

Fishery Management Series No.98-05

**Fishery Management Report for Sport Fisheries in the
Arctic-Yukon-Kuskokwim, Tanana River, and
Northwest Alaska Regulatory Areas, 1993-1994**

by

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Alaska Department of Fish and Game

Division of Sport Fish



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)		General		Mathematics, statistics, fisheries	
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, χ^2 , etc.
Kilometer	km			confidence interval	C.I.
Liter	L			correlation coefficient	R (multiple)
Meter	m			correlation coefficient	r (simple)
metric ton	mt			covariance	cov
Milliliter	ml			degree (angular or temperature)	°
Millimeter	mm			degrees of freedom	df
		Copyright	©	divided by	÷ or / (in equations)
Weights and measures (English)		Corporate suffixes:		equals	=
cubic feet per second	ft ³ /s	Company	Co.	expected value	E
Foot	ft	Corporation	Corp.	fork length	FL
Gallon	gal	Incorporated	Inc.	greater than	>
Inch	in	Limited	Ltd.	greater than or equal to	≥
Mile	mi	et alii (and other people)	et al.	harvest per unit effort	HPUE
Ounce	oz	et cetera (and so forth)	etc.	less than	<
Pound	lb	Exempli gratia (for example)	e.g.,	less than or equal to	≤
Quart	qt	id est (that is)	i.e.,	logarithm (natural)	ln
Yard	yd	Latitude or longitude	lat. or long.	logarithm (base 10)	log
Spell out acre and ton.		Monetary symbols (U.S.)	\$, ¢	logarithm (specify base)	log ₂ , etc.
		Months (tables and figures): first three letters	Jan,...,Dec	mid-eye-to-fork	MEF
Time and temperature		Number (before a number)	# (e.g., #10)	minute (angular)	'
Day	d	Pounds (after a number)	# (e.g., 10#)	multiplied by	x
Degrees Celsius	°C	Registered trademark	®	not significant	NS
Degrees Fahrenheit	°F	Trademark	™	null hypothesis	H_0
hour (spell out for 24-hour clock)	h	United States (adjective)	U.S.	percent	%
Minute	min	United States of America (noun)	USA	probability	P
Second	s	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	probability of a type I error (rejection of the null hypothesis when true)	α
Spell out year, month, and week.				probability of a type II error (acceptance of the null hypothesis when false)	β
				second (angular)	"
Physics and chemistry				standard deviation	SD
all atomic symbols				standard error	SE
Alternating current	AC			standard length	SL
Ampere	A			total length	TL
Calorie	cal			variance	Var
direct current	DC				
Hertz	Hz				
Horsepower	hp				
Hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
Volts	V				
Watts	W				

FISHERY MANAGEMENT SERIES NO. 98-05

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ARCTIC-YUKON-KUSKOKWIM, TANANA RIVER, AND NORTHWEST
ALASKA REGULATORY AREAS, 1993-1994**

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PREFACE

This report is organized into two major sections. Section I provides an overview of the Arctic Yukon Kuskokwim Region and its constituent regulatory management areas: the Tanana River Area; the Arctic Yukon Kuskokwim Area; and, the Northwest Alaska Area. Included is a description of how management activities are organized; a description of the Alaska Board of Fisheries (BOF) Process and regulatory schedule for these areas; an inventory of fisheries resources available; an historical perspective of sport angler effort and harvest within area waters; a description of stocking, research, management, and access program activities conducted; and a summary of major social and biological fisheries issues that may exist. Section II provides a more detailed summary of all the major fisheries in the AYK Region. Included are a description and historical perspective of each fishery; fishery management objectives if established; description of recent fishery performance; a description of recent Board of Fishery actions; a discussion of any social or biological issues that may be associated with each fishery; and a description of any ongoing or recommended directed research or management activities.

ABSTRACT

An estimated 220,972 angler days of sport fishing effort occurred in the AYK Region in 1993, of which 160,117 angler-days (approximately 72%) were expended in the Tanana Area. In 1994 it was estimated that 209,987 angler days of effort was expended in the AYK Region with 148,633 (71%) occurring in the Tanana Area. An estimated 151,551 and 153,010 fish were reported harvested in the AYK Region sport fishery for 1993 and 1994, respectively. A total of 105,711 were reported harvested in the Tanana Area in 1993 and 97,913 in 1994. Very good returns of chinook salmon together with increasing popularity of the chinook sport fishery, resulted in record sport harvests in 1993 and 1994 in the Chena River (733 and 993) and above average harvests (601 and 714) in the Salcha River. The estimated harvest of 48 coho salmon from the Delta Clearwater River in 1993 represents the lowest since 1988. In 1994, the estimated harvest was 509 coho salmon; similar to the 18-year average of 605 fish but about one-half the harvest of the 1986-1991 period. A three-year rehabilitation program was concluded in 1994 for the Arctic grayling fishery on the Chena River. The program combined catch and release regulatory controls with stocking of hatchery and pond reared Arctic grayling to supplement natural reproduction. Approximately 2.5 million fish of four species were stocked in waters of the Tanana Area. The Alaska Board of Fisheries considered 20 proposals concerning sport fishing regulations in the AYK Region during 1994.

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

SECTION I: MANAGEMENT AREA OVERVIEW

REGIONAL AREA DESCRIPTION

The AYK Region encompasses the majority of the landmass of the state of Alaska (Figure 1). Included within the region are some 1,061,000 km² of lands, some of the state's largest river systems (Yukon, Kuskokwim, Colville, and Noatak), thousands of lakes, and thousands of miles of coastline and streams. Regional coastline boundaries extend from Cape Newenham in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. The region as a whole is sparsely populated, with one dense population center located in the Tanana River valley. Fairbanks (population about 31,000) is the largest community. The Fairbanks North Star Borough Census Area contains about 85,000 people. Other population centers in the region include the Yukon-Koyukuk Census Area with 8,500 people, Nome Census Area with 8,300 people, Southeast Fairbanks Census Area with 6,000 people, Northwest Arctic Borough with 6,100 people, Wade Hampton Census Area with 5,800 people, and the North Slope Borough with 6,000 people, Alaska Department of Labor (ADL), 1991.

The State of Alaska sport fishery program divides the AYK Region into three separate fishery management areas; the Tanana Area, the Northwestern Area (Norton Sound and Kotzebue), and the AYK Area. The Tanana River drainage is a separate management area because it contains population centers that have greater impacts upon fishery resources. Intensive, stock specific studies have been required in the Tanana Area to provide needed biological information for fishery management because of higher fishery exploitation rates.

RURAL ALASKA SPORT FISHING

The vast majority of the AYK Region and its fishable waters occur away from highways and motor vehicle roads of any kind. Small communities are scattered along the major river systems

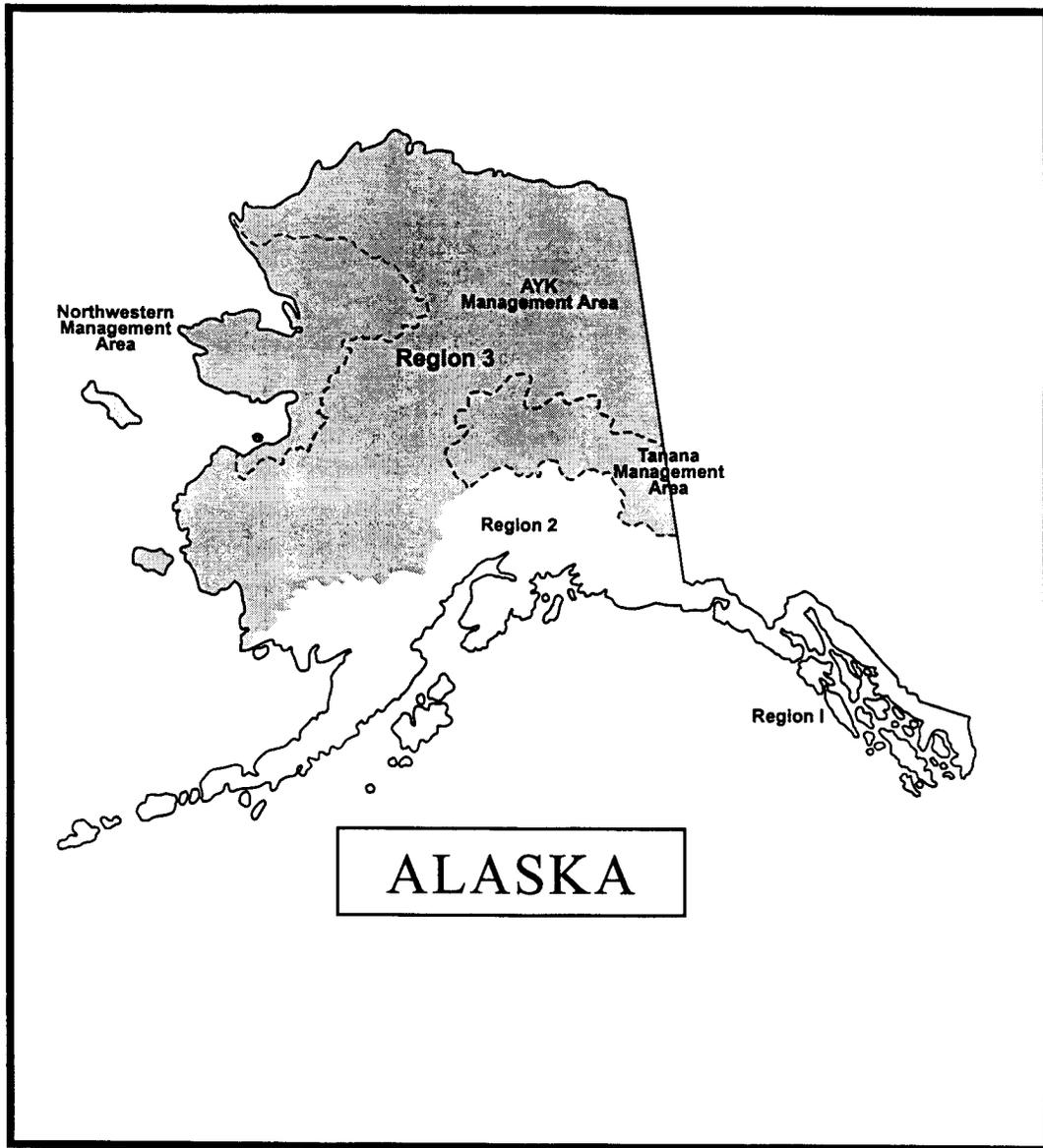


Figure 1.-The Arctic-Yukon-Kuskokwim Region. Dashed lines indicate boundaries between harvest reporting areas.

of Interior Alaska and along the coast of western Alaska as well. The communities are invariably located near water, either on a river or lake because of the importance of fish as a food source to native people historically and today. Native communities harvest a substantial amount of fish and game resources for personal subsistence use, but fishing is usually conducted with high catch-per-unit-of-effort gear types such as fish wheels and nylon gillnets. 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 because local residents usually fish under subsistence regulations and because the small amount of sport fishing done is usually conducted as a subsistence activity. Since statewide harvest estimates are based upon surveys of licensed sport fishers, the rural harvests may not be documented fully.

TANANA AREA DESCRIPTION

Prior to 1990, harvest reports for the Tanana Area included all southern drainages of the Yukon River from its confluence with the Tanana River, east to the Canadian border and including the Alaska portion of the Fortymile and Sixtymile River drainages, the entire Tanana River watershed, and the Alaska portion of the White River drainage. Beginning in 1990, only the Tanana River watershed is considered to be part of the Tanana Area for the purpose of harvest reporting (Figure 2). Harvest reports from all other portions of the upper Yukon River are now included in the AYK Area.

Arvey et al. (1995) provides a detailed description of the geography and geology of the Tanana Area.

ARCTIC, YUKON, AND KUSKOKWIM AREA DESCRIPTION

The AYK Management Area consists of some 562,000 km² (37% of the entire land area of Alaska) of extremely varied topography, climate, and zoogeography. Land ownership and jurisdictions fragment this huge area into a complex mosaic. The federal government is the major land manager through its jurisdiction over lands in National Parks and Preserves, National Wildlife Refuges, Wild and Scenic Rivers, as well as other classifications of federal lands. Native corporations, the State of Alaska and private lands comprise the remaining landmass. For purposes of reporting and organizing statistics in the Sport Fish Statewide Harvest Survey (SHS), the AYK Area is subdivided into three sub-areas; Yukon (Y), Kuskokwim (V), and Arctic (Z) (Figure 3).

Arvey et al. (1995) provides a detailed description of the geology and geography for each of the sub-areas within the AYK Management Area.

Yukon River Sub-area

The Yukon is the largest river in Alaska and its drainage constitutes the fifth largest in North America. The Yukon sub-area (statewide harvest Area Y; Figure 3) includes drainages of the Yukon River from the south slope of the Brooks Range to the Bering Sea, from Naskonat Peninsula north to Pastol Bay; and, from the Canadian border west to the Bering Sea. This sub-area does not include any portion of the Tanana or Kuskokwim rivers watersheds. Prior to 1990 the Lower Yukon and Kuskokwim rivers were combined into a single sub-area for Sport Fish Division reporting purposes. Separate harvest reporting for the two river drainages has been performed since 1990.

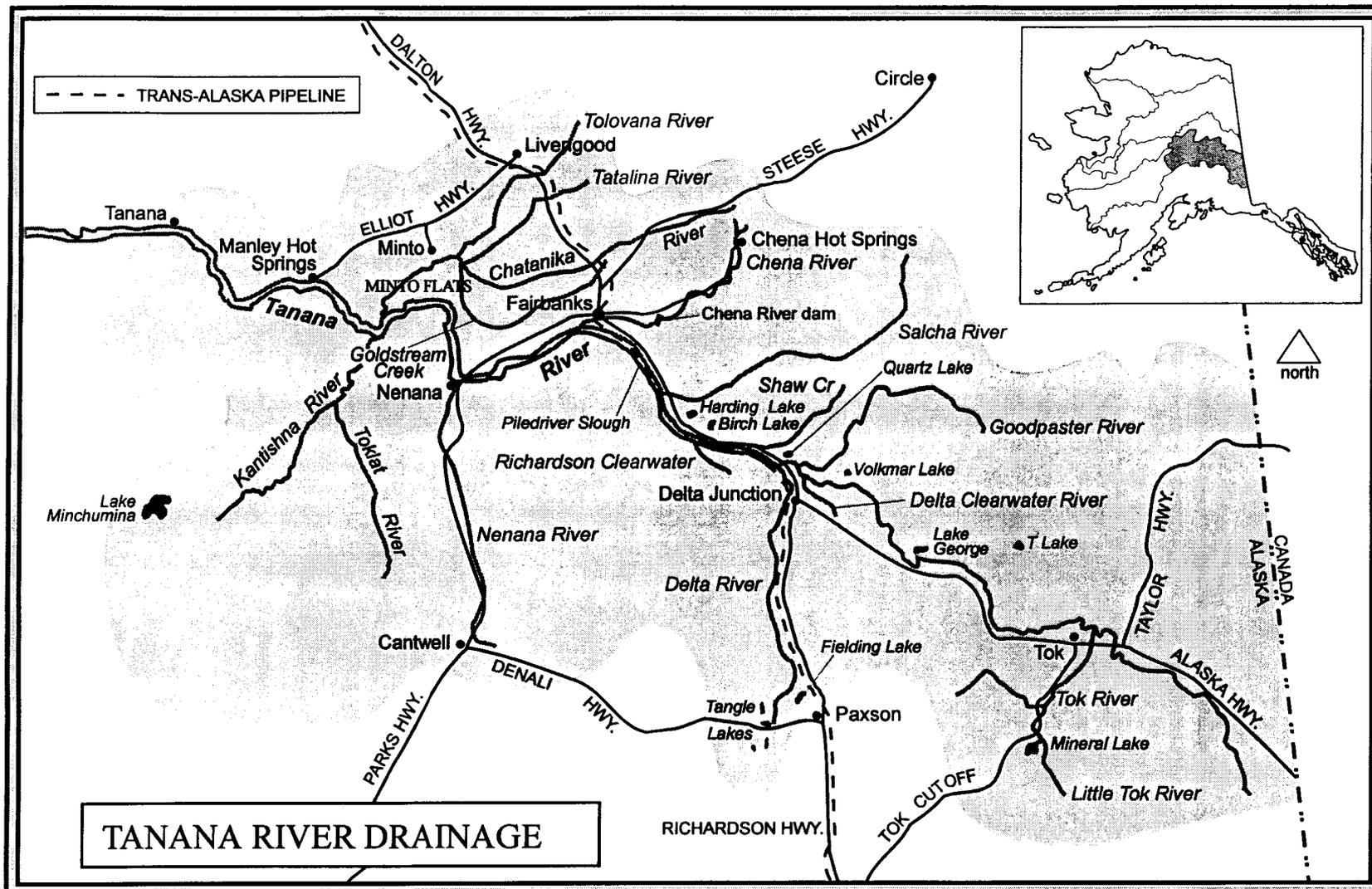


Figure 2.-The Tanana River Management Area.

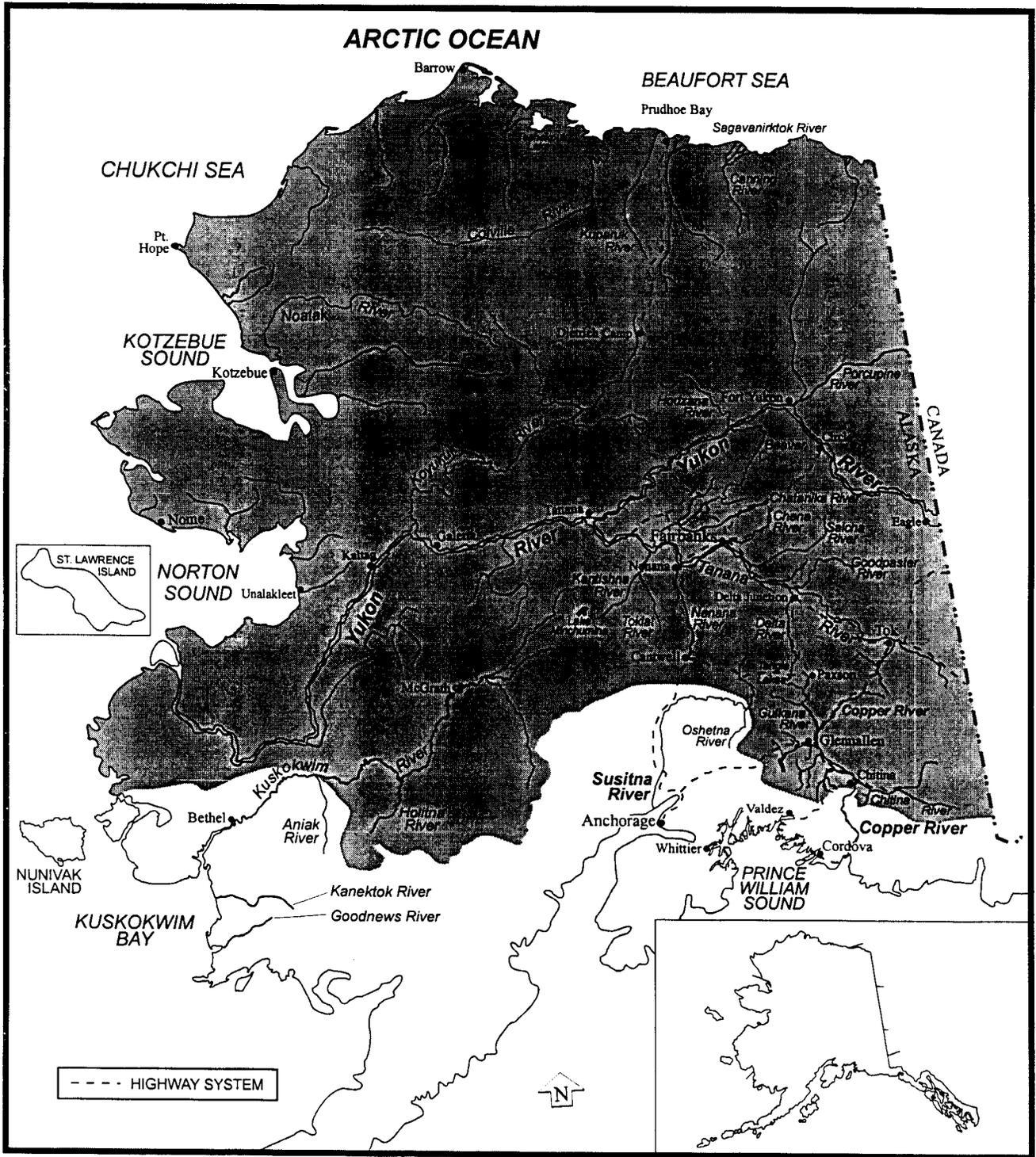


Figure 3.-The AYK Management Area.

Kuskokwim River Sub-area

The Kuskokwim River sub-area (Statewide harvest area V, Figure 3) includes the Kuskokwim River watershed and all waters flowing into Kuskokwim Bay inclusive of adjacent marine waters from Cape Newenham north to the Naskonat Peninsula (north of Nelson Island) and Nunivak Island¹.

North Slope Brooks Range Sub-area

The north slope of the Brooks Range sub-area (statewide harvest Area Z; Figure 3) includes all waters north of the Brooks Range flowing into the Beaufort and Chukchi Seas from Point Hope on the west to the Canadian border on the east including adjacent saltwater areas. Total landmass within this sub-area is approximately 209,800 km².

NORTHWEST ALASKA AREA DESCRIPTION

The Northwest Alaska sport fish management area includes all waters north of the Yukon River drainage, in Norton Sound, the Seward Peninsula, Kotzebue Sound including the major drainages of the Kobuk and Noatak rivers, and the eastern Chukchi Sea to Point Hope. The total landmass within this sub-area is approximately 173,500 km² (Figure 4).

Arvey et al (1995) provides a detailed description of the geology and geography of the Northwest Alaska Management Area.

Seward Peninsula/Norton Sound Sub-area

The Seward Peninsula-Norton Sound sub-area (statewide harvest Area W; Figure 4) includes all waters north of the Yukon River drainage and south of the Selawik River-Kotzebue Sound area and west of the Yukon-Koyukuk River drainages. This area includes the fresh and marine waters of Pastol Bay, Norton Sound and the Seward Peninsula, including Sparief Bay in Kotzebue Sound and the southern half of Eschscholtz Bay (ADF&G 1984).

Kotzebue Sub-Area

The Kotzebue Sub-Area (statewide harvest Area X; Figure 4) includes all waters and drainages of the Kotzebue area, including those of the Selawik, Kobuk, Noatak, Wulik, and Kivalina rivers. 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 including Point Hope (ADF&G 1984). The eastward limit of the sub-area extends to, but does not include, the Alatna River.

ALASKA BOARD OF FISHERIES ACTIVITIES

The process of developing appropriate fishing regulations continues each year both during the primary fishing seasons, as well as before and after. The following describes the salient features of that process which took place during 1993 and 1994.

¹ The Sport Fish Division assigns management responsibility for Kuskokwim Bay and Kuskokwim River waters upstream to Aniak to its Southcentral Region headquartered in Anchorage. Responsibility for these areas is assigned to Sport Fisheries staff stationed in Dillingham.

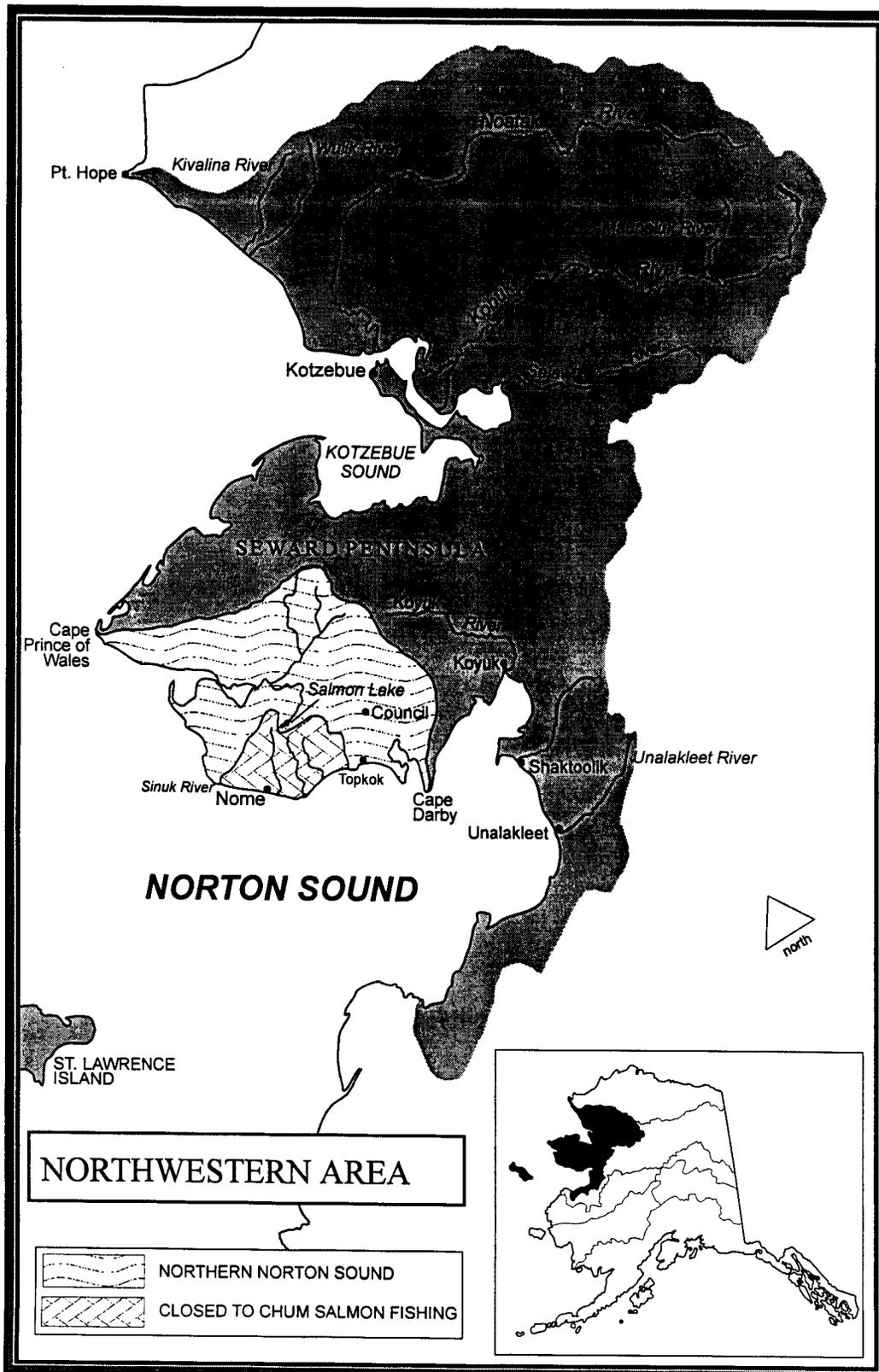


Figure 4.-The Northwestern Management Area.

Alaska Board of Fisheries

The Alaska BOF met in Anchorage from November 8 - 18, 1994 and considered 20 regulatory proposals for sport fishing that would have affected the Arctic-Yukon- Kuskokwim Region. Oral and written reports by staff of the Alaska Department of Fish and Game (ADF&G) and written and oral testimony by members of the public and by representatives of several Advisory Committees were provided during this meeting. The BOF adopted 16 of the 20 proposed regulation changes in either original or amended form, and took no action or failed to adopt four proposals. A summary of the proposals submitted for BOF action during the 1994 meeting are provided (Appendix A).

Advisory Committees

Public input concerning regulation changes are provided by several means, including direct testimony to the BOF, and by participation in local fish and game advisory committees. Local advisory committees have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes in the affected areas. Most active committees meet at least once a year, usually in the fall prior to Board meetings. Staff from the Division of Sport Fish and other divisions are often invited to attend the committee meetings. In this way, the public are afforded the opportunity for direct public interaction with Department staff involved with resource issues of local concern.

Several local advisory committees are active throughout the AYK Region : (1) in Western Alaska: Central Bering Sea, Lower Kuskokwim, Central Kuskokwim, Lower Yukon; (2) in Arctic Alaska: Norton Sound, Kotzebue, Northern Seward Peninsula, Upper Kobuk, Lower Kobuk, Noatak/Kivalina, Western Arctic, Eastern Arctic, St. Lawrence Island, Southern Norton Sound, and; (3) in Interior Alaska: Middle Nenana River, Delta, Eagle, Fairbanks, Lake Minchumina, Middle Yukon, Grayling/Anvik/Holy Cross, Koyukuk, McGrath, Ruby, Tanana/Rampart/Manley, Minto/Nenana, Upper Tanana/Forty Mile, and Yukon Flats.

During 1993-94 Sport Fisheries Division staff participated in meetings of the Fairbanks and Delta committees. Division of Commercial Fisheries staff handled most fisheries issues in Nome, Kotzebue, and in the lower Yukon and Kuskokwim River areas.

FISHERY RESOURCE INVENTORY

There are 17 fish species known in the Tanana Area of which 11 are commonly sought by sport anglers. They include: chinook salmon *Oncorhynchus tshawytscha*, coho salmon *Oncorhynchus kisutch*, chum salmon *Oncorhynchus keta*, Arctic grayling *Thymallus arcticus*, burbot *Lota lota*, lake trout *Salvelinus namaycush*, inconnu (sheefish) *Stenodus leucichthys*, least cisco *Coregonus sardinella*, humpback whitefish *Coregonus pidschian*, and northern pike *Esox lucius*. Rainbow trout *Oncorhynchus mykiss* are not native to the drainage, but have been stocked in several locations. Arctic char, coho salmon, Arctic grayling and lake trout have also been stocked in selected waters of the Tanana River drainage.

In addition to the species listed, wild stocks of Dolly Varden and Arctic char are important to sport fishing in many waters of the AYK Management Area. Wild stocks of rainbow trout occur as far upstream in the Kuskokwim River drainage as the Aniak River and its tributaries. Rainbow trout do not occur naturally in drainages north of the Kuskokwim River, although they have been stocked in two lakes of the AYK Area. Additional species of whitefish that are of importance to fisheries in the AYK Area include the broad whitefish, *Coregonus nasus*, Arctic

cisco, *Coregonus autumnalis*, and Bering cisco, *Coregonus laurettae*. All other species listed under the Tanana Area are also found in the AYK Area. Marine species such as Pacific halibut *Hippoglossus stenolepis*, Pacific cod *Gadus macrocephalus*, saffron cod *Eleginus gracilis*, rainbow smelt *Osmerus mordax*, Dungeness crab *Cancer magister*, Tanner crab *Chionectes opilio*, King crab *Paralithodes camtschatica*, and others occur in coastal waters from Bristol Bay northwards, and are occasionally harvested by sport anglers.

In the NW Management Area, pink salmon are important to sport fishing in many waters of Norton Sound and the Seward Peninsula. Trophy sheefish are found in the Kobuk River, and trophy Dolly Varden are taken in the Noatak and Wulik Rivers. Alaska's highest quality sheefish and Dolly Varden fisheries, as measured by abundance and fish size, are within this area.

SPORT ANGLER EFFORT

From 1982 through 1994, anglers in the AYK Region have expended an average of 211,324 angler-days, 10% of the total statewide effort (Table 1). The vast majority (average 73%) of sport effort in the region has occurred in the Tanana Regulatory Area. This dominance reflects the higher human population density in the Tanana River Valley, rather than higher levels of fish abundance.

Estimates of effort in most of the sub-areas have remained more or less stable since 1982 (Table 1). The fraction of statewide effort expended in the AYK Region has declined from over 12% in 1982 to approximately 8% in 1994. Sport fishing effort by location in the AYK Region by sub-area, from 1980 to 1994, is provided (Appendix B).

SPORT FISH HARVEST AND CATCH AND RELEASE

The average annual harvest for the Tanana Area for the 18-year (1977-1994) period has been 146,520 fish. Sport harvest of all species since 1977 in the Tanana Area reached an apparent peak in 1988 and 1989 when over 198,000 and 188,000 fish were harvested (Table 2). The estimated harvest in 1992 of approximately 85,000 fish was the lowest on record, which may reflect the unusually short, cool summer conditions. Arctic grayling, stocked rainbow trout, stocked landlocked coho salmon, northern pike, and whitefish have comprised the largest fraction (94%) of the average sport harvest.

Sport harvest of all species in the AYK and NW Management Areas (combined sub-areas of Norton Sound/Seward Peninsula, Northwest Alaska, North Slope, Yukon River and Kuskokwim River) has been an average of 59,030 fish annually since 1977 (Table 3). Peak harvests were recorded in 1982 and 1983 when more than 95,000 and 97,000 fish were harvested. Estimated harvests in 1993 and 1994 of 49,882 and 54,763 fish represent 85% and 93% of the 18 year average annual harvest. These harvests in the combined areas, have been dominated by Arctic grayling, Dolly Varden, pink salmon, northern pike and coho salmon which have accounted for approximately 73% of the mean annual harvest in the AYK and NW Areas.

Sport catch estimates since 1990 are provided in Tables 2 and 3. Numbers reported as catch include fish that are caught and kept (harvested) and those that are caught and released. On

Table 1.—Sport angling effort in waters of the Arctic-Yukon-Kuskokwim Region, 1982-1994.

Arctic-Yukon-Kuskokwim Region														
Year	Tanana Area		A-Y-K Area				Northwest Alaska				Total			
	Angler-Days ^a	% ^b	Angler-Days	%	Angler-Days	%	Angler-Days	%	Angler-Days	%	Angler-Days	%	Angler-Days	%
1982	150,530	9.3	4,879	0.3	11,034	0.7	12,244	0.8	13,198	0.8	6,906	0.4	198,791	12.2
1983	144,981	8.4	5,738	0.3	11,070	0.6	12,429	0.7	16,944	1.0	7,963	0.5	199,125	11.5
1984	145,142	7.8	8,344	0.4	6,358	0.3	13,970	0.7	17,436	0.9	7,791	0.4	199,041	10.7
1985	135,745	7.0	4,490	0.2	8,670	0.4	11,358	0.6	19,919	1.0	6,701	0.3	186,883	9.6
1986	144,814	7.0	4,779	0.2	9,381	0.5	11,319	0.5	18,107	0.9	6,313	0.3	194,713	9.4
1987	155,346	7.2	5,256	0.2	7,017	0.3	17,856	0.8	21,413	1.0	10,221	0.5	217,109	10.1
1988	173,706	7.5	2,541	0.1	8,261	0.4	23,494	1.0	20,278	0.9	5,279	0.2	233,559	10.1
1989	185,715	8.2	4,118	0.2	10,712	0.5	16,457	0.7	17,692	0.8	4,932	0.2	239,626	10.6
1990	184,887	7.5	3,764	0.2	15,539	0.6	15,858	0.6	21,799	0.9	3,782	0.2	245,629	10.0
1991	155,662	6.3	7,291	0.3	10,749	0.4	13,055	0.5	23,622	1.0	9,543	0.4	219,922	9.0
1992	120,848	4.8	4,940	0.2	12,831	0.5	14,404	0.6	22,684	0.9	6,145	0.2	181,852	7.2
1993	160,117	6.3	5,600	0.2	14,011	0.6	14,505	0.6	18,930	0.8	7,809	0.3	220,972	8.6
1994	148,633	5.5	5,407	0.2	12,872	0.6	18,117	0.9	18,922	0.9	6,036	0.3	209,987	7.7
Average														
1982-94	154,317	7.1	5,165	0.2	10,400	0.5	15,005	0.7	19,303	0.9	6,879	0.3	211,324	9.7

^a Measured as number of angler-days per year. One angler-day of effort equates to a single angler fishing for any portion of a day.

^b Percentage of statewide effort.

Table 2.—Tanana Area sport fish harvests by species, 1977-1994.

Year	Total	Salmon					Non-Salmon							Other Fish
		Chinook	Coho ^a	Coho ^b	Chum	Rainbow Trout	Lake Trout	Char ^c	Grayling	Northern Pike		Whitefish	Burbot	
1977	88,938	100	94	7,151	300	5,992	1,471	877	57,793	9,345	3,378	1,547	158	732
1978	129,789	163	139	22,412	158	6,406	603	524	83,275	7,838	6,573	1,383	234	81
1979	129,042	515	25	36,073	219	5,186	946	364	70,243	7,975	5,159	1,979	279	79
1980	146,981	941	67	25,733	483	19,584	1,264	524	80,150	9,452	5,987	2,700	96	0
1981	179,986	763	45	57,294	595	24,571	1,721	572	75,288	9,941	4,873	4,122	93	108
1982	179,122	984	52	43,374	698	26,186	3,104	482	81,753	9,822	8,643	3,887	127	10
1983	176,110	1,048	147	34,255	649	20,664	2,937	293	92,363	10,225	8,311	5,040	157	21
1984	178,299	338	831	29,245	585	34,022	2,104	350	83,626	9,607	11,658	5,556	338	39
1985	183,190	1,356	796	41,042	1,255	33,432	2,984	1,230	63,560	12,090	20,230	4,795	420	0
1986	149,202	781	1,374	24,061	693	31,270	713	200	45,981	11,934	26,810	5,142	72	171
1987	139,907	502	1,231	26,566	620	31,824	652	36	38,480	9,471	26,435	3,855	235	0
1988	198,533	853	2,237	32,342	491	78,345	2,221	909	52,569	11,986	11,775	3,733	982	0
1989	188,045	963	1,596	18,614	1,134	74,675	1,932	913	54,823	11,330	16,935	4,357	643	130
1990	128,680	439	1,719	13,943	55	64,143	896	830	28,414	7,348	6,891	3,799	169	34
1991	152,774	630	2,345	22,125	588	72,024	1,978	2,891	33,778	12,476	739	2,739	158	303
1992	84,787	118	1,115	14,019	690	37,547	993	2,088	14,983	6,148	3,246	3,620	184	0
1993	105,711	1,573	278	15,734	371	49,693	1,939	3,873	17,658	7,712	984	5,717	100	79
1994	97,913	1,871	1,165	10,350	260	33,400	1,582	1,799	24,754	16,299	940	5,165	166	175
Mean	146,520	768	848	26,347	547	36,050	1,669	1045	55,532	10,158	9,419	3,843	256	109
Percent		0.5	0.6	18.0	0.4	25.0	1.0	1.0	38.0	7.0	6.0	3.0	0.2	0.1
Catch^d														
1990	427,037	1,332	4,042	37,322	412	154,995	2,433	3,615	171,058	37,524	8,663	5,116	390	135
1991	375,806	1,199	6,811	33,382	1,195	136,345	4,162	6,175	146,892	33,461	1,719	3,574	339	552
1992	305,394	204	2,785	30,546	2,272	96,202	4,656	6,897	115,633	36,643	3,734	4,373	702	747
1993	458,514	5,231	3,858	31,017	2,330	144,699	7,414	11,084	193,088	76,692	1,363	6,657	314	187
1994	475,539	2,675	4,962	22,799	1,351	91,377	4,415	5,472	243,937	88,702	2,793	6,397	274	416
Mean	408,458	2,128	4,502	31,112	1,512	124,711	4,616	8,630	174,115	54,604	3,654	5,223	404	407
Percent		tr. ^e	1.0	8.0	tr.	31.0	1.0	2.0	43.0	13.0	1.0	1.0	tr.	tr.

^a Anadromous salmon.

^b Landlocked coho and chinook salmon.

^c Includes Arctic char and Dolly Varden

^d Information available from 1990-1994 only. Anglers may have harvested or released fish tallied as “catch”.

^e tr = trace; very low reported harvest.

Table 3.-Arctic-Yukon-Kuskokwim Area^a sport fish harvests by species, 1977-1994.

Year	Salmon										Non-Salmon								
	Total	Chinook	Coho ^b	Sockeye	Pink	Chum	Lake Trout	Rainbow Trout	Char ^c	Grayling	Northern Pike	Whitefish	Burbot	Sheefish	Smelt	Halibut	Other Fish	King Crab	
Harvest																			
1977	23,343	202	879	69	2,524	276	798	223	2,410	9,375	2,014	776	226	1,089	NR	NR	2,482	NR	
1978	36,248	932	1,308	85	8,328	1,834	497	362	4,014	11,289	3,915	909	506	1,057	NR	NR	1,212	NR	
1979	45,015	644	2,958	126	2,918	1,482	655	401	8,144	19,229	4,004	855	118	1,263	NR	NR	2,218	NR	
1980	59,569	939	3,469	112	7,844	2,290	1,025	835	8,273	20,396	6,190	1,705	663	2,315	NR	NR	3,513	NR	
1981	52,343	1,112	2,087	117	3,118	3,045	1,100	982	8,176	20,892	5,184	576	684	2,146	NR	NR	3,124	NR	
1982	95,419	1,530	5,909	430	14,214	5,083	2,023	796	13,647	27,043	7,435	3,708	1,896	3,154	NR	NR	8,551	NR	
1983	97,976	2,649	5,785	261	5,286	4,049	1,157	1,783	20,324	30,800	8,609	4,746	555	3,166	NR	NR	8,806	NR	
1984	66,784	1,481	11,205	650	8,712	2,689	1,520	1,455	12,882	15,516	4,610	234	377	3,609	NR	NR	1,844	NR	
1985	57,919	1,331	2,396	169	1,206	1,781	2,370	659	13,430	17,666	3,613	630	420	2,100	8,750	62	1,336	NR	
1986	67,624	2,079	7,319	439	3,404	3,643	2,537	504	10,173	19,744	7,062	4,960	469	3,649	464	NR	1,178	NR	
1987	61,770	1,691	7,210	1,364	1,322	2,148	461	592	12,333	19,476	4,751	724	162	2,362	7,080	36	0	NR	
1988	65,838	2,965	9,713	1,528	3,859	3,201	509	1,599	11,238	16,302	7,838	1,855	145	2,239	2,476	NR	371	NR	
1989	66,075	2,450	8,655	456	3,765	4,748	1,955	757	13,359	17,215	5,853	1,997	537	1,663	2,424	NR	241	NR	
1990	45,383	1,366	4,819	818	7,994	2,091	847	435	7,431	9,092	4,982	810	1,684	581	1,709	144	580	NR	
1991	68,953	1,333	8,317	631	1,865	2,570	774	1,055	16,880	18,576	8,295	2,197	316	2,098	1,818	NR	1,480	748	
1992	47,698	1,571	7,255	378	8,434	2,303	1,198	404	5,374	7,321	5,154	607	633	2,749	2,001	33	1,136	1,147	
1993	49,882	6,354	6,467	725	2,277	2,075	659	486	9,940	8,201	4,523	759	749	1,519	3,700	54	1,394	NR	
1994	54,763	3,158	9,253	912	7,228	2,500	249	299	7,919	8,377	3,459	514	538	1,345	7,506	120	1,386	NR	
Mean	59,030	1,877	5,834	515	5,239	2,656	1,130	757	10,330	16,473	5,416	1,587	593	2,117	2,107	25	2,270	105	
Percent		3	10	1	9	4	3	1	18	28	9	3	1	4	4	NR	4	NR	
Catch^d																			
1990	217,831	7,118	13,533	4,005	23,252	11,755	6,455	12,436	38,671	63,308	27,058	2,276	1,684	2,970	1,709	188	1,413	0	
1991	228,246	3,449	16,207	4,231	4,957	7,994	2,438	11,546	66,060	76,156	24,652	2,507	326	3,650	1,818	0	1,507	748	
1992	202,805	6,634	18,569	2,086	35,812	12,984	3,801	5,540	36,889	44,210	24,087	993	674	5,885	2,001	33	1,298	1,309	
1993	242,489	13,417	11,098	3,762	7,559	14,972	2,369	12,646	73,376	67,817	21,684	1,469	834	6,352	3,700	71	1,363	0	
1994	217,633	13,792	14,410	5,012	18,876	15,173	2,622	8,258	39,752	47,990	32,350	1,207	805	5,688	7,506	130	4,062	0	
Mean	221,801	8,882	14,763	3,819	18,091	12,576	3,537	10,085	50,950	59,896	25,966	1,690	865	4,909	3,347	84	1,929	411	
Percent		4	7	2	8	6	2	5	23	27	12	1	0	2	2	0	1	0	

^a Includes sub-areas Norton Sound/Seward Peninsula, Northwest, North Slope, Yukon River, and Upper Kuskokwim River

^b Includes only anadromous salmon.

^c Includes Arctic char and Dolly Varden.

^d Information available from 1990-1994 only. Anglers may have harvested or released fish tallied as “catch”.

average, for the five years of record, a higher proportion (72%) of fish caught in the combined NW and AYK Areas are released, than in the Tanana Area (59%). The overall proportion of catch and release activity varies by species, with burbot and whitefish for example, being frequently caught and harvested, rather than for Arctic grayling or rainbow trout (Figure 5).

COMMERCIAL AND SUBSISTENCE FISH HARVESTS

Important subsistence and commercial fisheries exist in the AYK Region and form an economic base for income and employment in many local communities. Commercial and subsistence harvests for salmon, herring, halibut and crab are much larger than sport harvests for those species. Extremely limited commercial fisheries exist for freshwater species such as sheefish, burbot, northern pike and whitefish, so that the majority of the freshwater harvest is for subsistence and sport use. Personal use fisheries are also allowed, and account for a small proportion of the salmon harvests except in the Tanana Area and in the Yukon Area near the Dalton Highway bridge, where larger personal use harvests occur.

Salmon harvests for subsistence and commercial use are relatively less important in the North Slope sub-area than in the other sub-areas of the AYK Region, mainly because salmon are only sparsely distributed north of Point Hope on the Chukchi Sea coast. Harvests are dominated by chum salmon in all sub-areas except in the Kuskokwim Area (Table 4), where coho salmon comprise a slightly larger proportion of the harvest. Chinook salmon, while less abundant, are the most important fish for commercial sale and for subsistence in many parts of the region. Sockeye salmon are taken commercially in the Kuskokwim Bay sub-area, especially in the Kuskokwim Bay subdistricts of Quinhagak and Goodnews Bay, but the species is almost absent north of the Kuskokwim River. Pink salmon occur throughout the AYK Region in streams near the coast, but, while numerically dominant in some years, the species is not exploited to a great extent in commercial or subsistence fisheries. Returns of pink salmon to Norton Sound have been estimated to be in the tens of millions in some years, during which times this species becomes an important sport fish.

Commercial catches have averaged some 3 million salmon annually of all species in the AYK Region from 1977-1994.

STOCKING PROGRAM INVENTORY

Selected waters (lakes, ponds, and Piledriver Slough) of the Tanana River drainage are stocked on a continuing basis with rainbow trout, coho salmon, Arctic grayling, chinook salmon, lake trout, and Arctic char. No anadromous releases are conducted as part of this program. Objectives of the fish stocking program in the Tanana River drainage are:

1. reduce harvest pressure on some wild stocks;
2. provide angling opportunity for increasing numbers of anglers;
3. diversify angling opportunity; and,
4. rehabilitate depleted wild stocks.

Lake stocking in the Tanana River valley takes place over an approximate 130,000 km² area, mostly near communities and along the road system, but also in a number of remote locations accessible only by off-road vehicle (ORV), dog team, or airplane. About half of the annual sport effort on stocked lakes takes place during the winter on the larger road accessible lakes.

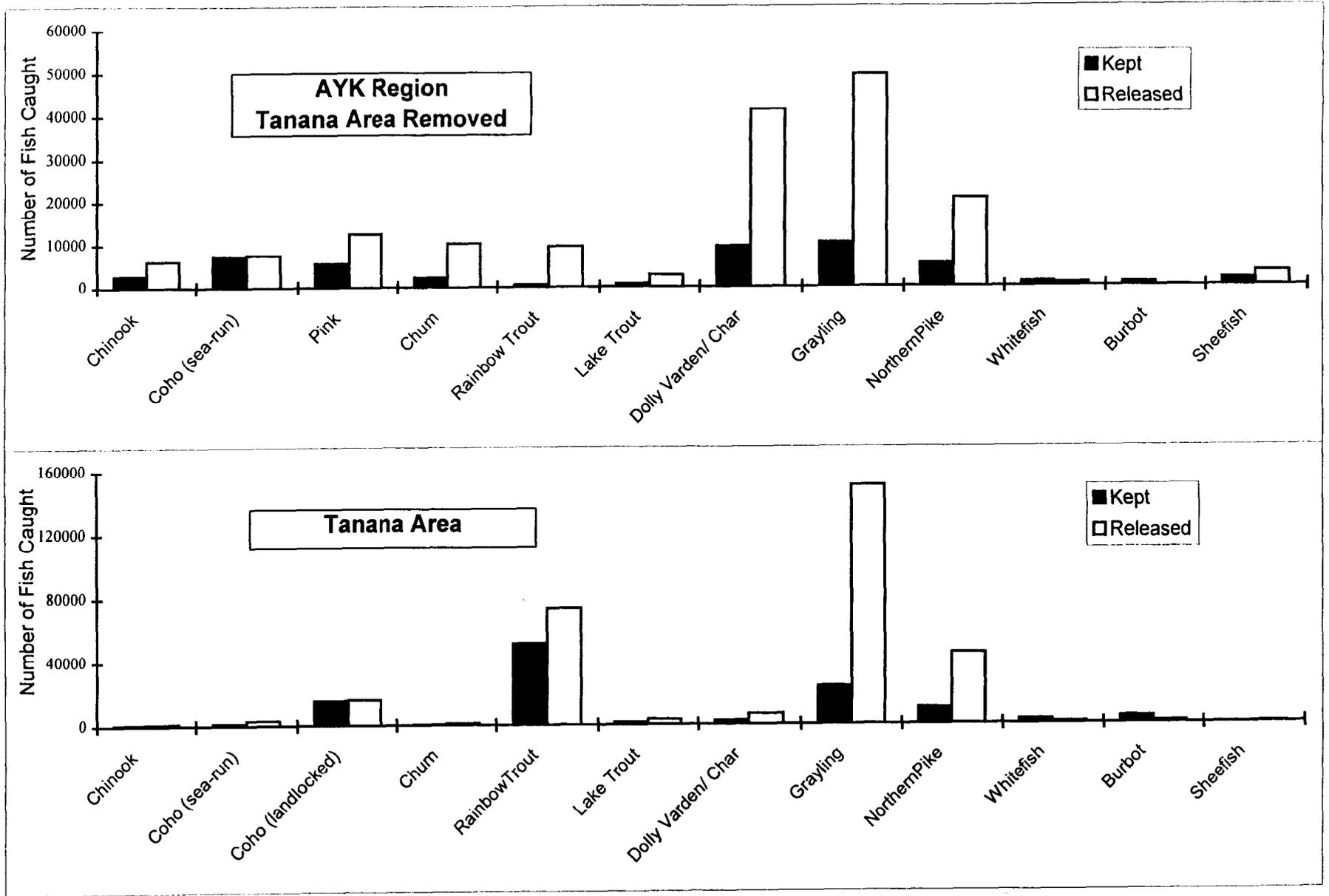


Figure 5.-Catch and Release data for the A-Y-K Region, 1990-1994.

Table 4.-Commercial harvest (thousands of fish) of salmon in the AYK Region, 1977 - 1994.

Year	Area					Grand Total
	Tanana River	Yukon River ^a	Kuskokwim River ^b	Norton Sound	NW Alaska	
Chinook Salmon Harvest:						
1977	1,008	95,749	58,256	4,500	tr.	159,513
1978	635	95,533	63,194	9,819	tr.	169,181
1979	772	126,901	53,314	10,706	tr.	191,693
1980	1,947	152,038	48,242	6,311	tr.	208,538
1981	987	157,031	79,378	7,929	tr.	245,325
1982	981	122,663	79,816	5,892	tr.	209,352
1983	911	146,999	93,676	10,308	tr.	251,894
1984	867	119,037	74,006	8,455	tr.	202,365
1985	1,142	145,046	74,083	19,491	tr.	239,762
1986	950	99,020	44,972	6,395	tr.	151,337
1987	3,338	131,422	65,558	7,080	tr.	207,398
1988	762	100,659	74,552	4,096	tr.	180,069
1989	1,741	100,099	67,003	5,707	tr.	174,550
1990	2,156	93,618	84,706	8,895	tr.	189,375
1991	1,072	105,344	48,170	6,068	tr.	160,654
1992	752	120,419	67,597	4,541	tr.	193,309
1993	1,445	92,665	26,636	8,972	tr.	129,718
1994	2,606	111,234	27,345	5,285	tr.	146,470
Mean (%)	1,337 (1.0)	117,527 (62.0)	62,806 (33.1)	7,803 (4.1)		189,472
Chum Salmon Harvest:						
1977	22,990	769,901	298,959	257,325	195,895	1,545,070
1978	59,996	1,271,320	282,044	531,948	111,533	2,256,841
1979	63,737	1,134,208	297,167	350,401	141,623	1,987,136
1980	58,657	1,305,508	561,483	444,337	367,284	2,737,269
1981	63,472	1,693,965	485,635	441,734	677,239	3,362,045
1982	30,530	911,475	325,471	511,208	417,790	2,196,474
1983	61,517	1,241,614	306,554	456,420	175,762	2,241,867
1984	77,204	999,396	488,482	342,159	320,206	2,227,447
1985	10,805	1,093,477	224,680	180,200	521,406	2,130,568
1986	54,703	1,274,166	349,268	230,400	261,436	2,169,973
1987	11,060	611,481	603,274	136,283	109,467	1,471,565
1988	65,425	1,692,046	1,443,916	225,132	352,915	3,779,434
1989	03,429	1,638,443	802,199	92,811	254,617	2,891,499
1990	65,762	586,128	522,535	131,665	163,263	1,469,353
1991	68,341	840,886	501,692	156,789	239,923	1,807,631
1992	26,250	529,987	436,506	83,394	289,184	1,365,321
1993	3,705	100,411	94,937	53,562	73,071	252,615
1994	35,803	230,937	360,893	18,290	153,452	645,923
Mean (%)	43,521 (2.1)	955,853 (49.1)	465,872 (23.0)	258,003 (12.7)	268,115 (13.2)	2,029,891

-continued-

Table 4.-Page 2 of 2.

Year	Area					Grand Total
	Tanana River	Yukon River ^a	Kuskokwim River ^b	Norton Sound	NW Alaska	
Coho Salmon Harvest:						
1977	1,284	37,579	263,728	3,690	NR	306,281
1978	3,066	23,086	247,271	7,335	NR	280,758
1979	2,791	14,374	208,683	31,438	NR	357,286
1980	1,226	2,519	327,908	29,842	NR	361,495
1981	2,284	21,396	278,587	31,562	NR	333,829
1982	7,780	29,396	567,451	91,690	NR	696,317
1983	6,168	7,132	249,018	49,735	NR	312,053
1984	7,688	74,252	829,965	67,875	NR	979,780
1985	11,762	45,910	382,096	21,968	NR	461,736
1986	441	46,814	736,910	35,600	NR	819,765
1987	NR	NR	478,594	24,279	NR	502,873
1988	13,972	72,640	623,719	37,214	NR	747,545
1989	16,084	67,269	556,312	44,091	NR	683,756
1990	14,804	27,890	445,062	56,712	NR	544,468
1991	9,774	93,406	556,818	63,647	NR	723,645
1992	7,979	NR	772,449	105,418	NR	885,846
1993	NR	NR	686,570	43,283	NR	729,853
1994	4,451	NR	856,100	102,140	NR	962,691
Mean (%)	6,197 (1.0)	28,767 (4.8)	503,736 (84.8)	47,084 (7.9)		593,888

^a Yukon River in Alaska, exclusive of Tanana River

^b Kuskokwim River and Kuskokwim Bay.

NR = no harvest or catch reported.

tr = trace; very low reported harvest.

The ADF&G stocking program in the Interior began in the mid-1950's when barren lakes along the road system were stocked with rainbow trout or salmon. Between 1968 and the early 1980's, 15 lakes (including Birch and Quartz lakes) were chemically treated to eradicate endemic fish populations (Doxey 1987).

Throughout the 1970's, the ability of hatcheries to provide stocked fingerlings steadily increased as fisheries enhancement received growing emphasis. Native Alaska rainbow trout brood stocks were developed when the importation of eggs from outside the state was discontinued in the late 1970's. As suitable brood stocks were developed and new hatcheries came on line, numbers of available stocked fish increased so that by 1985, average annual harvest and effort levels for stocked waters had risen by more than 40% and 20%, respectively (Doxey 1987).

The growth and success of the interior Alaska stocking program has been largely due to the development of, and production from, Alaska state hatcheries, particularly the Clear Hatchery, located about 145 km south of Fairbanks at the Clear Air Force Station and the Fort Richardson hatchery near Anchorage. The Clear Hatchery program began in 1977, with an initial mission to experimentally incubate, rear and release chum salmon to determine whether large scale enhancement of salmon would be feasible under conditions found in interior Alaska. In recent years, production of sport fish species has taken precedence over anadromous salmonids, and a large proportion of its output consists of fingerling and sub-catchable rainbow trout, coho salmon, and Arctic grayling. In 1994, the facility had a capacity of about 9.0 million eggs.

Success of the stocking program is evaluated annually. The level of evaluation varies according to the size and accessibility of the lake and the importance and intensity of the sport fishery. Minimal evaluations address the question of whether the stocked fish survived and are providing sport fishing. More comprehensive evaluations provide limnological data, growth rate data, and fishery statistics such as CPUE, population estimates, comparison of performance between species, and other parameters.

Stocking Results; 1993-1994

Nearly 1.5 million fish were stocked in 1993 and 1.05 million in 1994 (Table 5, Appendix C). The resulting fisheries comprised a minimum of 42% and 44% of the sport angling effort, and 68% and 49% of the fish harvested in the Tanana River drainage during 1993 and 1994, respectively (Skaugstad et al. 1995; C. Skaugstad, Alaska Dept. of Fish and Game, Fairbanks, personal communication).

The majority of the effort and harvest occurs at Quartz, Chena, and Birch lakes, 67% of the total harvest; and Piledriver Slough, which are the four major stocked waters. In 1993, 66% of the total effort directed toward stocked species occurred in these waters. In 1994, 62% of the effort and 70% of the harvest occurred in these four waters. The remainder of the effort and harvest produced by ADF&G stocking programs occurred in more than 80 smaller lakes.

1993-1994 Rehabilitation of Chena River Arctic Grayling Stocks

The stocking program took on a new dimension in 1992 when a rehabilitation program for Arctic grayling was initiated in the Chena River. The rehabilitation program includes regulatory actions designed to promote stock conservation as well as releases of hatchery and pond-raised Arctic grayling to supplement natural production. The proposed rehabilitation program was designed to

Table 5.-Summary of stocking by species and area for Tanana River Valley waters in 1993 and 1994.

AREA	Species	Lifestage	1993	1994
All	Arctic char	Brood stock	5,032	0
		Catchable	16,000	5,193
		Subcatchable	0	45,728
		Fingerling	180,880	35,900
	Arctic grayling	Catchable	68,586	65,835
		Fingerling	91,931	69,435
		Fry	0	0
	Chinook salmon	Catchable	30,638	13,988
	Coho salmon	Subcatchable	25,645	0
		Fingerling	322,400	205,838
		Fry	4,400	0
	Lake trout	Fingerling	0	52,603
	Rainbow trout	Brood stock	1,588	1,257
		Catchable	84,885	45,095
Subcatchable		15,956	44,192	
Fingerling		631,390	461,950	
Total			1,479,331	1,047,014

Delta	Arctic char	Subcatchable	0	400
		Fingerling	171,380	35,000
	Arctic grayling	Fingerling	5,200	5,500
	Chinook salmon	Catchable	12,568	0
	Lake trout	Fingerling	0	38,653
	Rainbow trout	Catchable	455	2,000
		Subcatchable	0	0
		Fingerling	565,774	400,415
	Coho salmon	Subcatchable	7,655	0
		Fingerling	160,600	116,704
Delta Total			923,632	598,672

Fairbanks	Arctic char	Brood stock	5,032	0
		Catchable	16,000	5,193
		Subcatchable	0	45,328
		Fingerling	9,500	900

-continued-

Table 5.-Page 2 of 2.

AREA	Species	Lifestage	1993	1994
Fairbanks (cont'd)	Arctic grayling	Catchable	68,586	65,835
		Fingerling	86,731	63,935
		Fry	0	0
	Chinook salmon	Catchable	18,070	13,988
	Lake trout	Fingerling	0	13,950
	Rainbow trout	Brood stock	1,588	1,257
		Catchable	84,430	43,095
		Subcatchable	15,956	44,192
		Fingerling	65,616	61,535
	Coho salmon	Fingerling	161,800	89,134
		Subcatchable	17,990	0
Fry		4,400	0	
Fairbanks Total			555,699	448,342

last three years, after which, fishery managers would enact fishing regulations to ensure sustained yield of the stock.

Fertilized Arctic grayling eggs were taken from the Chena River stock for use in supplementing natural production in May 1992 and 1993. The eggs were transferred to Clear Hatchery where they were incubated, hatched, and reared for about a year. The first lot (1992 brood year) of 64,936 hatchery-reared Arctic grayling were released at seven locations along the lower 160 km of the Chena River on June 1-11, 1993. Prior to release, each fish was marked (for future identification) by complete removal of the left ventral fin. Average fork length prior to release was 212 mm and average weight was 97 g. A second year stocking (the 1993 brood year) of approximately 61,435 fish on June 7-30, 1994 followed this procedure. These fish averaged 208 mm fork length, weighed an average of 94 g and were marked by the complete removal of the right ventral fin.

Subsequent evaluation of the 2-year rehabilitation effort was done as part of the annual stock assessment for the Arctic grayling population in the Chena River. During an abundance estimate of Arctic grayling in the lower 152 km of the lower Chena River, conducted in July 1993, only 33,061 (51% survival) hatchery fish could be accounted for (Clark 1994). This reduction is considered to be higher than expected given the short time (between 4 and 6 weeks) at large. Conditions during release appeared to be optimal, with low stream flows and water temperatures approximately that of the rearing facility at Clear Hatchery. The number of hatchery-reared grayling within the lower 152 km of the Chena River continued to decline to about 3,700 as indicated in the abundance estimate conducted in July 1994, (approximately one year after stocking). This represents a total survival rate from the time of initial stocking in June 1993 of 5.7% and an overwinter survival rate of 11.2%, (from July 1993 to July 1994). Survival of these age-2 hatchery-reared fish was much lower than expected given the size of fish at release (100 g), genetic origin (Chena River brood), water conditions during release (low, warm water), and lack of consumptive harvest. Clark (1994) reported that there was some disorientation of the fish for approximately the first hour after release. Furthermore, anecdotal information suggests that some hatchery-reared fish moved downstream and into tributaries of the mainstem Chena River, thus avoiding being detected in the mark/recapture abundance estimate. The average growth of hatchery-reared fish Floy tagged in 1993 and recaptured in 1994 was 9 mm (Clark 1995), while growth for wild Arctic grayling of this size (approximately 225 mm) is 25 mm (Clark 1994). Lack of growth, downstream movements, and disorientation of hatchery-reared fish are causal mechanisms thought to have contributed to the high mortality of releases.

The performance of the second (1994) release of hatchery-reared Arctic grayling into the Chena River was similar to the initial stocking. A total of 61,435 Arctic grayling were stocked into the Chena River in June of 1994. An abundance estimate conducted in July 1994 (approximately 30 days after stocking) accounted for 33,061 (survival rate of 68%) hatchery fish present in the lower 152 km of the Chena River. Future monitoring of both the 1993 and 1994 cohorts of hatchery-reared fish will continue as part of the annual stock assessment studies of the Chena River Arctic grayling.

RESEARCH AND MANAGEMENT ACTIVITIES

Organization of the regional staff is outlined in Figure 6. All activities were directed by the Regional Supervisor, F. Andersen¹ who delegated appropriate tasks to the Administrative Assistant E. Nielsen, the Research Supervisor (P. Merritt), the management supervisor (F. Andersen) and the following Fishery Biologist III's: W. Arvey, J. Hallberg, F. Parker, F. DeCicco, and C. Skaugstad. Lake stocking activities were the responsibility of M. Doxey. Area management responsibility and Emergency Order authority was vested with four positions, W. Arvey (AYK Area), J. Hallberg (Lower Tanana Area), F. Parker (Upper Tanana Area), and F. DeCicco (Northwest Alaska Area). Managers often conducted fisheries research projects in their respective areas. The Lower Tanana River Area biologist conducted creel survey studies in the Fairbanks and Delta Junction areas in 1993 and 1994; the Upper Tanana Area biologist conducted studies of lake burbot in 1993 and 1994, and conducted a northern pike angler questionnaire in 1993; and the Northwest Area biologist conducted studies on Seward Peninsula Arctic grayling and Dolly Varden in 1993 and 1994, and performed studies on lake trout in northwest Alaska in 1994.

The management staff was also engaged in a major effort to complete management plans for 33 of the important regional sport fisheries. This effort was initiated in 1991 and was still in progress at the close of 1994. Prior to this time, management plans for sport fisheries in the AYK Region had never been prepared. Following internal review of each draft plan (US Fish and Wildlife review was considered internal review for these plans) the plans were released for public review and comment before finalization. Finalized plans are subject to revision at any time, but a firm timetable for this to occur has not been established. Plans completed in 1993 and 1994 included:

1. Delta Clearwater Coho Salmon sport fishery, April 1993.
2. East Twin Lake sport fishery, April 1993.
3. George Lake sport fishery, April 1993.
4. Minto Flats sport fishery, April 1993.
5. Volkmar Lake, April 1993
6. Chena River chinook salmon, May 1993
7. Salcha River chinook salmon, May 1993
8. Tangle Lakes, May 1993
9. Delta Clearwater Arctic grayling sport fishery, May 1993.
10. Fielding Lake, June 1993
11. Goodpaster River Arctic grayling sport fishery, June 1993
12. Harding Lake, June 1993
13. Richardson Clearwater, June 1993

¹ F. Andersen replaced J. Clark as Regional Supervisor in mid 1993.

**Region III - Sport Fish Division
Organizational Chart**

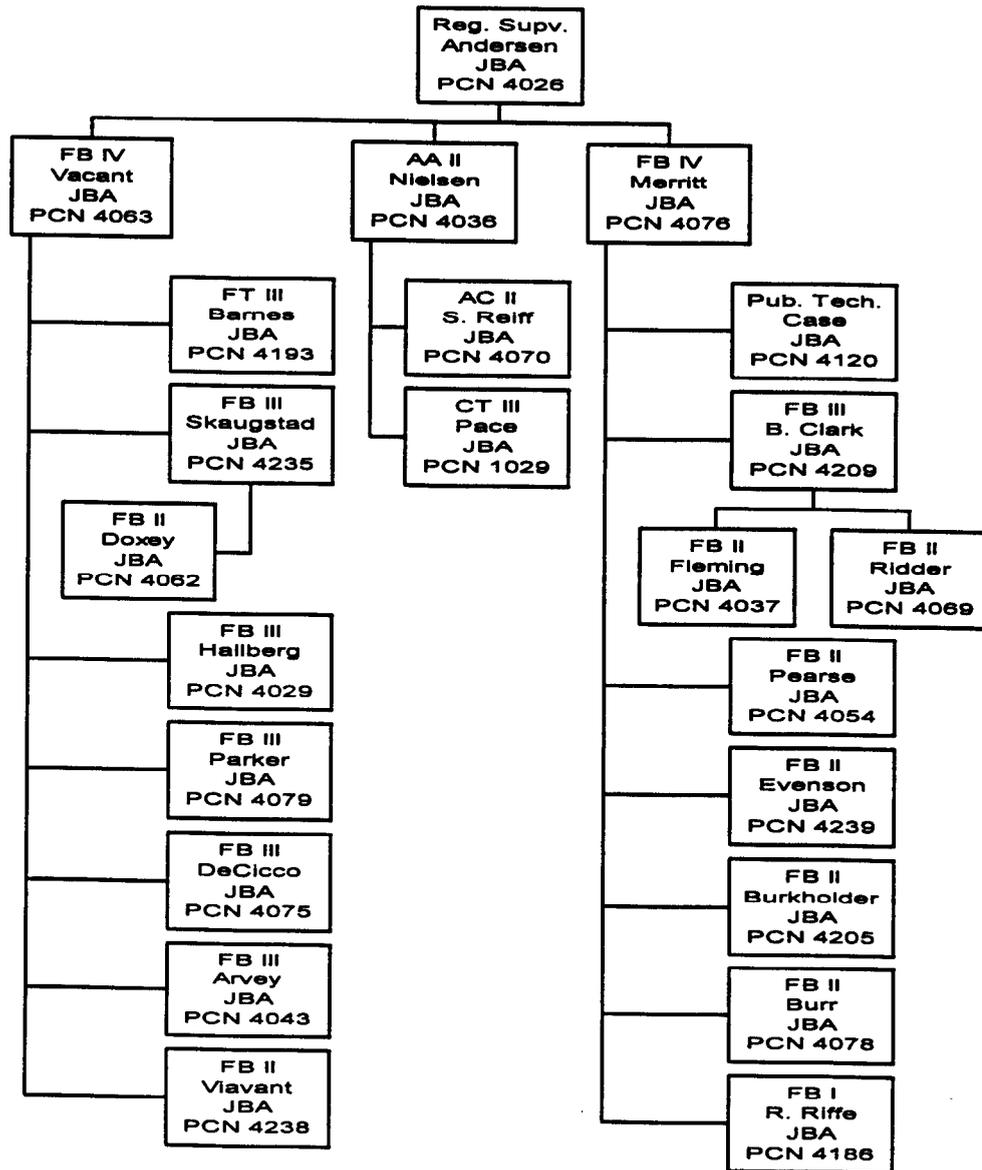


Figure 6.-Organizational Chart for A-Y-K Sport Fish staff (1993-1994).

14. Salcha River Arctic grayling, June 1993
15. Shaw Creek, June 1993
16. Tanana River burbot, June 1993
17. Northwest Alaska salmon, April 1993
18. Northwest Alaska Arctic grayling, October 1993
19. Northwest Alaska northern pike, October 1993
20. North Slope, March 1993
21. Yukon River drainage salmon, April 1993
22. Yukon River drainage northern pike, April 1993
23. Yukon River drainage Arctic grayling, April 1993

Special research was conducted by W. Ridder on stock assessment of Arctic grayling in the Salcha, Chatanika and Goodpaster rivers, and in the Tangle lakes, all in the upper Tanana Valley.

A variety of Arctic grayling research projects were carried out under the direct supervision of R. Clark. These included stock assessment of Arctic grayling in the Salcha, Chena, and Goodpaster rivers, Fielding Lake near Delta Junction, and the Tok River near Tok, Alaska. J. Burr conducted lake trout research in the Tanana River drainage and in the North Slope of the Brooks Range in 1993 and 1994.

Peggy Merritt conducted a study of Fairbanks Area rainbow trout assessment in 1993, along with stock assessment of rainbow trout and Arctic grayling in Piledriver Slough. M. Evenson conducted burbot research in rivers of the upper Tanana Valley in 1993 and 1994. G. Pearse and A. Burkholder conducted northern pike studies in 1993 and 1994. Evaluation of the fish stocking program was conducted by C. Skaugstad, and M. Doxey, in 1993 and 1994.

Adult chinook and chum salmon research on the Salcha and Chena rivers and coho salmon in the Delta Clearwater River were conducted by C. Skaugstad in 1993, and M. Evenson in 1994.

D. Fleming conducted studies of whitefish and Arctic grayling abundance and movement in the Chatanika River in 1993 and 1994.

ACCESS PROGRAM

The Sport Fish Access Program was initiated nation-wide in 1984 as a result of the Wallop-Breaux Amendment to the Sport Fish Restoration (Dingell-Johnson or D-J) Act. The D-J Act, passed in 1950, imposed a 10% excise tax on fishing tackle and lures, with money to be distributed to the states for sport fish restoration programs. The Wallop-Breaux amendment to the D-J Act increased the amount of money available under the Sport Fish Restoration Program by adding a motorboat fuel tax and duties on imported fishing tackle to the D-J fund. The Wallop-Breaux amendment also mandated that 10% (raised to 12.5% in 1992) of program funds distributed to states be used for a variety of projects. The Sport Fish Division of ADF&G began implementing a Sport Fish Access Program in 1985, and individual Sport Fish Access Projects in 1986. Access Program goals are to increase public access to sport fishing and motorized boating opportunities.

Program Description

The Sport Fish Access Program is divided into two separate parts. The first involves capital improvement projects, which are of a durable nature, and involve major construction. Each project is initiated with a written proposal that is subjected to public review and then submitted for funding approval. Projects may be initiated or recommended by Sport Fish Division staff, other agency staff, non-governmental interest groups, or members of the public. Typical projects include construction of boat launches, parking areas, camping areas, handicap-accessible public fishing docks, access roads, improved trails, and the purchase or lease of lands or right-of-ways to ensure public access.

The second portion of the program involves maintaining and upgrading existing angler access sites, and is called the Small Access Site Maintenance Project, which is an ongoing, annually funded program. Activities include placing and maintaining (replacing vandalized) signs at lake and river angling access sites, and constructing and maintaining pedestrian and Off Road Vehicle (ORV) trails to fishing sites, securing permanent right-of-ways on public and private land to ensure continued public access to fishing and boat launching sites. Additionally, this program allows for maintaining access roads to boating or angling sites that might not otherwise be maintained, providing portable toilets, picnic tables, and trash removal at heavily used roadside angling sites; constructing and maintaining outhouses and tent platforms at remote angling sites and producing and printing publications which inform anglers about fishing and boat launching opportunities.

Project Implementation

Potential major access projects can initially be recommended by members of the angling and boating public, as individuals or as organized groups, as well as by Sport Fish Division and other state, local, or federal agency staff. Once proposed, projects are initially reviewed by Sport Fish Division staff. Potential projects are evaluated at the regional level for fiscal feasibility, compliance with state and federal requirements, and compatibility with regional management goals.

Project proposals which are selected as a regional priority are then forwarded to the statewide Access Coordinator, for prioritization using a formal ranking process, and, if approved at the Divisional level, are forwarded to the USFWS for federal approval. If approved at the federal level, projects are then included into the annual Access portion of the Department's budget process. These kinds of major projects can be constructed and operated (by formal cooperative agreements) in cooperation with other state agencies, federal agencies, local governments such as cities or boroughs, or local non-profit groups. Some projects are also constructed and operated entirely by the Sport Fish Division under the Access Program.

Completed Major Projects

Harding Lake Boat Launch

The parking and staging area adjacent to the boat ramp were enlarged, and sound barrier material placed between the staging area and adjacent private property. The site is part of the Harding Lake State Recreation Area and is managed by Division of Parks and Outdoor Recreation. The project was completed in 1993 at a cost of \$137,000.

Chena Lakes Handicap Accessible Fishing Dock

A barrier-free fishing dock and associated trail from the existing parking area were constructed. The site is part of the Chena Lakes Recreation Area and is managed by the Fairbanks North Star Borough Department of Parks and Recreation. This project was completed in 1993 at a cost of \$50,000.

Quartz Lake Handicap-accessible Fishing Dock

This project represents the completion of the original Quartz Lake Project. A barrier-free fishing dock and accessible trail from the parking area were constructed, and two handicap accessible parking spaces were surfaced. This project was completed in 1994 at a total project cost of \$40,000.

George Lake Lodge Site

The pull-off from the Richardson Highway was enlarged and paved as part of the road construction to upgrade the highway. The access road to the boat launch on the Tanana River was widened and paved, and erosion control work completed on the road cut which was collapsing down onto the road. This project was completed in 1994 at no cost to the Department.

Yukon River, Galena Boat Launch

A concrete boat launch to the Yukon River was constructed in cooperation with the City of Galena. Prior to the construction of this boat ramp, all launching of boats in Galena was done from the gravel bank. The project also included grading a gravel parking area adjacent to the boat ramp. This project was completed in 1994 at a cost of \$100,000.

Completed Small Access Projects

Access Site signs. Over 50 angler Access Site signs have been placed at lakes, streams, and trailheads identifying these sites. Many of these signs are periodically vandalized and therefore need replacing.

Piledriver Slough Site Improvements and Informational Pamphlet

Picnic tables, trash removal, and portable toilets continue to be provided during each fishing season.

All of the first printing of 15,000 small color pamphlets produced in 1992 were distributed to members of the public, and a second printing of 15,000 of this pamphlet was issued in 1994.

Quartz Lake Pamphlet

A color pamphlet was produced and printed in 1994, describing the recreational fishery and other opportunities.

Angler Access Trails

Pedestrian or ORV trails to Donna Lakes, Forest Lake, Lisa Lake, Four Mile Lake, and several lakes off the Coal Mine Road, as well as into Piledriver Slough were built or upgraded.

Angler Access Right-Of-Ways

In addition to building new trails and maintaining existing trails to angling sites, applications for legal public right-of-ways for trails to angling sites continue to be filed with Division of Lands to ensure that public access is maintained regardless of change in land status.

Future Projects

Proposals for several projects are currently under consideration. These projects include upgrading access and parking at the Yukon River, Dalton Highway Bridge boat launch. Redredging the boat channel and enlarging the launching basin at the Harding Lake State Recreation Area. Repairing the launching ramp and parking area at the Chena River Nordale Road boat launch, and construction of a new boat launch and parking area at the Chena River near its confluence with the Tanana River near Fairbanks.

Trails to Monte Lake and Robertson Number Two Lake will be constructed and camping areas at Donna Lakes and Forest Lake will be constructed. Other trails may be constructed, upgraded or maintained as needed. Signs marking angler access sites periodically need replacing due to vandalism, and new signs will be placed as needed. The production and printing of several publications are planned, including a brochure on Interior Alaska River boat ramps and river and stream angling sites.

MANAGEMENT AREA FISHERY OBJECTIVES

Specific management objectives for the region or its constituent areas have been identified only in the management plans developed to date. In addition, a series of general divisional criteria have been prepared to guide in the establishment of fishery objectives, and include:

1. **Management and protection of existing fish resources.** Divisional activities should strive to manage and protect Alaska's wild fish stock resources for future generations.
2. **Public use and benefits of existing fish resources.** Alaska's fishery resources should be made available for public use and benefit on a sustained yield basis.
3. **Rehabilitation of depressed stocks and damaged habitat.** 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 impact other fisheries.

Many management plans prepared for specific regional fisheries also identify a series of fishery objectives. While in many cases the objectives are different, some recur frequently in the plans and 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 BIOLOGICAL AND SOCIAL ISSUES FOR THE AREAS

1. Chena River Arctic grayling. Depressed stock abundance coupled with catch and release-only fishing restrictions on this once healthy and popular road accessible stock, has created public concern for lack of opportunities to harvest grayling near

Fairbanks. The ADF&G is concerned that demand for grayling fishing not be transferred to other nearby weak stocks, creating a chain effect of impacts. These concerns have led to recent efforts to rehabilitate the stock using experimental enhancement techniques.

2. Tanana River chinook salmon stocks. Public perception is that the upriver sport fishery must be restricted in many years of lagging escapements to the Chena, Salcha, and Chatanika rivers to compensate for overharvests in downriver commercial and subsistence fisheries. Many feel that the sport fishery allocations are too small relative to other uses.
3. Wulik River Dolly Varden. Development of a world-class zinc-lead-silver deposit at the Red Dog site in the upper Wulik River drainage carries the risk of heavy metal contamination of 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 impounded waters that were not treated to remove contaminants. Contamination has been controlled to date with impoundment of waste water and treatment of impoundment release water to remove heavy metals.
4. Rural resentment of sport fishing and sport anglers. Rural Alaskans generally 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 is particularly strong towards catch-and-release practices. This conflict of values has led to resentment towards sport anglers who wish to fish on private and public lands within the AYK Region.

SECTION II: MAJOR FISHERIES OVERVIEW

Section II provides a summary of sport fisheries that during 1993-94 were considered significant in the AYK Region. Included in the section is a description and historical perspective of each fishery; description of the fishery performance, Board of Fishery actions taken relative to the fisheries; social and biological issues, and directed ongoing or recommended research or management activities.

TANANA AREA SPORT FISHERIES

Waters of the Tanana Valley support most of the sport fishing effort and harvest that takes place in the AYK Region as a whole (Table 1). By comparison with statewide sport fisheries, those taking place in the Tanana Valley have comprised an average of 7.4% of the total amount of estimated sport effort throughout waters of the state from 1982 to 1994.

Fourteen separate sport fisheries in the Tanana River drainage have been identified and described below.

TANANA AREA SALMON

The most important fisheries for chinook, chum, and coho salmon in tributaries of the Tanana River are described in this section.

Fishery Description and Historical Perspective

Sport fishing for sea-run chinook salmon in the Tanana River drainage is largely limited to the lower sections of the Salcha, Chena, and Chatanika rivers, since these are essentially the only road-accessible stocks of sufficient size to support sport harvests. Annual sport harvests in the Salcha River since 1977 have ranged between 62 (1977) and 904 (1980) chinook salmon. The chinook salmon fishery in the Chena River grew rapidly between 1992-1994 with harvests increasing from 39 (1992) to 733 and 993 during 1993 and 1994, respectively (Table 6). Harvests in the Chatanika River have generally been smaller, ranging as high as 373 fish.

Sport harvests of chinook salmon in the Chena and Salcha rivers are expected to fall within the guideline harvest ranges established by the BOF. These guidelines were established in recognition that chinook salmon in the Yukon River are fully utilized and allocated to various user groups throughout the basin. The guideline harvest range of chinook salmon is 300-600 fish for the Chena River and 300-700 fish for the Salcha River. The sport fishery has exceeded the guideline harvest range in two of eighteen years in the Chena River and in six of eighteen years in the Salcha River. Since both fisheries are not monitored intensively during the fishing season, the Department lacks ability to detect whether the ranges are exceeded during any given year. Post season adjustments to harvest rates in following years may be necessary if it becomes apparent that the sport fishery consistently takes more than the allocated number of salmon.

Estimates of the chinook salmon sport harvest within the Chatanika River have increased from fewer than 50 fish annually in the late 1970's to several hundred fish during some years, a decade later (Table 6). Estimates of harvest in some years exceed the observed escapement and therefore are questionable. A few anglers target chinook salmon while fishing in the Chatanika River during July and early August however, angler's practice catch and release fishing.

The Delta Clearwater River supports the largest documented spawning run of coho salmon in the Yukon River drainage (Bergstrom et al. 1992). Anglers harvest some of these salmon on the spawning grounds but the proportion is small in comparison to the annual spawner counts, averaging only about 8% since 1984. Since the mid-1980's, coho salmon returning to the Delta Clearwater River to spawn have been the target of an increasingly popular sport fishery that takes place during September and October. Anglers fish along a stretch of shore within approximately one mile of the State campground. Some also use boats to fish for salmon in other parts of the stream, which is about 20 miles in length. Because the fishery is for spawning fish, flesh quality is only fair to poor and many anglers catch and release coho. Harvests during the period from 1977-1994 averaged about 600 coho salmon (Table 7), with a high of about 1,700 fish in 1991.

Table 6.-Sport harvest and catch of chinook salmon in the Tanana River drainage (1977-1994).

Year	Salcha River	Chena River	Chatanika River	Other Streams	Total
Harvest					
1977	62	29	9	NR	100
1978	105	23	35	9	163
1979	476	10	29	NR	515
1980	904	NR	37	NR	941
1981	719	39	5	NR	763
1982	817	31	136	NR	984
1983	808	31	147	62	1,048
1984	260	78	NR	NR	338
1985	871	37	373	75	1,356
1986	525	212	NR	44	781
1987	244	195	21	42	502
1988	236	73	345	199	853
1989	231	375	231	126	963
1990	291	59	37	52	439
1991	373	110	103	44	630
1992	47	39	16	16	118
1993	601	733	192	47	1,573
1994	714	993	105	59	1,871
Mean	460	166	104	44	768
Catch^a					
1990	680	401	164	87	1,332
1991	515	258	181	245	1,199
1991	86	71	31	16	204
1993	1,788	2,545	625	273	5,231
1994	971	1,308	278	118	2,675
Mean	808	947	256	147	2,128

^a Information available from 1990-1994. Anglers may have harvested or released fish tallied as “catch”.

Table 7.-Sport harvest and catch of coho salmon in the Tanana River drainage (1977-1994).

Year	Delta Clearwater River	Nenana River Drainage	Other Streams	Total
Harvest				
1977	31	NR	63	94
1978	126	NR	13	139
1979	NR	NR	25	25
1980	25	NR	42	67
1981	45	NR	NR	45
1982	21	NR	31	52
1983	63	NR	84	147
1984	571	NR	260	831
1985	722	NR	74	796
1986	1,005	168	201	1,374
1987	1,068	NR	163	1,231
1988	1,291	255	691	2,237
1989	1,049	125	422	1,596
1990	1,375	261	83	1,719
1991	1,721	359	265	2,345
1992	615	89	411	1,115
1993	48	NR	230	278
1994	509	440	216	1,165
Mean	605	87	159	848
Catch^a				
1990	3,271	664	107	4,042
1991	4,382	1,679	750	6,811
1992	1,555	583	657	2,785
1993	1,695	52	2,111	3,858
1994	3,009	720	653	4,382
Mean	2,782	739	856	4,386

^a Information available from 1990-1994 only. Anglers may have harvested or released fish tallied as “catch”.

Clear and Julius creeks in the Nenana River drainage both support small stocks of coho salmon that are fished by anglers in the fall. The Department has little information on the fishery or the stock, except for estimates of harvest and catch since 1988. The highest harvest is estimated to have taken place in 1994 in the Nenana River drainage, when 440 coho salmon were harvested (Table 7).

The Tanana River drainage supports several chum salmon stocks, of both summer run and fall run types. The summer run fish spawn in almost all the larger run-off streams such as the Chatanika, Chena, Salcha, Goodpaster, Nenana, and Tolovana rivers. Fall chum salmon spawn in the Toklat, Delta, and Delta Clearwater rivers and in portions of the mainstem Tanana River where upwelling spring water occurs. Sport fishery effort for chum salmon in Tanana River tributaries is generally light and sporadic; the largest harvest occurred in 1991 when 2,345 fish were retained (Table 7).

Recent Fishery Performance

The SHS estimated that 601 chinook salmon were harvested in the Salcha River in 1993, and 714 in 1994, (Mills, 1994 and 1995). These estimates were within or very close to the BOF guideline harvest ranges of 300-700 chinook salmon for the Salcha River. However the reported harvests of 733 chinook salmon in the Chena River in 1993, and 993 in 1994 were well above the 18 year average of 166 salmon, and exceeded the guideline harvest range of 300-600 fish. The reasons for the high harvests of chinook salmon in both rivers was due to the near record returns of chinook salmon, along with the increased popularity of fishing for these fish, especially in the Chena River.

In 1993, abundance's were estimated for chinook salmon returning to spawn in the Salcha and Chena rivers using tower counting methodology. Tower counts offer a number of advantages over the previously used mark-recapture experiments and aerial surveys. Most important is that tower counts allow managers to manipulate the fisheries in-season to achieve escapement goals. Aerial surveys are less costly and provide managers with data on run abundance that in most cases are too late to be used for in-season management of the fishery. Aerial surveys are dependent upon good survey conditions (affected by turbidity, wind, light conditions and water levels) which are required for good results. Mark-recapture techniques are more costly than aerial surveys, are often partial estimates good for only a portion of the river, and the abundance estimates are not available until after all fisheries have taken place.

Minimum escapement objectives for chinook salmon returning to the Salcha and Chena rivers have been established by the ADF&G. Objectives are to achieve aerial counts of 2,500 fish in the Salcha River and 1,700 fish in the Chena. Using the historical counts from aerial surveys and mark-recapture abundance estimates of escapements, the minimum escapement guidelines for aerial surveys were expanded into actual abundance. In April of 1993, staff from the Sport Fish Division and the Commercial Fisheries Management and Development Division, using these expansions calculated minimum escapement guidelines of 7,100 chinook salmon for the Salcha River and 6,300 for the Chena River.

In 1993, the estimated number of chinook salmon moving past the counting site on the Salcha River was 10,007 (SE = 360). The estimated passage of chinook salmon in the Chena River in 1993 was 12,241 (SE = 387; Skaugstad (1994)). The Alaska BOF has authorized the department to increase the sport fish bag and possession limits for anadromous salmon when the total

escapement exceeds the optimum escapement goal by 25%. By July 21, 1993 it was estimated that more than 8,600 chinook salmon had entered the Salcha River and the department projected that the total number would exceed more than 9,000 fish. Confident that the spawning escapement would be met and exceeded by 25%, managers, using Emergency Order authority, increased the daily bag and possession limit from one to two fish. A similar Emergency Order was issued for the Chena River, on July 16, 1993, when it was estimated that more than 7,500 chinook salmon had passed the counting tower. As the spawning escapement was now assured, managers felt that it was appropriate to provide sport anglers with an opportunity to increase their harvest of chinook salmon in the Chena River.

The 1994 run of chinook salmon into the Salcha and Chena rivers were greater than the 1993 return. The counting towers estimated the abundance of returning chinook salmon to the Salcha and Chena rivers at 18,399 (SE = 549) and 11,877 (SE = 479), respectively, (Evenson 1995). Managers once again utilized the Emergency Order authority and increased the daily bag and possession limit from one to two chinook salmon, on both rivers, on July 17, 1994.

In 1993, an estimated 625 chinook salmon were caught in the Chatanika River, while 433 (70%) were released, and in 1994, 278 chinook were caught and 173 (62%) released. Recent escapement estimates of chinook salmon in the Chatanika River are not available because of limited stock assessment in this river. Aerial estimates of escapement range from fewer than 20 fish in 1978 to approximately 160 in 1982. Because only one section of the river is surveyed and because only a portion of the total escapement can be seen from the air, the estimates represent an unknown fraction of the actual number of spawning fish.

In 1993, an estimated 1,695 coho salmon were caught in the Delta Clearwater River of which 48 (3%) were retained, and in 1994, 3,009 were caught and 509 (17%) harvested. The estimated harvest of 48 coho salmon in 1993 represents the lowest harvest value since 1982, and is well below the recent 5-year (1990-1994) mean of 854 fish. The low catch of coho by the sport fishery in 1993 was due to the fishing closure that extended from September 3 to October 15. The 1993 coho salmon run to the Yukon and Tanana Rives was determined to be weak based upon hydro acoustic counts from the Pilot Station sonar project (D. Huttunen, Alaska Department of Fish and Game, CFMD, Anchorage, personal communication) and on results from test fisheries in the up-river districts. All coho salmon fisheries (recreational, commercial, personal use, and subsistence) were closed by Emergency Order to allow adequate escapement to the spawning streams. The Department has set an escapement goal of 9,000 coho salmon for the Delta Clearwater River. By October 14, boat counts conducted on the Delta Clearwater River indicated that the escapement goal would be met. The coho sport fishery in the Delta Clearwater River was reopened by Emergency Order on October 15.

In the Nenana River drainage, an estimated 720 coho salmon were caught of which 440 (61%) were kept in 1994, compared to 52 caught and 0 harvested in 1993. The low catch of coho by the sport fishery in the Nenana drainage in 1993 was due to the fishery closure that began on September 3, 1993. Unlike the Delta Clearwater River, streams in the Nenana drainage were not re-opened during the 1993 season. The Department does not possess escapement counts for spawning streams in the Nenana drainage. The 1994 harvest of coho salmon from the Nenana River drainage is the highest on record and is well above the recent 5-year average of 230 fish. A similar harvest was observed in 1991 when an estimated 359 coho were harvested. These recent harvest estimates may be indicative of an expanding fishery for coho in the Nenana drainage.

The sport fishery for chum salmon in the Tanana drainage continues to be limited in size. Sport catch of chum salmon in 1993 was estimated to be 2,330 fish, of which 371 (16%) were harvested. The 1994 chum catch was 1,351 of which 260 (19%) were kept. The recent 5-year average sport catch of chum salmon is estimated to be 1,512 fish with an average of 343 (26%) harvested. The low catches of chum salmon by the sport fishery in 1993 and 1994 were due, in part, to Emergency Order closures on August 13, 1993 and again on the same date in 1994. The 1993 and 1994 chum salmon runs to the Yukon and Tanana rivers were determined to be weak based upon hydro-acoustic counts from the Pilot Station sonar project. In 1993, sonar results were verified with results from test fisheries in the up-river districts. Other indicators of run strength such as test fish wheels, subsistence catches and tributary escapement monitoring projects, suggested that the 1994 run was much stronger than indicated by sonar results. As a result, the chum salmon sport fishery was reopened on September 6, 1994.

Recent Board of Fisheries Action

Because estimated harvests of chinook salmon on the Chatanika River exceeded observed escapements in some years, the BOF recently adopted a regulation prohibiting chinook salmon fishing in the primary spawning area (upstream of a regulatory marker placed approximately one mile upstream of the Elliott Highway Bridge). This regulation is similar to others that close spawning grounds to sport harvest in the upper Chena and Salcha rivers.

Current Issues

Counting platforms were successfully used to estimate returning chinook salmon to both the Chena and Salcha rivers in 1993 and 1994. Counting tower methodology is dependent upon stream substrate visibility (which is affected by water level, turbidity, wind, and light conditions) to be successful. The obvious advantages of using tower counts is providing timely and accurate escapement data to the fishery manager. Aerial surveys, which the department has historically used, are also timely in providing information that can be used in-season than mark-recapture estimates, and are usually less expansive than tower counts. Tower counts in 1993 estimated that 10,007 chinook salmon returned to the Salcha and 12,241 returned to the Chena River. During aerial surveys on 25 July 1993, a total of 3,636 chinook salmon were counted in the Salcha River and 2,943 were counted in the Chena River. These aerial counts were 36% and 24% of the respective tower derived abundance estimates. In 1994, counting towers estimated 18,399 chinook salmon into the Salcha River and 11,877 in the Chena River. Aerial surveys conducted 25 July, 1994 counted 11,823 chinook salmon in the Salcha River and 1,570 in the Chena River. These aerial counts were about 64% and 13% of the respective (tower count) abundance estimates. If the tower counts are to be the estimator of choice for the Chena and Salcha rivers chinook salmon, the department will need to develop the relationship between these estimates and the aerial surveys. This correlation would allow managers a better estimate of the spawning escapement of chinook salmon to both the Salcha and Chena rivers in those years when only aerial surveys are available.

Public perception with many sport anglers in the Fairbanks and Delta areas is that allocations to the upriver salmon sport fisheries are too small and that sport fisheries must be restricted in many years to compensate for perceived overharvests in downriver commercial and subsistence fisheries. Many feel that the sport fishery allocations are too small relative to other uses, and that when closures are needed to protect escapements, as they were in 1992, they are directed unfairly

at the sport users. These issues were discussed at many fisheries related meetings held throughout the area during the year.

A flood control structure, built by the US Army Corps of Engineers (COE) upstream of Fairbanks on the Chena River is designed to divert water when dam floodgates are closed during flood events, from the Chena River, west to the Tanana River via a floodway. Many in the Fairbanks and North Pole area are concerned that the dam and floodway entrap salmon smolts during their downstream migration when the floodgates on the dam are closed. Pressure on the COE is mounting for additional studies of dam impacts upon salmon.

Ongoing Research and Management Activities

Aerial survey estimates of chinook salmon escapement were, and will continue to be conducted by the Division of Commercial Fisheries Management and Development (CFMDD). Mark-recapture experiments to estimate spawner abundance have been conducted from 1986-1992 in the Chena River and 1987-1992 in the Salcha River by the Sport Fish Division. In 1993 and 1994 tower counts replaced the mark-recapture experiments as the tool used to estimate returning salmon. It is anticipated that both these techniques will continue to be used in the future.

Coho salmon escapement to the Delta Clearwater River is estimated annually by Sport Fish Division personnel, utilizing direct observation methods from a boat. The survey is typically conducted during the third week in October when peak spawner abundance occurs.

CHENA RIVER ARCTIC GRAYLING FISHERY DESCRIPTION AND HISTORICAL PERSPECTIVE

The Chena River is a typical interior Alaska stream that supports several species of resident freshwater and anadromous fish. The stream passes through many urban neighborhoods in Fairbanks and the surrounding area and parallels an improved road for about 50 km east of Fairbanks. The fishery for Arctic grayling, during the early 1980's, was utilized by anglers fishing from the banks at access points along the roads, float parties on extended trips in the upper half of the drainage, and anglers fishing from powered boats in the lower third of the drainage. The fishery occurred almost exclusively during the open water period, from early May through early October in most years.

The Chena River and its tributaries, including Badger Slough supported the largest Arctic grayling fishery in North America, with harvests exceeding 30,000 fish, and effort exceeding 30,000 angler-days annually during several years preceding 1984 (Table 8; Clark 1994).

Annually, from 1979 to 1994 the sport harvest averaged 14,657 fish and effort for all species averaged 26,144 angler-days (Table 8). However, status of this fishery has changed since 1984, and sport harvest for Arctic grayling has declined to historic low levels. Harvest decreased 76% from 1984 to 1985, although effort declined only 39% during that period. Concomitant with the declining sport fishery, was a decline in Arctic grayling population abundance. Stock assessment projects during 1986 (Clark and Ridder 1987) and 1987 (Clark and Ridder 1988) reported a decline in population abundance of 49% between these two years.

Table 8.-Summary of total angling effort and Arctic grayling harvest on the Chena River, 1977-1994 (taken from Mills 1979-1994).

Year	<u>Lower Chena River</u> ^a		<u>Upper Chena River</u> ^b		<u>Entire Chena River</u>	
	Angler-days	Harvest	Angler-days	Harvest	Angler-days	Harvest
1977 ^c					30,003	21,723
1978 ^c					38,341	33,330
1979	9,430	11,290	8,016	11,664	17,446	22,954
1980	13,850	18,520	10,734	16,588	24,584	35,108
1981	11,763	10,814	10,740	13,735	22,503	24,549
1982	18,818	11,117	15,166	12,907	33,984	24,024
1983	17,568	7,894	16,725	10,835	34,293	18,729
1984	20,556	13,850	11,741	12,630	32,297	26,480
1985	11,169	2,923	8,568	3,317	19,737	6,240
1986	18,669	4,167	10,688	3,695	29,357	7,862
1987 ^d	12,605	1,230	10,667	1,451	23,272	2,681
1988 ^{d, e}	16,244	2,686	9,677	1,896	25,921	4,582
1989 ^{d, e}	20,317	7,194	10,014	5,441	30,331	12,635
1990 ^{d, e, f}	18,957	3,494	6,949	945	25,906	4,439
1991 ^{d, e, f, g}	12,547	2,997	8,591	722	21,138	3,719
1992 ^g	7,671	0	4,983	0	12,654	0
1993 ^h	15,631	0	6,018	0	21,649	0
1994 ^h	19,280	32	7,912	82	27,192	114
Averages ⁱ	15,317	6,138	9,824	5,994	26,144	14,657

^a Lower Chena River is from the mouth upstream to 40 km Chena Hot Springs Road (Mills 1988). In 1991, the lower Chena River included Badger Slough. Angling effort is for all species of fish.

^b Upper Chena River is the Chena River and tributaries accessed from the Chena Hot Springs Road beyond 40 km on the road (Mills 1988). Angling effort is for all species of fish.

^c angler-days and harvest are computed for the Chena River and Badger Slough.

^d Special regulations were in effect during 1987 through 1991. These regulations were: catch-and-release fishing from 1 April until the first Saturday in June; a 305 mm (12 inch) minimum length limit; and, a restriction of terminal gear to unbaited artificial lures.

^e In addition to the special regulations, a catch-and-release area was created on the upper Chena River (river km 140.8 to 123.2).

^f The daily bag and possession limits were reduced from five fish to two fish in 1990.

^g During 1991, the Chena River and its tributaries were closed to possession of Arctic grayling from 1 July through 31 December.

^h During 1992 through 1994, the Chena River and its tributaries were closed to possession of Arctic grayling.

ⁱ Averages are for 1979 through 1994 only.

Clark (1987) attributed declines in abundance and fishing success in the Chena River since 1984 to both sport fishing overharvest and to reduced recruitment owing to unfavorable environmental conditions (primarily high river discharge during the natal year).

Recent Board of Fisheries Action

New fishery regulations adopted by the Alaska BOF in 1987 to deal with the decline in Chena River Arctic grayling were the first changes in management since 1975, when the daily bag limit was decreased from 10 to 5 fish. Regulations adopted in 1987 were first implemented in the summer of 1987, when the Department processed emergency regulations to reduce harvest of grayling until a BOF meeting could be convened in the fall of 1987. New regulations adopted in 1987 were:

- 1) catch-and-release fishing from 1 April to the first Saturday in June;
- 2) 12 inch (305 mm) minimum total length limit from the first Saturday in June until 31 March;
- 3) use of artificial unbaited lures only, with bait fishing allowed downstream of the Moose Creek Dam with hooks having a gap larger than 0.75 inch (19 mm);
- 4) catch-and-release fishing year around from river kilometer 140.8 downstream to river kilometer 123.2; and,
- 5) possession limit reduced from 10 to five fish (Tanana River drainage-wide regulation).

In 1990, continued concern for the stock prompted the BOF to implement a bag limit of two fish throughout the river, and to allow only single hooks upstream of the Moose Creek Dam. Even with these measures in effect, the Department stock assessment studies could detect little or no stock recovery, and it became necessary to adopt a policy of no consumptive use in 1991. Daily bag limits in the Chena River drainage were thus reduced to zero fish on 1 July, 1991 by Department Emergency Order, allowing only catch-and-release fishing to occur throughout the entire year. The Emergency Order remained in effect until the BOF met in 1992. In 1992, the BOF closed the Chena River to the harvest of grayling.

Recent Fishery Performance

Due to the catch and release only regulation for Arctic grayling, there was no reported harvest in 1992 and 1993, and only a small illegal, (but reported) harvest of 114 fish in 1994 (Table 8). Angling effort for all species in 1993 increased above the all time low recorded in 1992. This increase continued in 1994 when effort for all species surpassed the annual average number of angler-days. Although separate estimates of angler effort for each fishery (species) are not available, managers believe that the two year increase in angler effort from 1992 through 1994, for the lower Chena River is due in part to the increase in fishing for chinook salmon. Concurrently the increase in effort observed in the upper Chena River for the same period is almost entirely directed toward Arctic grayling: they are the most common sport fish species found in this portion of river.

Ongoing Research and Management Activities

The Chena River stock of Arctic grayling has received more research attention throughout the previous 40 years than any other stream or lake stock in Region III, and probably within the state

of Alaska. Approximately 60 report titles are available in the literature (Armstrong et al. 1986) that describe grayling studies by state and federal agencies, the University of Alaska, and other institutional entities. A large proportion of the studies have been supported by the Federal Aid in Fisheries Restoration Program, which sponsored fisheries research on the Chena River beginning in the early 1950's with the USFWS and the Alaska Game Commission. Since Statehood in 1959, most of the Federal Aid money for fisheries research has been allotted to the State of Alaska and the Sport Fish Division of the ADF&G.

The Department initiated a program of stock rehabilitation for Chena River Arctic grayling in 1991. The program consisted of: 1) regulation changes (previously described) to ensure adequate protection of the stock; and, 2) a program of supplementation of natural production with releases of hatchery and pond-reared Arctic grayling, artificially spawned from Chena River stock. Beginning in the spring of 1992, the first lot of fertilized eggs were taken from the Chena River for use in supplementing natural production. The eggs were transferred to Clear Hatchery where they were incubated, hatched, and reared. In June of 1993, approximately 64,936 fish (of about 97 g in weight) from the 1992 brood were stocked into the lower 160 km of the Chena River. This procedure was followed by a second year stocking of approximately 61,435 fish (1993 brood) during 7 through 30 June 1994 (Clark 1994, 1995, and 1996).

OTHER STREAM AND LAKE ARCTIC GRAYLING

Significant sport fisheries for Arctic grayling exist in: Piledriver Slough, Chatanika, Salcha, Delta Clearwater, Richardson Clearwater, and Goodpaster rivers, Tangle and Fielding lakes, and Shaw Creek.

Fishery Description and Historical Perspective

From the above-mentioned systems, the Chatanika and Salcha rivers have supported the largest annual harvests from 1977 to 1994 (Table 9). The fishery in Piledriver Slough has developed since 1976 when damming the upstream portion to intrusion of silty waters from the Tanana River created clear water conditions. After clear water conditions were established, the 22 mile long slough was colonized by species native to the area, including grayling. Anglers have been attracted to the fishery by the stocking of rainbow trout by ADF&G since 1987. Shaw Creek supports a small grayling fishery, and before spring sport fishing closures were adopted in the Tanana Valley, the fishery targeted on spawners about to migrate upstream in Shaw Creek at break-up. Grayling that spawn in Shaw Creek migrate to feed in other local and nearby streams such as the Richardson Clearwater River. The Delta Clearwater River is a spring-fed system that supports grayling only in the summer. It is believed that the stock using the stream for summer feeding spawns primarily in the Goodpaster River.

Table 9.-Sport harvest of Arctic grayling in the Tanana River drainage (1977-1994)^a.

Year	Piledriver Slough	Chatanika River	Salcha River	Delta Clearwater River	Richardson Clearwater River	Goodpaster River	Fielding Lake	Tangle Lake	Shaw Creek	Other	Total
Harvest											
1977	NR	6,737	6,387	6,118	NR	NR	NR	NR	NR	16,828	36,070
1978	NR	9,284	9,067	7,657	NR	NR	NR	5,786	NR	18,151	49,945
1979	NR	6,121	5,980	6,492	NR	NR	NR	3,466	NR	20,207	42,266
1980	NR	5,143	5,351	5,680	NR	NR	NR	5,522	NR	16,629	38,325
1981	NR	3,808	3,983	7,362	1,562	NR	1,913	6,858	NR	22,254	47,740
1982	NR	6,445	6,843	4,779	1,729	NR	3,044	9,590	NR	20,005	52,435
1983	5,822	9,766	9,640	6,546	2,822	3,021	2,035	7,794	NR	23,051	70,497
1984	3,751	4,180	13,305	4,193	NR	1,194	935	4,829	2,570	18,269	53,226
1985	NR	7,404	5,826	5,809	NR	2,757	1,023	5,029	2,584	25,090	55,522
1986	NR	2,692	7,540	2,343	NR	1,508	1,329	4,781	505	16,074	36,772
1987	4,907	5,619	4,762	2,005	NR	1,702	910	2,467	567	12,451	35,390
1988	8,095	8,640	2,383	2,910	NR	1,273	1,492	3,711	NR	18,827	47,331
1989	4,459	6,934	5,721	3,016	972	1,964	1,283	3,136	411	13,190	41,086
1990	2,380	4,237	1,992	1,772	523	760	1,097	2,853	203	8,090	23,907
1991	3,987	2,642	1,688	2,165	1,419	636	1,284	4,917	453	10,868	30,059
1992	1,030	1,751	1,592	797	436	766	548	2,608	113	5,342	14,983
1993	759	2,001	1,768	437	405	588	1,055	3,741	383	6,521	17,658
1994	57	2,659	2,308	1,411	591	700	1,244	5,668	515	9,474	24,627
Mean	3,525	5,337	5,341	3,972	1,162	1,406	1,371	4,868	830	27,325	55,136

^a Excluding the Chena River.

NR = Harvest estimate not available.

Conservation concerns for several Tanana River drainage Arctic grayling stocks were identified from stock status studies conducted during the latter half of the 1980's. Shaw Creek, the Delta Clearwater River, Richardson Clearwater River, and Chena River Arctic grayling stocks were considered in danger of over-exploitation.

In spite of (or perhaps, because of) large historic annual harvests in the Tanana Area, there have been no trophy Arctic grayling (larger than 1.4 kg, 3.0 lb) registered since the inception of the trophy program in the mid-1960's, while 137 individuals have been recorded from the remainder of Alaska. Growth rates of individual Arctic grayling in the Tanana River drainage are considered to be typical for Alaska, however, growth rates of Arctic grayling in Bristol Bay, and the Seward Peninsula, where the majority of the trophy fish have been taken, are exceptionally high. It is also possible that Tanana River drainage populations have been maintained at smaller individual size from steady fishing and natural mortality, so that even though growth rates are normal, most individuals are removed before reaching minimum trophy size.

Recent Fishery Performance

Because of low abundance and over-harvest, grayling fishing in Piledriver Slough was restricted (by Emergency Order) to catch-and-release only on June 26, 1993. Except for Piledriver Slough, harvest estimates throughout the Tanana drainage in 1993 and 1994 increased from an all time low observed in 1992. The grayling harvest in the Tanana drainage increased by 18% in 1993 followed by a 40% increase in 1994, but are still less than the long term average harvest estimate (Table 9).

Recent Board of Fisheries Action

In 1975, because of increased fishing effort associated with the influx of people for the construction of the trans-Alaska pipeline, the daily bag limit in the Tanana River drainage was decreased from 10 to five Arctic grayling. The reduction in bag limit in 1975 to five fish daily and 10 in possession did not prevent the decline of important Arctic grayling stocks. Further restrictions were enacted in 1987, including a decrease in the possession limit to five Arctic grayling daily, and institution of a minimum length limit of 30.5 cm (12 inch) in the Chena River. Additional conservation measures were also enacted for other stocks in the Tanana River drainage. The Alaska BOF in 1992 imposed restrictions for the Chatanika River upstream of the Elliott Highway bridge, that mandated catch-and-release fishing from April 1 until the first Saturday in June and the use of unbaited artificial lures. In 1994, the BOF adopted a proposal that expanded the catch and release area to include the entire Chatanika River. The BOF also adopted a regulation that changed the dates pertaining to the spring spawning closure on Arctic grayling for six Tanana River drainage, streams. These dates were changed from April 1 to the first Saturday of June, to April 1 through May 31. The Board also established an open fishing season for grayling in the Tok River from May 15 through October 31 (see Appendix A).

Current Issues

Greatly increased fishing effort on Piledriver Slough since introduction of rainbow trout in 1987 has had an effect upon fishing mortality rates of grayling that utilize the system during summer months. The close proximity of Piledriver Slough to Fairbanks and to Eielson Air Force Base, its accessibility, and abundance of both stocked rainbow trout and grayling have created an extremely popular fishery. Piledriver Slough received an estimated 15% of all angler effort for the Tanana River drainage in 1990 (27,705 angler-days) more than any other single fishery in the drainage. Because of low abundance and overharvest, grayling fishing in Piledriver Slough, was

drainage. Because of low abundance and overharvest, grayling fishing in Piledriver Slough, was restricted to catch and release only in June of 1993. In 1994 angling effort fell to an 8 year low of 11,369 angler-days, or 7% of the total angling effort for the Tanana River drainage. The Department is not only challenged to maintain healthy wild stocks of grayling in Piledriver Slough but also must be concerned with the decline of angler participation in what was once one of the more popular fisheries in AYK.

Ongoing Research and Management Activities

Stock assessment studies for Arctic grayling and rainbow trout have been conducted at Piledriver Slough since 1990. Abundance, stock composition, growth, maturity, and mixing rate parameters were estimated for Arctic grayling (Timmons and Clark 1991, Fleming 1991, Timmons 1992, and Fleming and Schisler 1993). The mark-recapture experiment conducted on Arctic grayling in Piledriver Slough in 1993 (Fleming 1994) provided the department with information that led to the no-harvest regulation. In 1994, a weir was used to characterize immigration of Arctic grayling into Piledriver Slough and served as the sampling tool during the capture event of the mark-recapture abundance estimate, (Fleming 1995). Electrofishing was used to sample grayling during the recapture event to complete the 1994 abundance estimate. Future efforts are planned in order to monitor the grayling population in this important sport fishery.

As part of the ongoing stock assessment studies on grayling in the Tanana River drainage, stock composition and abundance of Arctic grayling in the Salcha, Chatanika and Goodpaster rivers were conducted in 1993 and 1994 (Roach 1994, 1995).

MINTO FLATS NORTHERN PIKE

Minto Flats, has for many years, supported the largest northern pike sport fishery in the Tanana River area.

Fishery Description and Historical Perspective

Anglers gain access to various areas in the Minto Flats by float-equipped aircraft and by boat during summer and by ski-equipped aircraft and snow machine during winter. Minto Flats may be reached by road via the Elliott Highway at New Minto Village and via the Murphy Dome Road extension that terminates at a boat-launch point on the lower Chatanika River. Boats are also launched at Nenana and run downstream to the mouth of the Tolovana River or to Swanneck Slough which connects with the Tolovana River in the flats complex.

Since 1977, estimates of fishing effort for all species have ranged from 700 angler-days (1989) to about 3,900 angler-days (1977) and averaged 2,100 angler-days (1977-1994; Mills 1995). The northern pike population of Minto Flats is also subject to a sport harvest that occurs in the lower portions of the Chatanika River. Harvests in this area are sometimes reported as Minto Flats harvests and at other times as Chatanika River harvests. Annual harvest of northern pike is thus best depicted as the sum of the harvests in Minto Flats and in the Chatanika River. Since 1977, annual harvests by the sport fishery have averaged 3,141 northern pike. Sport harvests have ranged from about 1,500 fish in 1988 to about 9,500 fish in 1994 (Table 10).

Table 10.-Sport harvest and catch of northern pike in the Chatanika River and Minto Flats (1977-1994).

Year	Chatanika River	Minto Flats	Total
Harvest			
1977	121	3,615	3,736
1978	407	3,300	3,707
1979	71	3,209	3,280
1980	458	3,909	4,367
1981	28	2,009	2,037
1982	305	1,886	2,191
1983	713	1,825	2,538
1984	389	1,960	2,349
1985	763	3,902	4,665
1986	1,282	3,621	4,903
1987	554	1,161	1,715
1988	364	1,128	1,492
1989	812	872	1,684
1990	388	1,182	1,570
1991	401	1,754	2,155
1992	26	1,247	1,273
1993	1,344	2,076	3,474
1994	1,051	8,438	9,489
Mean	522	2,616	3,143
Catch^a			
1990	979	3,967	4,946
1991	520	4,907	5,427
1992	410	5,765	6,175
1993	4,842	19,536	24,378
1994	4,943	47,248	52,191
Mean	2,339	16,285	18,623

^a Information available from 1990-1993 only. Anglers may have harvested or released fish tallied as “catch”.

Minto Flats supported Alaska's largest sport fishery for northern pike from the late 1970's until the mid-1980's. A new development occurred in the sport fishery in 1985. During early winter in 1985-1986, anglers located a major overwintering area for pike inhabiting the south-eastern portion of the flats. Effort was attracted and concentrated on this population of overwintering fish in the winter of 1986-1987, and large numbers of sport anglers were able to quickly fill bag limits with large northern pike. It was estimated that over 90% of the pike taken in this fishery were mature, pre-spawning, female fish. As a result, harvests in 1985 and 1986 were approximately double the harvests that occurred in the previous four years. Concern over increased harvests and the high female composition of the harvests led ADF&G to close the winter fishery by emergency order throughout Minto Flats in January 1987.

Pike are widely dispersed in Minto Flats in the summer, especially in the large shallow lakes that characterize these wetlands. Winter oxygen deficiency in shallow lakes forces fish to migrate to flowing waters sometime before, or after freeze-up. Between mid-April and mid-May, northern pike migrate from over-wintering areas to many lakes and waterways within the flats complex for summer feeding.

Stock assessment studies conducted by the ADF&G suggest that in recent years, northern pike abundance in Minto Flats has been increasing, and that the stock has supported sustainable harvests. There is evidence that the northern pike population has recovered from over-fishing that occurred in the mid-1980's, and that it may sustain even larger sport harvests in future years.

Recent Fishery Performance

Record catch and harvest estimates of northern pike from Minto Flats were reported in 1994 (Table 10). The estimated harvest from 1993 was the highest observed since 1986 and was about 3x larger than for 1992, but about 50% of that estimated in 1994. In 1993, anglers caught about 6,250 northern pike, 30 inches or greater and retained 400 (6%). About 18,100 pike less than 30 inches were caught and 3,000 (17%) of these were retained. In 1994, anglers caught an estimated 5,750 pike 30 inches or longer and retained 2,200 fish (39%) they also caught 46,400 fish under 30 inches and retained 7,300 (16%). The proportion of northern pike of all sizes that were retained from the sport catch was 14% in 1993 and 18% in 1994 (Table 10).

Recent Board of Fisheries Action

Review of the Minto Flats sport fishery by the Alaska Board of Fisheries was conducted in 1987. The review resulted in the establishment of a June 1 through October 14 sport fishing season for northern pike in the Tolovana River drainage, which includes Minto Flats. In addition, a bag limit of 5 fish daily, with only one fish equal to or exceeding 30 inches total length was instituted. In 1990, the BOF considered a public proposal in which the winter closure for the entire Tolovana drainage was questioned. The Board reconfirmed the need for continued restrictions on the winter fishery, and rejected the proposal.

Current Issues

Many sport anglers support a sport fishery for northern pike be allowed during winter months, because of recent indications that the population is experiencing recovery. The Department has recommended continued winter harvest restrictions to prevent overfishing on concentrated wintering fish and particularly females.

There has been some resentment expressed by sport anglers that subsistence fishers are allowed to fish with no bag limits and no seasonal closures. This issue is complicated by changing eligibility requirements for subsistence users as a result of court rulings on various legal actions. Prior to 1992, subsistence eligibility with the State of Alaska system hinged upon "rural residency" as defined by the Boards of Fish and Game. Court rulings have made this method of determining eligibility no longer applicable, and all Alaska's citizens are currently qualified for subsistence. Theoretically, access to subsistence fishing in Minto Flats is open to all citizens, and therefore, possibly subject to overfishing in winter months as was experienced in the mid-1980's.

Ongoing Research and Management Activities

No stock assessment of the Northern pike population inhabiting Minto Flats was completed during 1993 or 1994. However, the department plans assessment projects for the area in future seasons. A creel census project conducted from the end of Murphy Dome Road collected size and age information from pike caught in the Minto Flats sport fishery.

TANANA RIVER DRAINAGE NORTHERN PIKE

Important fishing areas besides Minto Flats include Harding, George, Volkmar, Healy and East Twin lakes.

Fishery Description and Historical Perspective

Anglers harvest northern pike with hook and line gear year round and with spears during the winter. Anglers fishing in lakes are particularly successful in the spring when pike concentrate for spawning (Hallberg 1992). In 1993, a survey was conducted to obtain information on the northern pike sport fishery in the Tanana River management area. A total of 549 households responded to this survey. Survey results indicated that most (84%) fishing effort directed toward northern pike and most harvest (82%) occurred during the open-water months (Bingham and Parker 1995). During the open-water season, pike anglers fished slightly more on rivers (51%) than on lakes (49%). In contrast, during the ice-covered season, most fishing effort (86%) occurred on lakes. In winter 40% of northern pike harvested were taken with spears.

Other popular fisheries for northern pike in the Tanana River area include: West Twin and Wien lakes in the Kantishna River drainage; Fish Lake near the confluence of the Tanana and Yukon rivers; and Wellesley, Dog, Jatahmund, Island, and Deadman lakes located in the upper Tanana River. Tributary streams to the Tanana River currently supporting northern pike fisheries include the Chena, Salcha, Goodpaster, and Volkmar rivers.

Angler surveys indicate that this species is the second most sought-after indigenous sport fish species in interior Alaska (Holmes and Pearse 1987). Harvests of northern pike generally increased until 1989 (Table 11). This increase was followed by a decline in harvests from most lakes within the area between 1990 - 1993 (Table 11). In 1994, the largest recent harvest occurred; most of this harvest was from the Minto Flats and Harding Lake fisheries. Total catch of northern pike in the sport fishery has been estimated since 1990. Estimates of catch have increased from 37,524 in 1990 to 88,702 fish in 1994. These results indicate a substantial amount of catch and release of northern pike.

Table 11.-Sport harvest and catch^a of northern pike in the Tanana River drainage (1977-1994).

Year	Harding Lake	Chena River	George Lake	Healy Lake	East Twin Lake	Volkmar Lake	Minchumina Lake	Island Lake	Deadman Lake	Minto Flats ^c	T Lake	Other	Total
Harvest													
1977	NR	871	1,227	NR	NR	NR	NR	NR	NR	3,736	NR	3,511	9,345
1978	NR	452	1,392	NR	NR	NR	NR	NR	NR	3,707	NR	2,287	7,838
1979	NR	437	2,018	NR	NR	NR	NR	NR	NR	3,280	NR	2,240	7,975
1980	NR	458	1,395	NR	NR	NR	NR	NR	NR	4,367	NR	3,232	9,452
1981	NR	333	2,236	NR	NR	648	NR	NR	NR	2,037	NR	4,687	9,941
1982	NR	377	1,635	NR	NR	777	NR	NR	NR	2,191	NR	4,842	9,822
1983	178	780	1,322	NR	NR	430	629	NR	1,311	2,748	63	1,925	10,225
1984	766	1,064	1,700	NR	NR	428	78	NR	NR	2,453	325	2,468	9,490
1985	503	787	2,670	NR	NR	503	69	NR	121	4,146	NR	2,927	12,066
1986	673	664	3,076	NR	NR	657	56	NR	24	4,927	NR	1,545	11,854
1987	1,886	169	2,229	462	NR	224	409	NR	145	1,781	NR	1,955	9,405
1988	2,092	453	1,837	982	346	255	1,037	55	182	1,492	NR	3,092	11,823
1989	1,764	1,303	882	1,393	832	180	401	NR	160	1,734	60	2,361	11,170
1990	591	204	945	152	760	84	203	34	490	1,570	NR	2,315	7,348
1991	1,888	1,650	1,262	387	635	565	446	NR	416	2,155	NR	3,072	12,476
1992	341	256	529	43	546	231	154	111	427	1,299	NR	2,168	6,148
1993	391	282	442	NR	284	322	NR	NR	NR	2,076	NR	1,593	7,712
1994	539	236	948	NR	NR	206	25	134	349	8,438	18	2,696	16,299
Mean	1,093	599	1,542	570	497	394	319	84	330	2,616	117	2,431	9,500
Catch^a													
1990	3,629	1,553	3,950	NA	2,515	NA	NA	NA	NA	4,946	NA	20,931	37,524
1991	5,071	3,019	4,996	NA	3,316	1,011	NA	NA	NA	5,427	NA	7,169	30,009
1992	3,400	1,513	2,861	NA	3,408	1,256	NA	NA	NA	6,175	NA	12,637	32,250
1993	8,471	4,532	7,857	NA	6,724	NA	NA	NA	NA	19,536	NA	8,464	51,272
1994	5,559	1,092	4,377	NA	NA	NA	NA	NA	NA	47,248	NA	12,806	88,702
Mean													

^a Catch includes fish caught and released.

NR = no harvest or catch reported.

Recent studies of northern pike populations within the Tanana River drainage indicated that exploitation rates are higher than sustainable in some populations. Even in populations where exploitation rates are not judged to be excessive (less than 20% per year) as in Volkmar Lake, the number of large fish has declined under only moderate harvest pressure.

Recent Fishery Performance

The combined estimated sport harvest of northern pike from Harding Lake, Minto Flats (including Chatanika River), George Lake, and East Twin Lake was 4,517 in 1993 and 11,252 in 1994. In 1993, harvests from these popular sites accounted for about 60% of the total pike harvest from the Tanana management area. In 1994, harvest from these waterbodies comprised 69% of the total Tanana area harvest (Table 11). The harvest estimate for 1994 is the highest since inception of the SHS in 1977.

In general, estimated harvests in 1993 and 1994 were higher than previous years. Harvests from some areas were less, for example where restrictive regulations appear to have controlled any increases within Harding Lake although catch rates have increased substantially (Table 11). The total pike harvest for the reporting years varied about the 18-year average, approximately 19% less in 1993, and 72% greater in 1994 (Table 11).

The estimated harvests of northern pike in the Tanana River drainage in 1993 (7,712 fish) and 1994 (16,299) constituted about 40% and 63% respectively, of the estimated statewide harvest (19,366 and 25,785) of this species (Mills 1994 and 1995).

Levels of harvest from remote sites in the Tanana area in general appear to be sustainable. For example, Volkmar Lake (273 ha.), located 25 km northeast of Delta Junction, is assessable by floatplane in summer and by snow machine and ski plane in winter (Pearse 1994). The lake supports a popular fishery throughout the year. The estimated harvests of northern pike in Volkmar Lake were 320 fish in 1993 and 552 in 1994. These harvests appear to be sustainable and represent 7% to 14% of the estimated population abundance of adult pike (Pearse 1994; Hansen and Pearse 1995). In contrast, harvests from Deadman Lake have ranged from 349-490 pike since 1990. This level of harvest is higher than the sustainable level estimated at 230 fish (Hansen and Pearse 1995).

Recent Board of Fisheries Action

In 1992, the Board of Fisheries established a closed season for northern pike for the Tanana area from April 1 to May 31. The intent of the closure was to protect northern pike during spawning when they are concentrated in shallow waters and extremely vulnerable to anglers.

Current Issues

No current issues are identified in Tanana area sport fisheries for northern pike outside of those mentioned under the Minto Flats discussion.

Ongoing Research and Management Activities

Stock assessments of northern pike populations were conducted in selected waters of the Tanana area during 1993 – 1994 including: Harding, Volkmar, Deadman, East Twin, and T lakes (Pearse 1994). Northern pike were radio tagged in the Chena River in 1993 as an aid for additional research on this stock (Pearse 1994).

ALASKA RANGE LAKE TROUT

Sport fisheries for lake trout occur in many lakes and some streams of the Delta River and upper Tanana River drainage's (Burr 1987).

Fishery Description and Historical Perspective

Lake trout most frequently inhabit deep, oligotrophic mountain lakes and are rarely found at lower elevations of the Tanana River drainage. The Delta River drainage includes Fielding, Landmark Gap, Glacier, Sevenmile, and the Tangle lakes, all of which contain lake trout. Transplanted lake trout occur in Harding Lake near Fairbanks and although the population does not support a large fishery, a few large individuals are annually harvested. Lake trout have also been transplanted into several small lakes in the Tanana area (Appendix C). An average of 33% of the lake trout harvested since 1988 within the Tanana area have come from stocked lakes (Table 12). The harvest of lake trout from the Tanana River drainage during both 1993 and 1994, represented 14% of the statewide harvest, of this species with the majority of the statewide harvest produced in Southcentral Alaska. In 1993 and 1994, 80% of the AYK Regions lake trout harvest was from the Tanana River drainage; this harvest has increased at an annual rate of 27% from 1978 to 1985. An apparent major decline in population abundance was first observed in 1986 in waters of the Tanana River drainage. Research in both Southcentral and interior Alaska indicated that many road-accessible stocks had been overharvested.

Lake trout are a long lived, slow growing, and late maturing species, and the productive impact of even modest fishing pressure can be significant. Lake trout 25 years of age and older are not uncommon and individuals estimated to be older than 50 years are recorded for Alaska (Burr 1987).

Lake trout inhabiting high elevation lakes in the Alaska Range migrate into shallow rocky shoals to spawn in late fall. Lake trout spawn for the first time at ages ranging from 5 to 12 years of age, depending apparently on growth conditions. Alternate year spawning may be more normal than spawning in consecutive years in interior and northern Alaska.

Trophy lake trout weighing 8.7 kg (20 lb.) or more, are typically 20 years old (Burr 1987). Six trophy (minimum weight 20 lb. or 36 inches long) lake trout are recorded from the Tanana Area, four taken in Harding Lake, one each in Fielding and Upper Tangle lakes.

Recent Fishery Performance

The harvest of lake trout in the Tanana River drainage peaked at approximately 3,100 fish in 1982 and has subsequently decline to 713 and 652 in 1986 and 1987, after the bag limit was reduced from 12 to 2 lake trout per day (Table 12). The 1988 lake trout harvest increased to 2,221 fish.

In 1989, staff discovered that anglers in some lakes reported rainbow trout and Arctic char as lake trout. This reduced the estimate of the 1989 native lake trout harvest in the Tanana River drainage to 1,498 (Arvey 1995).

Harvest of lake trout in the Tanana River drainage in 1993 was 1,939, which was 16% higher than the 18 year average of 1,621 fish (Table 12). In 1994, 1,582 fish were harvested which was similar (5% lower) to the 18 year average. Estimated harvests of lake trout from stocked lakes in 1993 and 1994 represented 29% and 52% of the total harvest.

Table 12.-Sport harvest and catch of lake trout in the Tanana River drainage (1977-1994).

Year	Harding Lake	Fielding Lake	Tangle Lakes ^b	Delta River	Stocked Lakes and Ponds	Other	Total
Harvest							
1977	NR	NR	NR	NR	NR	1,471	1,471
1978	NR	NR	416	NR	NR	187	603
1979	NR	NR	NR	NR	NR	518	944
1980	NR	NR	603	NR	NR	661	1,264
1981	NR	295	864	NR	NR	562	1,721
1982	NR	346	1,079	NR	NR	1,679	3,104
1983	NR	294	2,109	NR	21	10	2,749
1984	NR	169	636	234	26	91	2,000
1985	NR	347	2,376	NR	NR	70	2,984
1986	24	136	409	NR	NR	32	713
1987	NR	127	NR	NR	NR	254	652
1988	55	364	127	NR	1,247	428	2,221
1989	119	195	478	11	283	293	1,932
1990	51	186	236	51	135	153	896
1991	133	295	472	44	443	399	1,978
1992	200	170	208	15	285	54	993
1993	132	276	597	NA	348	566	1,669
1994	66	52	416	NA	795	253	1,582
Mean	83	244	696	68	349	507	1,621
Catch^a							
1990	186	321	523	169	NR	1,234	2,433
1991	148	870	988	44	811	1,301	4,162
1992	517	247	1,488	23	547	1,834	4,656
1993	438	939	2,668	9	1,666	1,703	7,414
1994	280	213	1,357	NA	1,582	983	4,415
Mean	314	518	1,405	49	1,225	1,207	4,616

^a Information available from 1990-1993 only. Anglers may have harvested or released fish tallied as "catch".

^b Includes Tangle River.

NR = no harvest or catch reported.

Recent Board of Fisheries Action

The Board of Fisheries instituted restrictive bag limits for lake trout throughout the Tanana River drainage in 1987. The daily bag limit for most of the drainage was restricted to two fish per day with no size limit. However in Fielding, Harding, and the Tangle Lakes, where fishing pressure was more intense, additional restrictions were adopted. A minimum length limit of 18 inches total length was implemented for these three lakes, while in the Tangle Lakes the limit was one fish per day. In 1993, an emergency regulation reduced the minimum size limit from 22 to 18 inches and the bag and possession limit to one fish at Fielding Lake. High harvest rates from Fielding Lake relative to stock size indicated that the minimum length limit regulations previously in place, were inadequate to control harvest at acceptable levels. A reduction of harvest from 276 in 1993, to 52 in 1994 may indicate that this regulation change was effective. No formal board action has taken place since these changes were made.

Current Issues

It was decided that no brood source for the lake trout stocking program would be accepted from outside the drainage because of genetics and disease considerations. The lake trout population at Sevenmile Lake was identified as a suitable brood source for the stocking program in 1992. In 1993, the Sport Fish Division conducted an egg-take from lake trout at Sevenmile Lake by live spawning 107,500 eggs from 90 females. This number of eggs represents a minimum of 20% of the annual egg production of the population (Burr 1994). Egg takes conducted on a biannual basis are perceived to lessen the impact of production removal.

Ongoing Research and Management Activities

Studies of lake trout since 1985 have focused on roadside lakes in the upper Tanana River area. Assessment of the Sevenmile Lake stock will continue in order to study the impact of production losses as a result of biannual egg takes. Stocking of lake trout into small roadside lakes in the Tanana River drainage has been successful in higher elevation lakes and has added diversity to the stocking program. An age validation study utilizing stocked lake trout of known age has been in progress since 1991.

TANANA RIVER DRAINAGE BURBOT

The Tanana River supports one of the largest burbot fisheries in the state, rivaled only by burbot fisheries in the Copper River Basin.

Fishery Description and Historical Perspective

Local residents using baited setlines or hand-held fishing gear are the primary participants in this year-around fishing. Most fishing in the Tanana River near Fairbanks occurs during the winter months while in the upper Tanana River drainage, a major portion of the annual harvest occurs in spring and summer. Burbot are fished in streams, such as the Tanana, Chena, and Tolovana rivers, and in lakes. The most common gear type in flowing waters of the drainage are set lines, on which, up to 15 hooks may be used. In past years, the most heavily fished lakes were Fielding, Harding, and Tangle lakes. Since 1987, bag limits in these lakes were reduced to two fish daily, and use of set lines was eliminated. Burbot stocks in the Tanana River are exploited most heavily near population centers such as Fairbanks, Delta Junction, and near Northway. Burbot movements within the Tanana River tend to minimize effects of concentrated local

fishing effort, and stocks in the Tanana River appear to be lightly exploited (Evenson 1990, 1991, 1992, 1994).

Of the 204 trophy burbot registered in Alaska through 1994 (minimum size 3.6 kg-8 lb.) 142 (69%) were taken in the Tanana Area, and the majority of these were taken near Fairbanks in the Tanana (50%) and Chena (11%) rivers.

Recent Fishery Performance

The estimated harvest of burbot in the Tanana River drainage by sport anglers was 5,717 (1993) and 5,165 (1994; Table 13). The estimated harvest of burbot in the Tanana River drainage in 1993 was the highest on record while 1994 harvest was exceeded only by harvests in two years (1984 and 1993). The majority of the harvest (75% in 1993 and 73% in 1994) was taken in the Tanana River and lower Chena Rivers. The harvest from area lakes has declined since 1987 when restrictions on number of hooks, set lines, and seasons for many lakes were enacted.

Recent Board of Fisheries Action

To prevent further declines in burbot populations inhabiting lakes of the Tanana drainage, the ADF&G implemented emergency regulations in 1987 that prohibited the use of set lines from 15 May to 15 October, and reduced the bag and possession limit in all Tanana drainage lakes to five fish. Also, a ban on the use of set lines throughout the entire year was enacted for Harding, Fielding, T, and Tangle lakes. A further reduction in the bag and possession limits to two burbot daily in Fielding, T, Harding and Tangles lakes was enacted as well. In 1994 the burbot fishery at Fielding Lake was closed by emergency order to prevent overfishing on a low population abundance.

Current Issues

Although exploitation rates of burbot in the Tanana River are not considered excessive, studies suggest low stock population abundance in most of the lakes examined. Population density of burbot in lakes declined dramatically in the early 1980's due to unsustainable rates of sport fishing exploitation. Stock assessment studies conducted in lakes of the upper Susitna/upper Copper River basin and the Tanana River drainage, in the mid-1980's (Lafferty et al. 1992), confirmed that several lake stocks in the Tanana drainage showed evidence of high exploitation. More recent stock assessment studies conducted within lakes of the Tanana River drainage, demonstrate the effects of experiencing long term high exploitation rates on stocks relative to stock sized (Parker 1994, 1995).

Ongoing Research and Management Activities

Several studies of burbot were conducted during the reporting period in the Tanana Area. Stock assessment of burbot in the Tanana River continued in areas of high fishing effort (Evenson 1994, Evenson and Merritt 1995). Stock assessment of lake-dwelling burbot occurred in Fielding and Harding lakes (Parker 1994, 1995). A model for predicting the fecundity of Tanana River burbot was developed by Roach and Evenson (1993). Seasonal movements of radio-implanted burbot in the Tanana River drainage were followed and reported by Evenson (1993c).

TANANA RIVER DRAINAGE WHITEFISH AND SHEEFISH

Because of their reluctance to bite or be caught with conventional sport tackle, whitefish (all species except sheefish) are not widely harvested by sport anglers using traditional hook and line

Table 13.-Sport harvest and catch of burbot in the Tanana River drainage (1977-1994).

Year	Harding Lake	Fielding Lake	Tangle Lake ^b	Chena River	George Lake	Tolovana River ^c	Piledriver Slough	Shaw Creek	Nenana River	Tanana River	Other	Total
Harvest												
1977	NR	NR	NR	642	5	71	NR	NR	NR	NR	829	1,547
1978	NR	NR	72	389	NR	90	NR	NR	NR	NR	832	1,383
1979	NR	NR	88	807	64	45	NR	NR	NR	NR	966	1,970
1980	NR	NR	229	1,127	NR	50	NR	NR	NR	NR	1,285	2,691
1981	NR	249	194	1,317	68	37	NR	NR	NR	NR	2,257	4,122
1982	NR	365.	105	1,457	31	63	NR	NR	NR	NR	1,866	3,887
1983	157	367	84	1,055	105	21	84	42	21	2,623	481	5,040
1984	428	NR	39	1,233	143	52	NR	415	NR	1,921	1,325	5,556
1985	NR	NR	70	2,065	105	280	70	175	NR	1,365	665	4,795
1986	NR	32	104	889	32	473	NR	120	NR	2,948	544	5,142
1987	53	13	NR	149	NR	409	79	607	NR	2,322	223	3,855
1988	73	36	NR	386	218	NR	55	NR	NR	2,419	546	3,733
1989	10	NR	NR	1,322	20	30	100	170	60	2,305	340	4,357
1990	17	NR	17	304	34	17	456	354	68	1,789	743	3,799
1991	45	NR	23	225	11	79	158	45	11	1,601	541	2,739
1992	17	51	17	1,032	110	8	195	161	76	1,717	236	3,620
1993	NA	32	11	1,135	43	NA	568	161	11	3,156	600	5,717
1994	31	73	31	592	52	208	73	93	NR	3,194	818	5,165
Mean	83	135	77	896	69	114	184	213	35	2,280	839	3,840
Catch^a												
1990	17	NR	51	338	NR	17	456	726	68	1,975	1,468	5,116
1991	45	NR	23	609	11	56	237	45	11	1,950	587	3,574
1992	17	51	34	1,235	110	17	203	161	102	2,148	295	4,373
1993	0	32	21	1,328	43	NR	760	161	21	3,627	664	6,657
1994	31	73	31	685	73	218	135	114	NR	4,048	989	6,397
Mean	22	52	32	839	59	62	358	241	40	2,750	801	5,223

^a Information available from 1990-1994 only. Anglers may have harvested or released fish tallied as "catch".

^b Includes Tangle River.

^c Includes Glacier Creek.

NR = no harvest or catch reported.

gear. Consequently, the harvest of whitefish is relatively small. The Tanana Area sport harvest of whitefish is almost entirely from the Chatanika River, tributary to the Tolovana River, where an active spear fishery usually occurs in the fall, when whitefish make their way to upper sections of the Chatanika River to spawn.

Fishery Description and Historical Perspective

The spear fishery takes place during hours of darkness, and gas powered lanterns are used by those spearing fish to illuminate the water column and fish moving through it. The fall spear fishery for whitefish proceeded at modest harvest levels until the mid-1980's. Harvest levels in the Tanana Area increased steadily during the 1981 to 1989 period, ranging from 5,449 fish in 1981 to 26,810 fish in 1986. From 1977 until 1987, harvest of whitefish from the Chatanika River increased at an average annual rate of 34%, the fastest growing sport fishery in the Tanana River drainage (Hallberg and Holmes 1987).

The Chatanika River supports spawning populations of humpback whitefish, least cisco, and round whitefish *Proscopium cylindraceum*. During late summer and fall, these fish migrate upstream from Minto Flats to spawn. By freeze-up in approximately mid-October, adult whitefish have departed for wintering areas that are as yet unidentified, and which may be located downstream of the Chatanika River. The importance of the Chatanika River as habitat for whitefish other than during spawning and the egg-fry development stages is not fully understood.

Prior to 1988, there was no bag limit imposed on whitefish within the Tanana River drainage, which include the Chatanika River. As harvests of whitefish increased in the 1980's, there were concurrent dramatic decreases in abundance, which prompted managers to become concerned that whitefish stocks were being overfished. Subsequently a bag limit of 15 fish was enacted in 1988. The new bag limit initially reduced the whitefish harvest by about two-thirds of the 1987 harvest level. However, by 1989, the whitefish harvest had risen to 15,500 fish, and in 1990 the Department issued an emergency order closing the Chatanika River on October 11 to spear fishing due to low population numbers. The following year, 1991, spear fishing was closed on July 1 by emergency order, which resulted in only a minimum harvest from the Chatanika River.

In 1992 the Department developed a Chatanika River Sport Fishery Management Plan which established minimum whitefish abundance threshold levels that must be met (annually) before a consumptive fishery could occur. The plan stipulates a threshold population abundance level of 10,000 humpback whitefish and 40,000 least cisco. Secondly, based upon population modeling conducted by ADF&G staff, annual exploitation levels of 15% and 25% for humpback and least cisco whitefish, respectively, are not to be exceeded to insure sustainability of the resource. In order to implement this plan, annual stock assessment of Chatanika River whitefish is required to provide estimates of abundance, and an onsite creel survey also conducted annually will be used to monitor the whitefish harvest.

Spawning stocks of sheefish in the Tanana River drainage have been documented only in the upper Chatanika River (Alt 1987). Tagging studies conducted from 1967 to 1971 indicated that sheefish spawning in the Chatanika River spend the summer feeding in Minto Flats (Alt 1987). Recaptures in the lower Chena River and at Nenana, of fish tagged in the Chatanika River, show that sheefish disperse widely in areas adjacent to spawning. Sheefish are widely distributed in

the Tanana River drainage during the open water season, extending from the Tanana River mouth to more than 300 km upstream from Fairbanks. They have also been found at the mouths of the Bearpaw and Toklat rivers in the Kantishna River drainage. Typically sheefish are taken in the lower reaches of clear water tributaries such as the Chena, Chatanika, Tolovana, and Tatalina rivers as well as others. In 1985, ADF&G stocked approximately 140,000 fingerling sheefish from a Yukon River stock into the Chatanika River in an effort to stimulate the sport fishery. Although the stocking program was generally believed to have failed, some increase in the sport harvest occurred in 1988. There have been no specific assessments of Tanana River stocks, and little is known concerning status of any drainage stocks.

Recent Fishery Performance

The 1993 whitefish research stock assessment program estimated that there were approximately 46,500 least cisco and 13,100 humpback whitefish spawners present in the Chatanika River (Fleming 1994). Since the number of both species in 1993 exceeded the defined threshold abundance levels, the fishery was allowed to proceed. Based upon these estimates, ADF&G was prepared to hold the harvest of least cisco and humpback whitefish to 9,300 and 1,600, respectively, which represented the maximum number of each species that could be taken, and still remain within the recommended ranges of exploitation. During 17-30 September, 1993 a creel survey estimated that 609 least cisco and 87 humpback whitefish were harvested (Hallberg and Bingham 1994). The low harvest in 1993 was attributed to the heavy rainfall that persisted during much of the spear fishery. This created poor visibility due to high turbid water conditions making spearing difficult. The estimated (SHS) 1993 harvest of Tanana Area whitefish was 984 fish, with 558 taken from the Chatanika River.

The 1994 mark-recapture experiments estimated that 14,292 humpback whitefish and 29,557 least cisco were present in the 102 km (64 miles) of the Chatanika River study area. Consequently, the sport (spear) fishery was closed by emergency order on September 5, 1994, as the estimated abundance for both species were below the defined threshold abundance levels as outlined in the management plan. The estimated (SHS) 1994 harvest of Tanana Area whitefish was 940 fish, with 97 taken from the Chatanika River prior to the fishery closure (Table 2).

Total sport harvest of sheefish in the Tanana River drainage during 1993 and 1994 were 100 and 166 fish, respectively, (Table 2). The estimated sheefish harvests for 1993 and also for 1994 was well below the 18 year average annual harvest of 256 fish for the Tanana drainage.

Recent Board of Fisheries Action

Since 1987 a daily bag limit of 15 whitefish for the waters of the Tanana River drainage has been in effect. At the time of new regulatory implementation, it was hoped they would reduce harvest and also limit exploitation rates to no more than 20%, a level thought to be sustainable for these species. The reduced limit did not curb overfishing and after two seasons where emergency closures were implemented, the Alaska Board of Fisheries adopted a regulation in early 1992 that required the spear fishery to close on October 1. Hook and line fishing was not affected by the new regulation. In addition, a geographic restriction was enacted to limit the open area of the fishery to that portion of the river downstream of the Elliott Highway bridge, removing the upper portion of the drainage from the fishery.

No Board of Fisheries regulatory action was taken pertaining to the Tanana River whitefish fishery in either 1993 or 1994.

Current Issues

In 1992, the department perceived there had been a recruitment failure of humpback whitefish during 1985 and 1986, years when large harvests occurred. Evidence came from stock assessments which indicated a dominance of larger, older age fish. Research completed in 1993 and 1994 indicated the whitefish populations in the Chatanika River continue to exhibit low recruitments and abundance. While no new regulation changes have been enacted, it is hoped that the fishery will be sustainable at a lower level resultant from the more restrictive regulations implemented in 1992.

Ongoing Research and Management Activities

Prior to 1992, estimates of whitefish abundance upon which the calculation of exploitation rates are based were restricted to a section of the Chatanika River near the location of the fishery, and consequently, estimates were not considered germane to the entire river and its stocks of whitefish (Timmons 1990). Abundance surveys were expanded in 1992 to include river areas downstream of the spear fishing area (Fleming 1993). Research in 1993 centered around estimating the abundance, size, and age composition of humpback whitefish and least cisco in the Chatanika River. In 1994 the emphasis changed somewhat to include collecting basic life history information on both species. Future management of the this fishery will require research that not only estimates abundance, size, and age composition of whitefish, but also on life history traits. We need to define the geographic range of Chatanika whitefish and to further detail run timing up the Chatanika River, and determine spawning attributes.

TANANA RIVER DRAINAGE RAINBOW TROUT

Rainbow trout are not indigenous to the Yukon River drainage but have been introduced in several locations, including about 75 Tanana Area lakes since the 1950's.

Fishery Description and Historical Perspective

There is evidence that successful natural reproduction has taken place in only one of the stocked locations, Fourteen Mile Lake, near Paxson. This landlocked lake, tributary to the Delta River, was last stocked in the 1960's by Federal Fishery Biologists, and there is evidence that young of the year fish are present (J. M. Burr, Alaska Department of Fish and Game, Fairbanks, personal communication).

Piledriver Slough has been stocked with rainbow trout since 1987. The slough was formerly connected to the Tanana River and is located about 30 km south of Fairbanks (Figure 2). Water in the slough became clear when the Army Corps of Engineers blocked Tanana River water from entering the upper end at several locations in 1976. The slough was blocked in conjunction with the Army Corps of Engineers Chena Flood Control Project to prevent spillage of high water discharge from the Tanana River into the floodway channel during construction. Temporary dikes remain, although they have not been maintained. Piledriver Slough, fed by groundwater from the Tanana River valley, re-established itself as a clear-water tributary to Moose Creek which discharges directly into the Tanana River. Arctic grayling, whitefish and long-nose suckers *Catostomus catostomus* were found inhabiting Piledriver Slough within a year after its upper end was blocked. The objective of stocking was to create a stream type rainbow trout

fishery in Alaska's interior, thus providing more diversity of fishing opportunity for Interior anglers. This was the first time rainbow trout had been released into flowing waters in interior Alaska since statehood.

Trophy Rainbow Trout

Trophy rainbow trout (minimum size 6.8 kg, 15 lbs) have not been recorded from interior Alaska streams or lakes, and most of the registered trophy fish are native anadromous fish taken in coastal streams. Nevertheless, good growth rates and size have been achieved in some enhanced lake situations. The largest rainbow trout recorded in the Tanana Area was taken in 1980 from Quartz Lake at a size of 4.5 kg (9.8 lbs). Rainbow trout exceeding 2.3 kg (5 lbs) are commonly taken from area lakes.

In 1993, a local sport angling group (the Fairbanks chapter of Trout Unlimited) approached the Department with a request that we create "trophy rainbow trout" angling opportunities in three of our smaller stocked lakes. Currently none of the 70-plus stocked lakes are being managed for the production of large (over 18 inches) rainbow trout. The Department believed this to be a reasonable request and began working on a selection process for which to identify 3 stocked lakes in the Fairbanks and Delta Junction area to be managed as trophy rainbow trout waters. Working with the public, various angling groups, and the local Fish and Game Advisory committees, Little Harding Lake, Craig Lake, and Coal Mine #5 were selected. Larger more popular lakes such as Quartz Lake which has produced trophy size fish, were not selected because they contain several other species of stocked fish and are managed as high yield, high production, fisheries that are heavily utilized.

The Department began developing a stocking strategy for these 3 lakes that would facilitate better growth and survival of rainbow trout. The new approach called for a reduced stocking density using larger fish. The Department typically stocks fingerling size rainbow (2-4 g 50 mm – 2 in size) trout at a density of 200 fish per surface acre. While the trophy program calls for stocking sub-catchable size (15-50 g; 250-300 mm, 5-10" length) fish at 50 fish per surface acre. Concurrently, Trout Unlimited submitted a proposal to the Board Of Fisheries that if adopted would restrict the harvest of rainbow trout, so as to promote better growth and survival. The Department supported the proposal and the Board Of Fisheries passed it at their November 1994 meeting, with the new regulations going into effect in April of 1995.

Recent Fishery Performance

Sport fishers expended an estimated 17,263 angler days of effort to harvest 6,007 rainbow trout in Piledriver Slough in 1993. During the spring 1993 stock assessment of Arctic grayling in Piledriver slough, it was determined that grayling abundance had declined for the third consecutive year (Fleming 1994). Concerned that the harvest of Arctic grayling was no longer sustainable, the department issued an emergency order closing the slough to the retention of Arctic grayling. The restriction in the grayling fishery may have inadvertently impacted the rainbow trout fishery as angling effort in 1994 declined 35% to 11,369 angler days, while the harvest dropped to 2,673 fish, the lowest since stocking began in 1987 (Mills 1995). However, the harvest of rainbow trout in the Tanana Area declined by 33%, for the same period resulting in a harvest of 49,693 rainbow trout in 1993 declining to 33,400 in 1994 (Table 14).

Table 14.-Sport harvest and catch of stocked rainbow trout in the Tanana River drainage (1977-1994).

Harvest by Water Body:	Year												
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Birch Lake	1,850	5,126	4,190	18,727	21,622	18,385	16,963	12,123	10,161	8,723	9,981	18,390	16,420
Quartz Lake	2,634	512	273	129	1,869	5,003	1,574	5,491	12,398	14,778	10,106	25,175	27,356
Chena Lakes	NR	NR	NR	NR	NR	NR	294	12,032	9,660	7,001	5,220	9,877	11,968
Harding Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	118	73	456
Jan Lake	NR	NR	NR	NR	NR	NR	NR	52	NR	NR	501	1,019	185
Koole Lake	NR	NR	NR	NR	NR	NR	608	26	312	NR	167	200	1,358
Sansing lake	NR	NR	NR	NR	NR	NR	304	1,571	260	72	118	1,073	152
Piledriver Slough	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	4,346	12,296	7,689
Steese Ponds	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
CHS Road Ponds	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	109	NR
Dune Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	80	42	236	1,705
Hidden Lake	NR	NR	NR	NR	NR	NR	NR	39	NR	NR	NR	546	NR
Meadow Road Lakes	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Coal Mine Road Lks	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	11
Grayling Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Middle Tanana River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other Streams	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other Lakes	1,508	768	723	728	1,080	2,790	2,086	4,376	1,213	768	2,053	12,534	7,723
Total	5,992	6,406	5,186	19,584	24,571	26,178	20,664	34,022	33,432	31,270	31,824	78,345	74,675
Catch^a													
Birch Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Quartz Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chena Lakes	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Harding Lakes	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Koole Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Piledriver Slough	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Steese Ponds	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
CHS Road Ponds	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dune Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Meadow Road Lakes	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Coal Mine Road Lks	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other Lakes	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Total	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

-continued-

Table 14.-Page 2of 3.

Harvest by Water Body:	Year				
	1990	1991	1992	1993	1994
Birch Lake	15,901	17,625	8,312	11,332	7,880
Quartz Lake	20,847	28,238	13,544	18,669	11,556
Chena Lakes	8,558	12,196	3,602	5,628	2,812
Harding Lake	354	246	1,385	245	20
Jan Lake	NR	NR	NR	437	
Koole Lake	574	NR	NR		962
Sansing lake	NR	NR	NR	663	
Piledriver Slough	8,052	6,352	6,414	6,007	2,673
Steese Ponds	NR	123	40	208	89
CHS Road Ponds	NR	954	127	226	195
Dune Lake	591	646	166	293	959
Hidden Lake	NR	NR	NR		191
Meadow Road Lakes	NR	1,184	1,290	2,157	1,493
Coal Mine Road Lks	NR	477	356	59	103
Grayling Lake	NR	NR	NR	30	111
Middle Tanana River	NR	NR	NR	NR	119
Other Streams	NR	NR	NR	208	32
Other Lakes	9,266	3,921	3,271	3,501	4,145
Total	64,143	72,024	37,547	49,693	33,400
Catch^a					
Birch Lake	34,705	35,512	19,726	29,250	22,249
Quartz Lake	47,568	44,679	30,294	43,654	23,675
Chena Lakes	23,075	22,055	9,618	14,310	8,550
Harding Lakes	1,182	277	3,253	417	657
Koole Lake	912	NR	NR	NR	2,213
Piledriver Slough	23,818	18,134	18,404	23,327	8,267
Steese Ponds	NR	800	237	1,752	1,099
CHS Road Ponds	NR	1,784	269	1,021	1,523
Dune Lake	2,144	1,230	2,304	3,060	2,207
Meadow Road Lakes	NR	3,168	2,755	7,765	5,122

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Table 14.-Page 3 of 3.

Harvest by Water Body:	Year				
	1990	1991	1992	1993	1994
Catch^a (Cont'd)					
Coal Mine Road Lks	NR	907	752	692	954
Sansing Lake	NR	NR	NR	14,051	13,004
Jan Lake	NR	NR	NR	1,632	NR
Middle Tanana River	NR	NR	NR	3,034	
Hidden Lake	NR	NR	NR	NR	159
Grayling Lake	NR	NR	NR	NR	692
Other Streams	NR	NR	NR	NR	533
Other Lakes	21,591	7,799	8,590	69	454
Total	154,995	136,345	96,202	665	91,337

^a Information available from 1990-1994 only. Anglers may have harvested or released fish tallied as “catch”.
NR = no harvest or catch reported.

Substantial harvests of rainbow trout occur in Quartz, Birch, and Chena lakes. The combined harvest from these three lakes accounted for 71% of the total harvest in 1993, and 67% of the total numbers of rainbow trout taken in the Tanana River drainage in 1994 (Table 14).

Recent Board of Fisheries Action

The Board of Fisheries in 1994 adopted a regulation, proposed by the local chapter of Trout Unlimited, that restricted the harvest of rainbow trout, shortened the season, and limited fishing gear type for Craig, Coal Mine #5, and Little Harding lakes. The proposal was supported by the staff and is part of the effort to provide trophy rainbow trout angling opportunities.

The regulations adopted by the Board of Fisheries, imposed a single hook artificial lure only regulation, closed fishing from October 1 through May 14 and established a daily bag limit of 1 rainbow trout 18 inches or greater.

Current Issues

With the regulation restrictions placed on the wild stocks of Arctic grayling in Piledriver Slough (catch & release only) angling effort declined. The challenge here is to restore the anglers interest in Piledriver Slough through the continued stocking of large rainbow trout while at the same time continue to protect and rebuild the Arctic grayling stocks. Another issue important to the staff and local anglers is the performance of the rainbow trout stocked in Craig, Coal Mine #5 and Little Harding Lakes, where the plan is to create trophy rainbow trout fishing opportunities.

Ongoing Research and Management Activities

Stocks of both Arctic grayling and rainbow trout in Piledriver Slough have been assessed (Fleming 1994, 1995). The region's stocked waters evaluation program continues to collect valuable information on performance of rainbow trout throughout the Tanana River drainage. Studies conducted by Skaugstad (1995) report the results of population sampling of rainbow trout (and other species) in Birch, Quartz, and Chena lakes along with the costs associated with these programs. Future plans include a thorough evaluation of rainbow trout stocked in Craig, Coal Mine #5, and Little Harding lakes.

AYK AREA SPORT FISHERIES

Waters of the AYK Area offer some of the most remote and diverse angling opportunities available in Alaska. Trophy angling opportunities for lake trout, sheefish, northern pike, burbot, 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 tributaries to the Yukon and Kuskokwim rivers. Marine sport fisheries, are practically non-existent except in the lower Kuskokwim Area. Described below in some detail are the sport fisheries for the area that staff believe to be the most important. Several of the minor fisheries in terms of effort and harvest are discussed jointly at the end of this section.

YUKON RIVER DRAINAGE SALMON

The chinook, chum, and coho salmon are important subsistence and commercial species in the Yukon River drainage; however, utilization by sport anglers has, to date, been minimal.

Fishery Description and Historical Perspective

Chinook salmon spawn throughout the Yukon River drainage. Chum salmon, including a summer run and a fall run are numerically the most abundant species, and are also distributed

throughout the drainage. Coho salmon are less abundant and spawn in large numbers in only a few streams. Pink salmon are locally abundant in some years but are not thought to migrate upstream of the Anvik River. Sockeye salmon occur occasionally, but only a few individuals are taken annually in commercial or subsistence harvests. There may be a small spawning stock of this species in the Innoko River, but the exact location of spawning has not been identified.

Annual sport harvests of Yukon River drainage salmon have historically been, and continue to be primarily from streams of the Tanana River drainage. Mills (1977-1993) and Arvey and Mills (1993) report sport harvests from other streams and drainages in the Yukon watershed, primarily from the Andreadfsky, Anvik, Porcupine and Koyukuk rivers (Table 15). Approximately 12,000 people live along the Yukon River and its tributaries (excluding the Tanana River). Most of these people depend on salmon for either livelihood, subsistence, or both. However, sport fishing for salmon is seldom practiced by rural residents compared to the more customary methods such as gill net and fish wheels, where a larger volume harvest can be taken in the turbid mainstem of Yukon River. Rod and reel fishing for salmon is practiced by some rural residents on occasion and by non-area residents who visit for the purpose of sport fishing. Consequently, size of reported sport harvest does not reflect the abundance of salmon in the drainage.

Recent Fisheries Performance

Estimated sport harvests of the three principal species of salmon during 1993 and 1994 were 104 and 410 chinook, 104 and 93 chum, and 619 and 728 coho salmon (Table 15). Chum salmon harvests in 1993 and 1994 were smaller than in recent years due largely to emergency closures in all fisheries (sport, commercial, and subsistence). Irregardless, the sport harvest of salmon of all species is extremely light for a drainage as large and productive as the Yukon.

Recent Board of Fisheries Action

In 1987, bag and possession limits were established throughout the drainage for all salmon species. In 1994, the BOF opened the Ray River and the Yukon River within the Dalton Highway Corridor to chinook fishing (Appendix A).

Current Issues

No issues are identified at this time.

Ongoing Research and Management Activities

No active research or management is taking place or planned because of the minor nature of the salmon sport fishery in the Yukon River drainage.

UPPER KUSKOKWIM RIVER SALMON

As described previously, sport fishing for salmon and other species upstream of the Aniak River confluence has historically been very limited.

Fishery Description and Historical Perspective

In the 18 year database of harvest estimates (Mills 1977-1994; Howe et al. 1995) from this area, a combined total harvest of only 14,000 chinook, chum or coho salmon were estimated (Table 16). Typically, there is little sport effort or harvest for any of these species. In the

Table 15.-Sport harvest of salmon in the Yukon River drainage (1977-1994).

	Year																		All Years
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	
Harvest of Chinook Salmon by tributary:																			
Koyukuk River	NR	NR	NR	NR	NR	NR	NR	13	NR	NR	NR	NR	NR	NR	20	NR	NR	NR	33
Porcupine River	NR	NR	NR	NR	NR	NR	NR	NR	12	NR	NR	NR	10	NR	10	39	28	NR	99
Andreafsky River	NR	104	NR	15	NR	NR	NR	NR	NR	NR	NR	NR	40	NR	31	08	19	19	236
Innoko River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	10	NR	NR	NR	NR	NR	10
Anvik River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	18	30	01	31	94	NR	NR	184
Nulato River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Melozitna River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nowitna River	NR	NR	NR	NR	NR	11	NR	NR	NR	NR	NR	11							
Dall River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chandalar River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Charley River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fortymile River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other above Tanana	NR	NR	NR	NR	NR	NR	NR	NR	NR	15	NR	NR	NR	NR	NR	94	NR	257	366
Other below Tanana	NR	244	39	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	01	31	NR	57	NR	372
Yukon drainage Lks	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other Yukon River	52	12	NR	NR	6	11	NR	NR	NR	NR	NR	73	NR	105	20	62	NR	124	465
Total	52	260	39	15	6	22	NR	13	12	15	NR	91	90	107	243	279	104	410	1,776

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Table 15.-Page 2 of 3.

	Year																		All Years
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	
Harvest of Chum Salmon by tributary:																			
Koyukuk River	NR	NR	NR	NR	NR	NR	297	NR	NR	NR	124	NR	10	NR	NR	23	NR	NR	454
Porcupine River	NR	NR	NR	NR	NR	21	NR	NR	12	NR	NR	NR	NR	13	NR	08	NR	NR	54
Andreafsky River	NR	273	NR	NR	NR	NR	42	NR	NR	NR	35	NR	103	76	31	02	55	80	697
Innoko River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	21	NR	NR	NR	NR	NR	21
Anvik River	02	NR	NR	NR	NR	37	NR	NR	NR	NR	NR	18	206	101	188	NR	18	10	580
Nulato River	06	NR	NR	NR	NR	NR	NR	NR	NR	NR	25	NR	31	25	NR	137	NR	NR	224
Melozitna River	NR	NR	NR	NR	NR	24	NR	NR	NR	NR	NR	NR	NR	NR	NR	15	NR	NR	39
Nowitna River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Dall River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	21	NR	NR	NR	21
Chandalar River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Charley River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fortymile River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other above Tanana	06	20	NR	NR	06	NR	NR	NR	NR	92	NR	NR	NR	NR	NR	84	NR	NR	208
Other below Tanana	NR	NR	109	NR	NR	NR	10	NR	NR	NR	42	NR	NR	126	209	114	120	NR	730
Yukon drainage Lks	03	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	21	NR	NR	NR	NR	NR	24
Other Yukon R.	NR	NR	NR	NR	11	NR	NR	NR	NR	110	NR	73	577	76	NR	229	NR	NR	1,076
Total	17	293	109	NR	17	82	349	NR	12	202	226	91	969	417	449	612	193	90	4,128

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Table 15.-Page 3 of 3.

	Year																		All Years
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	
Harvest of Coho Salmon by tributary:																			
Koyukuk River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	25	NR	40	NR	89	NR	NR	NR	154
Porcupine River	NR	NR	NR	NR	NR	NR	NR	NR	12	NR	NR	NR	NR	NR	NR	81	NR	NR	93
Andreafsky River	18	100	NR	36	73	110	206	237	235	583	688	1,015							
Innoko River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	89	NR	NR	NR	89
Anvik River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	55	NR	22	15	NR	36	NR	92
Nulato River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Melozitna River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nowitna River	NR	NR	NR	NR	NR	45	NR	NR	NR	NR	NR	NR	NR	NR	NR	49	NR	NR	94
Dall River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chandalar River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Charley River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Fortymile River	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other above Tanana	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other below Tanana	NR	63	25	NR	NR	NR	NR	NR	NR	73	NR	NR	NR	NR	NR	162	NR	NR	323
Yukon drainage Lks	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Other Yukon R.	NR	NR	NR	NR	NR	NR	52	NR	NR	88	NR	55	30	NR	NR	24	NR	40	289
Total	18	163	25	NR	NR	45	52	NR	12	161	61	183	180	228	430	551	619	728	3,456

NR = No harvest or catch reported.

Table 16.-Sport harvest of principal species in the upper Kuskokwim River drainage (1977-1994).

	Year														
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Harvest from the Holitna River															
Chinook Salmon	09	71	NR	NR	NR	74	231	78	12	NR	42	18	156	NR	NR
Chum Salmon	07	NR	NR	NR	NR	183	514	26	50	NR	42	NR	NR	14	119
Sockeye Salmon	14	NR	NR	NR	NR	10	NR	NR	50	NR	21	NR	NR	NR	NR
Coho Salmon	19	NR	NR	NR	08	753	483	91	100	24	145	91	NR	12	205
Arctic Grayling	180	45	08	NR	160	123	1,353	65	NR	24	543	73	128	18	312
Northern Pike	42	109	22	NR	NR	522	535	26	69	NR	97	528	82	53	504
Sheefish	16	109	NR	NR	NR	22	535	26	35	NR	217	36	90	53	128
Arctic Char	277	45	09	NR	44	325	73	NR	NR	24	147	36	50	18	216
Harvest from other streams															
Chinook Salmon	51	81	68	97	869	402	189	26	49	NR	21	NR	156	41	NR
Chum Salmon	118	117	173	165	916	756	220	52	NR	NR	56	NR	NR	202	NR
Sockeye Salmon	52	71	48	NR	111	219	206	NR	NR	NR	126	127	11	12	NR
Coho Salmon	253	289	388	512	327	423	NR	455	24	269	254	182	112	109	276
Arctic Grayling	1,992	1,908	3,801	4,440	3,769	4,609	4,061	1,545	503	318	870	1,275	583	300	664
Northern Pike	750	273	1,480	2,050	1,610	1,054	451	584	243	NR	258	1,182	584	18	1,009
Sheefish	108	36	283	134	287	343	157	182	105	48	91	528	180	NR	13
Arctic Char	1,219	406	569	368	1,192	2,060	1,164	260	NR	24	NR	200	88	18	58
Harvest from lakes															
Chinook Salmon	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chum Salmon	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Sockeye Salmon	NR	NR	NR	NR	NR	NR	41	NR	NR	98	NR	NR	NR	NR	NR
Coho Salmon	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Arctic Grayling	NR	NR	919	NR	NR	NR	115	52	NR	49	NR	NR	NR	335	NR
Northern Pike	NR	NR	NR	NR	NR	NR	650	78	NR	NR	NR	273	175	NR	33
Sheefish	NR	NR	NR	NR	NR	NR	63	NR	NR	NR	NR	NR	NR	NR	NR
Arctic Char	NR	NR	NR	NR	NR	NR	125	65	NR	NR	NR	NR	25	NR	86
Total	5,017	3,560	7,768	7,766	9,328	12,097	11,166	3,611	1,240	878	2,930	4,549	2,420	1,203	3,623

-continued-

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	Year			Average All Years
	1992	1993	1994	
Harvest from the Holitna River				
Chinook Salmon	23	68	40	46
Chum Salmon	91	208	NR	69
Sockeye Salmon	NR	43	NR	8
Coho Salmon	130	NR	NR	115
Arctic Grayling	23	NR	NR	170
Northern Pike	145	9	155	161
Sheefish	173	45	130	90
Arctic Char	NR	79	NR	75
Harvest from other streams				
Chinook Salmon	55	34	68	123
Chum Salmon	38	17	173	167
Sockeye Salmon	24	43	238	72
Coho Salmon	315	83	324	256
Arctic Grayling	121	184	122	1,725
Northern Pike	60	44	63	650
Sheefish	NR	NR	NR	139
Arctic Char	98	44	27	433
Harvest from lakes				
Chinook Salmon	NR	NR	NR	NR
Chum Salmon	NR	NR	NR	NR
Sockeye Salmon	33	52	NR	13
Coho Salmon	NR	NR	NR	NR
Arctic Grayling	38	NR	153	101
Northern Pike	153	98	69	91
Sheefish	NR	NR	NR	4
Arctic Char	16	44	93	25
Total	1,536	1,095	1,655	4,531

NR = No reported harvest.

Kuskokwim River drainage, most salmon fishing is conducted under commercial and subsistence regulations by local residents. Sport fishing is conducted by persons visiting the area on guided and sometimes personal fishing trips, or as sidelights to hunting in the fall. More salmon harvest was estimated during the period from 1980 to 1983, although total numbers of fish estimated are low in all years, relative to other active salmon sport fisheries in less remote areas. Chinook salmon was the mainstay of the commercial and subsistence fisheries of the Kuskokwim River until the mid-1980's when escapements dropped below levels believed necessary to sustain recent harvests. Various harvest restrictions on the commercial fishery since 1985, coupled with apparent increases in stock productivity reversed the trends of declining escapement, but the targeted commercial fishery for chinook salmon has been largely eliminated, leaving the subsistence fishery as the largest-volume fishery for the species. However, substantial numbers of chinook are still harvested in the commercial fishery. Recent estimates of the subsistence harvest for chinook salmon range from 70,000 to 80,000 fish in the Kuskokwim River during both 1990 and 1991. While total utilization of chinook salmon in 1990 and 1991 was 125,000 and 119,000, and about 105,000 fish in 1994 (Burkey et al. 1995).

Coho salmon are distributed widely south of the Brooks Range in the AYK Area, however, they are more abundant in the Kuskokwim River drainage and south, than in drainages north of the Kuskokwim River. Returns of coho salmon to the Kuskokwim River may be the largest to any single river in Alaska. Approximately 660,000 coho salmon were harvested in the 1986 Kuskokwim River commercial fishery, historically the largest commercial harvest for this system (Francisco et al. 1987). Western Alaska coho salmon are thought to spawn primarily in spring-fed portions of streams. The upper Kuskokwim River and its tributaries that drain the northern slopes of the Alaska Range are extensively underlain with alluvial gravels as a result of outwash from the Alaska Range. The resulting gravel aquifers provide high quality spring water for spawning and rearing of coho salmon in the Kuskokwim drainage.

Recent Fisheries Performance

Sport harvest of all salmon species in the upper Kuskokwim River in 1993 and 1994 continued to be very light for all species, conforming generally to the historic pattern. Coho salmon harvests were larger than those for other salmon species in both years (Table 16).

Recent Board of Fisheries Action

The BOF established bag and possession limits in 1987 for all salmon species throughout the drainage. Bag and possession limits for chinook salmon were revised downward to one per day in 1987 when status of local stocks of chinook was unquestionably depressed and maintenance of historic escapement levels were threatened. In 1994, the BOF reestablished the bag and possession limit for chinook to three fish. Between 1988 and 1994 the Kuskokwim Area king salmon populations increased along with guideline harvest levels for the commercial fishery. The 1994 regulations are presented in Appendix A.

Current Issues

Local residents have expressed concern over perceived increases in the sport fishery in some parts of the middle Kuskokwim River, in particular the Aniak River, and to a lesser degree the Holitna River. Results from the statewide harvest survey (Mills 1990-1994; Howe et al. 1995) do not indicate an increasing trend in total fishing effort or in catch or harvest of salmon.

Ongoing Research and Management Activities

There are no current or planned activities for salmon in this area.

YUKON RIVER ARCTIC GRAYLING

Grayling are an extensively distributed resident freshwater species that occur from the Yukon River Delta, upstream to the headwaters. It is a prized species for anglers because of its feeding characteristics, pleasing appearance, and food qualities.

Fishery Description and Historical Perspective

Grayling are distributed throughout the entire drainage, from extreme headwaters in Canada to streams that originate in the Yukon Delta. Sport fishing effort is likewise widespread and diverse, but historic documentation of harvests (Mills 1977-1994; Howe et al. 1995) indicate that the heaviest sport utilization has occurred on Koyukuk River tributaries, primarily those that are crossed by the Dalton Highway. A large proportion of the reported harvest from the Koyukuk River drainage were taken near tributary road crossings of the Jim River, Fish Creek, Bonanza Creek, and South Fork of the Koyukuk River.

Virtually all other grayling harvests in the drainage are from streams that have no, or very limited, road access. Historic sport effort and harvests are estimated to be small relative to road accessible streams (Table 17).

Recent Fishery Performance

Harvest estimates in 1993 and 1994 (Table 17) were below the 18-year average for the drainage (6,104 fish), while the harvest in 1993 was the lowest on record.

Recent Board of Fisheries Action

The BOF reduced the bag and possession limit for grayling within the Dalton Highway Corridor from 10 to 5 fish and added a minimum length limit of 12 inches total length (Appendix A). This action was taken in response to increases in recreational use and harvest.

Current Issues

Local roadside depletion of fish stocks near crossings of Koyukuk River tributaries by the Dalton Highway are of concern, since such depletions reduce angling opportunity for sport fishers traveling the route. Bag and possession limits were reduced to alleviate harvest pressure in the immediate road crossing areas.

Ongoing Research and Management Activities

There are no current or planned activities for grayling in this area.

KUSKOKWIM RIVER DRAINAGE ARCTIC GRAYLING

Similar to the Yukon River drainage, this species is widespread. A portion of its range within the Kuskokwim River drainage from Aniak downstream is shared with rainbow trout.

Fishery Description and Historical Perspective

Local rural residents of the upper Kuskokwim River communities and occasional visitors from outside are the primary participants in this sport fishery. The mean annual sport harvest since

Table 17.- Sport harvest of Arctic grayling in the Yukon River drainage (1977-1994).

	Year												
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Harvest of the Arctic grayling by tributary													
Koyukuk River	169	208	1,053	3,598	1,521	1,726	4,808	4,544	2,099	3,773	6,911	3,439	3,674
Porcupine River	NR	353	2,853	3,207	616	1,084	93	104	346	92	NR	NR	187
Andreafsky river	76	985	45	521	NR	114	136	NR	NR	122	209	NR	73
Innoko River	55	NR	76	NR	287	NR	10	NR	NR	NR	NR	NR	166
Anvik river	117	NR	115	44	NR	910	21						
Nulato River	53	162	44	NR	NR	95	NR	52	NR	NR	297	NR	167
Melozitna River	11	45	57	211	32	48	42	195	NR	NR	NR	NR	354
Nowitna River	92	18	NR	NR	NR	285	84	NR	104	NR	NR	NR	NR
Dall River	NR	NR	64	NR	96	29	NR						
Chandalar River	14	235	64	86	432	347	483	NR	NR	107	NR	218	31
Charley River	326	18	NR	NR	64	171	157	NR	347	NR	92	36	125
Fortymile river	193	81	392	35	365	286	609	91	121	45	13	73	83
Other above Tanana	597	226	1,034	451	249	343	241	961	174	1,070	66	729	760
Other below Tanana	97	543	189	150	185	209	975	1,389	486	111	278	200	NR
Yukon drain. Lakes	374	262	864	516	205	330	689	766	538	259	124	364	833
Other Yukon River	311	847	1,425	816	2,124	2,103	274	104	243	76	1,064	182	1,009
Total	2,485	3,977	8,275	9,635	6,176	7,170	8,601	8,206	4,458	5,655	9,054	6,151	7,483

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Table 17.- Page 2 of 2.

	Year					Average All Years
	1990	1991	1992	1993	1994	
Harvest of the Arctic grayling by tributary						
Koyukuk River	2,827	1,685	1,001	716	2,015	2,543
Porcupine River	203	1,337	180	137	245	613
Andreafsky river	169	193	38	299	98	171
Innoko River	NR	NR	NR	NR	NR	33
Anvik river	NR	154	143	71	10	88
Nulato River	NR	26	68	NR	NR	53
Melozitna River	17	129	68	19	NR	69
Nowitna River	NR	77	84	NR	NR	42
Dall River	NR	129	15	NR	NR	19
Chandalar River	592	257	353	50	NR	181
Charley River	17	129	383	54	416	130
Fortymile river	119	218	347	261	90	190
Other above Tanana	357	309	737	183	34	473
Other below Tanana	17	372	61	558	143	331
Yukon drain. Lakes	322	244	38	19	37	377
Other Yukon River	321	335	535	963	1,486	789
Total	4,961	5,594	4,051	3,330	4,574	6,104

1977 has been about 2,000 grayling (Table 16). This remote fishery is almost entirely inaccessible by road and therefore can be characterized by low effort and harvest. Fishing is typically conducted in small to medium size tributaries of the Kuskokwim River or one of its major branches. Since 1977, the largest estimated annual harvests occurred in 1982 and 1983 when approximately 5,000 grayling were taken.

Recent Fishery Performance

Harvest estimates for the most recent years, 1990-1994 (Table 16) are significantly lower than those for prior years, and well below average.

Recent Board of Fisheries Action

Very liberal fishing regulations are in place for the area in recognition of its remote nature and the minimum level of sport fishing effort exacted. There have been no recent actions by the BOF for the fishery.

Current Issues

No current issues are identified.

Ongoing Research and Management Activities

There are no current or planned activities for grayling in this area.

NORTH SLOPE ARCTIC GRAYLING AND DOLLY VARDEN

Lakes and streams in nearly all of the freshwater drainages of the Arctic coastal plain contain Arctic grayling (USFW 1982). Dolly Varden char are found in most drainages of the eastern coastal plain from the Canadian Border to the Colville River. Lake dwelling Arctic char a closely related species is found in many lakes in upper portions of the drainages.

Fishery Description and Historical Perspective

Alaska's North Slope extends approximately 1,050 km from the Lisburne Peninsula along the Chukchi Sea, eastward to the Canadian border near Demarcation Point. Sport fishing effort is light, ranging from 1,400 to 8,300 angler-days per year from 1977 to 1994 (Mills 1977-1994; Howe et al. 1995; Table 18). Most streams and lakes receive little or no sport fishing pressure, while a few receive more use because of proximity to human settlements or industrial sites, are target destinations for guides and clients, or because they are easily accessible from the Dalton Highway. The combined effects of rugged climate, short summers, and generally limited access are likely to discourage expansion of the sport fishery beyond current levels within the near future.

Arctic grayling are the most commonly harvested species, followed by Dolly Varden and/or Arctic char. The average annual harvest of Arctic grayling from 1977 to 1994 (18 years) was approximately 2,200 fish, with the largest harvest of about 5,500 fish in 1985 (Table 18). Most harvest and catch of grayling occurs in streams adjacent to the Dalton Highway. The mean annual harvest of Dolly Varden or Arctic char over the same period has been about 1,300 fish, with a peak of about 3,500 fish in 1985.

Recent Fishery Performance

Estimated harvests of both species in 1993 and 1994 were below the long-term average despite effort being about 25% greater than average (Table 18).

Table 18.-Sport fishing effort and harvest of Arctic grayling and Dolly Varden/Arctic char in waters of Alaska's North Slope.

Year	Effort Angler-Days	Harvest	
		Arctic grayling	Dolly Varden/ Arctic char
1977	2,434	1,239	241
1978	1,422	678	181
1979	1,526	1,373	364
1980	2,142	1,765	801
1981	2,601	2,908	1,188
1982	4,879	4,077	2,065
1983	5,619	2,568	2,966
1984	8,344	2,441	1,507
1985	4,490	5,382	3,489
1986	4,779	4,099	983
1987	5,256	1,932	2,676
1988	2,541	983	1,018
1989	4,118	2,113	1,031
1990	3,764	791	489
1991	7,291	3,301	1,199
1992	4,940	1,145	836
1993	5,600	1,632	1,092
1994	5,407	807	598
Mean	4,286	2,180	1,262

Recent Board of Fisheries Action

The BOF reduced the bag and possession limit for grayling within the Dalton Highway Corridor from 10 to five fish and added a minimum length limit of 12 inches (Appendix A). This action was taken in response to increases in recreational use and the potential for increased harvest.

In 1994, the BOF adopted new regulations for Dolly Varden and Arctic char for the entire AYK region. It is extremely difficult to distinguish between Dolly Varden and Arctic char in the field. However these two species have substantially different biological characteristics and cannot withstand the same exploitation rates. Dolly Varden (which inhabit streams and are often anadromous) can be exploited at much higher rates than can lake dwelling arctic char. The BOF adopted the following regulations: in flowing waters the bag and possession limit for these species is ten per day with only two over 20 inches in length; in all lakes the bag and possession limit is two per day with no size limit.

Current Issues

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

Ongoing Research and Management Activities

There are no current or planned activities for grayling or Dolly Varden in this area.

OTHER AYK AREA SPORT FISHERIES

The following are brief descriptions of sport fisheries in the AYK Area that are smaller and less well documented than those described in the foregoing sections.

Lake Trout

A description of the distribution of lake trout in Alaska is described by Burr (1987). Lake trout are most frequently associated with deep, oligotrophic lakes in mountainous areas and are rarely found at lower elevations of the Yukon or Kuskokwim basins (Redick 1967; Morrow 1980). They occur in lakes and streams of the Brooks Range in the Noatak and Kobuk River drainages, and in most drainages that flow into the Yukon River from the Brooks Range. Lake trout distribution is primarily restricted to lakes at higher elevations in these drainages. Lake trout are widely distributed on the north slope of the Brooks Range. They occur most frequently in mountain and foothill lakes, but they also occur in streams of the Colville, Sagavanirktok, and Canning rivers. With one notable exception, lake trout generally do not occur in the lowland lakes of the Arctic coastal plain, but are common in central coastal plain lakes between the Ikpikpuk and Colville rivers. They occur in Teshekpuk Lake, an immense lake (810 km², Philo and Moulton 1993) in the Arctic coastal plain, about 100 km southeast of Barrow.

The harvest in 1993 and 1994 for the entire AYK Area totaled about 650 and 250 fish. Harvests for the AYK Management Area since 1977 have ranged from about 2,500 fish in 1986 to the most recent estimate of 250 (Table 3). Harvests from the three sub areas in the AYK Management Area in the most recent five year period (1990-1994) averaged about 600 lake trout with about one third coming from each sub-area.

Studies conducted by ADF&G indicate that lake trout resources have been overharvested in many of the more accessible waters of south-central and interior Alaska. Specific life history features (slow growth, delayed maturity, and non-consecutive spawning) combined with the short

growing season at higher latitudes and altitudes increases the vulnerability of the species to overharvest.

Most of the harvest (48%) during the last five years in the North Slope sub-area has come from lakes within the Dalton Highway Corridor. Less than a dozen lakes within this corridor contain populations of lake trout. Stock assessment conducted in 1994 for lake trout populations within this area found that population density was very low and harvests had been excessive (Burr 1995). The BOF adopted a catch a release only regulation for lake trout residing in lakes within the Dalton Highway Corridor (Appendix A).

Northern Pike

Sloughs, interconnected lakes, and the lower sections of large rivers throughout most of the AYK Area are inhabited by northern pike. Lowland areas of the Yukon and Kuskokwim rivers are particularly noted for large northern pike. Northern pike are abundant in all parts of the AYK Area containing appropriate habitat except on the north slope of the Brooks Range, where distribution is limited. Bendock and Burr (1985) reported the presence of northern pike in the Ikpikuk River on the Arctic coastal plain west of the Colville River, and in middle reaches of the Killik River, tributary to the Colville River.

During summer, northern pike are generally distributed near shore in shallow waters containing aquatic vegetation and a mud bottom. Northern pike have some tolerance for salinity and they are taken frequently in brackish waters of the Yukon-Kuskokwim Delta. They are not known to feed or travel extensively in marine or coastal waters outside the major rivers. During winter, northern pike congregate in deep, well-oxygenated waters found in the lower reaches of tributaries or other areas of sufficient water flow (Hallberg 1984).

Most of the sport harvest of northern pike is taken with hook and line. Spearing, bow and arrow, and hand jigging techniques are also legal means and account for a small proportion of the total harvest. Northern pike sport fishing occurs in the Kuskokwim River drainage from McGrath to downstream of Bethel, including the Takotna, Nixon Fork, Holitna, and Johnson rivers. Most sport fishing for northern pike along the Yukon River takes place upstream from Galena. Popular areas include the Yukon Flats near Fort Yukon, Koyukuk River, Beaver Creek, Birch Creek, Dall River, Hess Creek, Tozitna River, Melozitna River, and Nowitna River.

Much of the sport and some of the subsistence harvest in the AYK Area is taken during winter months through the ice with hook and line gear. Sport fishing for northern pike has gained in popularity since the early 1960's. Northern pike are eagerly sought by fishermen in areas that have good boat access. They are often fished in the fall in combination with hunting activities.

The estimated sport harvest of northern pike in the AYK Management Area has ranged from about 1,600 fish in 1977 to more than 6,500 fish in 1983 (Mills 1979-1994; Howe et al. 1995). The estimated harvest was 3,427 fish in 1993 and 2,796 fish in 1994 (Appendix D). Generally, the largest harvests have been taken in the Yukon and Kuskokwim river sub-areas; in 1993 and 1994 about 70% of the total AYK Area harvest was from the Yukon sub-area.

Little is known concerning the status of northern pike stocks in the AYK Area, but because of remoteness and restricted access, fishing effort is light except on those stocks near towns and villages where angling and subsistence gill netting effort may be more intense. Northern pike populations close to the Yukon River Haul Road Bridge have experienced more angling pressure

because the recent opening of the road has allowed easy boat access for Fairbanks Area residents. Studies of pike in the vicinity of the Yukon River bridge (Arvey and DeCicco 1989; Arvey and Burkholder 1990) suggested that annual harvests in the Dall River were sustainable. Northern pike population studies conducted in the Tanana River drainage suggest that abundance and stock composition parameters such as age and size composition respond negatively and rapidly when annual harvest exploitation rates exceed 16%.

Opening of the Dalton Highway to public travel in 1994 caused concern that increases in recreational use would result in localized depletions of fresh water fish populations in waters adjacent to the road way. The BOF addressed this concern in 1994 by adopting new regulations for many of the resident fish species in the highway corridor (Appendix A). The northern pike bag and possession limit was reduced to five fish with only one over 30 inches.

River and Lake Burbot

Burbot are distributed throughout the AYK Area in all major rivers and many of the lakes and minor waterways. It is an important fishery resource for subsistence economies of rural Alaska and for sport fisheries as well. Burbot are members of the cod family, *Gadidae*, and spawn in mid-winter under the ice of rivers and lakes. Sport fishing interest and intensity has increased for the species in recent years, particularly near settlements where burbot fishing provides an outdoor wintertime activity for many people. Reported annual sport harvests of burbot in the AYK Area since 1978 have ranged from just over 100 fish to approximately 1,900 fish (Table 3). The majority of the harvest and fishing effort occurs in the winter with lines set through the ice, although hand-held lines with rod and reel are also used. The estimated AYK Area harvest of burbot was 514 fish in 1993 and 518 fish in 1994; the most recent five-year average is 700 fish (Appendix D).

Only seven of the 205 Alaska trophy burbot registered from 1967 to 1992 were taken in the AYK Area.

Sheefish

Sheefish are large, predatory whitefish found throughout western, interior, and northwestern Alaska. They do not occur in streams of the North Slope nor in Norton Sound north of the Koyuk River. Alt (1987) recognized nine stocks of sheefish, with anadromous-estuarine stocks occurring in the Kuskokwim, lower Yukon, Koyuk, Kobuk-Selawik rivers, and resident non-anadromous stocks in Yukon River tributaries of the Nowitna, Tanana River (Minto Flats), Porcupine, and Salmon Fork of the Black River, as well as the main stem of the upper Yukon River. The distribution of this species in Alaska is limited to the AYK Region. Alt (1975, 1977) reported that the most abundant stocks of sheefish in Alaska occur in the lower Yukon River, Koyukuk River, and in the mainstem middle Yukon River, and that the Yukon river stocks make the longest migrations of any stocks in Alaska. Sheefish generally overwinter in lower reaches of rivers and in estuarine waters, migrate upstream in summer to feeding grounds, and migrate further upstream to spawning grounds in the late summer and fall. Migrations of over 1,650 km have been documented. It is not certain that spawning grounds have been identified for all major sheefish stocks. A discussion of the stocks resident to Northwest Alaska is found elsewhere in this report.

Sheefish are harvested by subsistence, commercial, and sport users with subsistence harvests exceeding all others. In the AYK Management Area most of the sport harvest of sheefish comes

from the Yukon River drainage. During the most recent five-year period (1990-1994), the sport harvest in the Kuskokwim has ranged from 54 to 390 fish and has averaged 199 fish. In comparison, the average sport harvest during this time from the Yukon River was 609 sheefish (391 – 1,341). These results indicate a continued light level of harvest for the area.

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 virtually non-existent. Through the ice jigging for saffron cod, flounder, sheefish, and other species are common near settlements, but these fisheries operate under subsistence fishing regulations.

NORTHWESTERN ALASKA SALMON

Fishery Description and Historical Perspective

Guided and nonguided 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.

Total fishing effort estimated to have occurred for all species of fish ranged from about 11,000 angler-days in 1977 to 33,000 angler-days in 1991 (Table 19). Salmon harvests have ranged from 3,800 fish in 1977 to 18,300 fish in 1984 with an average (all species combined) annual harvest of 10,250 fish (1984-94); of this harvest 97% was reported from the Seward Peninsula and Norton Sound, and only about 3.0% from Kotzebue. About 40% of the average total harvest has been coho salmon, 37% pink salmon, 15% chum salmon, and 5% chinook salmon. During years of high, even-year cycle pink salmon abundance, 1978, 1980, etc., harvests of this species have comprised 50% to 60% of the total harvest.

The Unalakleet River supports substantial runs of all salmon species except sockeye. Guided and nonguided 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 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 caught more than 8,000 salmon in the Unalakleet River but killed less than 10% of these fish. Of the 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 1983 to 1994 has been about 2,500 fish. Coho comprised about half the average harvest while chinook made up less than 10% (Howe et al. 1995; Mills 1984-1994).

There are nine rivers accessible from the road in the Nome Area which 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 comprised about 85%. The Nome River

Table 19.-Sport fishing effort and harvests (catches for 1990-1994) of salmon in Seward Peninsula/Norton Sound, and northwestern Alaska 1977-1994.

Seward Peninsula/Norton Sound:							
Year	Number of Anglers	Effort ^a in Angler Days	Chinook Harvest (Catch)	Coho Harvest (Catch)	Chum Harvest (Catch)	Pink Harvest (Catch)	Sockeye Harvest (Catch)
1977	NR	7,828	197	449	670	2,402	0
1978	NR	8,379	303	742	546	7,399	0
1979	NR	NR	NR	NR	NR	NR	NR
1980	NR	7,968	52	1,455	1,601	7,732	0
1981	NR	10,879	70	1,504	1,889	3,101	0
1982	NR	13,198	409	2,986	2,620	13,742	0
1983	NR	16,944	687	3,823	2,042	4,583	0
1984	2,512	17,436	247	7,582	1,481	8,322	351
1985	3,399	19,919	239	1,177	1,036	1,138	20
1986	3,381	18,107	1,077	3,926	1,719	3,172	19
1987	2,679	21,413	615	2,319	814	1,304	924
1988	3,001	20,278	400	5,038	1,583	2,912	782
1989	3,052	17,692	203	4,158	1,497	3,564	165
1990	3,233	21,799	364	3,305	925	7,647	198
			(467)	(6,397)	(3,044)	(14,532)	(256)
1991	3,776	23,622	404	5,800	1,415	1,738	237
			(512)	(8,810)	(2,380)	(3,993)	(498)
1992	3,540	22,684	204	4,671	523	6,403	131
			(570)	(8,415)	(2,436)	(25,855)	(188)
1993	3,134	18,930	595	3,783	691	2,250	10
			(3,067)	(6,174)	(2,219)	(6,397)	(116)
1994	3,016	18,922	600	5,547	536	7,051	18
			(877)	(7,737)	(2,562)	(14,259)	(105)
Average	3,157	16,823	392	3,427	1,270	4,968	168
			(1,099)	(7,507)	(2,528)	(13,007)	(233)

-continued-

Table 19.-Page 2 of 2.

Northwestern Alaska:							
Year	Number of Anglers	Effort ^a in Angler Days	Chinook Harvest (Catch)	Coho Harvest (Catch)	Chum Harvest (Catch)	Pink Harvest (Catch)	Sockeye Harvest (Catch)
1977	NR	3,487	16	0	28	8	0
1978	NR	4,997	0	0	254	0	0
1979	NR	2,593	10	0	27	0	0
1980	NR	3,841	9	0	86	0	0
1981	NR	5,219	22	0	32	0	0
1982	NR	6,840	0	0	346	0	0
1983	NR	7,963	0	0	463	0	0
1984	717	7,791	13	0	312	0	0
1984	1,922	6,701	0	51	310	68	0
1986	1,649	6,313	0	0	749	62	0
1987	2,191	10,221	95	11	402	0	21
1988	990	5,279	18	0	236	0	0
1989	1,063	4,932	0	0	41	10	0
1990	1,008	3,782	0	0	0	0	0
			(0)	(0)	(303)	(0)	0
1991	1,795	9,543	NR	NR	59	91	0
			(0)	(0)	(284)	(146)	0
1992	1,421	6,145	8	NR	220	293	0
			(70)	(49)	(987)	(458)	0
1993	1,575	7,809	NR	9	443	0	0
			(26)	(43)	(771)	(20)	0
1994	1,100	6,036	NR	NR	248	51	0
			(25)	(0)	(402)	(85)	(0)
Average	1,402	6,083	11	4	236	32	1
			(24)	(18)	(549)	(142)	(0)

^a Effort for all species.

NR = no harvest or catch reported.

supports more sport fishing effort than any other single water body in northwestern Alaska because of its proximity to a 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 (Appendix D).

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 often required restrictive management measures.

Recent Fishery Performance

Estimated harvests and effort in 1993 and 1994 were slightly lower than in recent prior years, with both near the average for the period of record (1977 - 1992; Table 2).

Current Issues

Chum salmon stocks have steadily declined on the Seward Peninsula, as evidenced by failure to achieve desired spawning escapements in many key streams where spawners are enumerated, creating the need for increasingly restrictive sport, commercial and even subsistence fishing regulations. It is anticipated that until stocks recover, there will be a need to continue with very restrictive measures to protect local stocks. Restrictions to the sport harvest of coho salmon have been necessary during recent years in the Nome Area. Increased effort is being directed at the enumeration of coho salmon escapements in Nome Area streams.

Ongoing Research and Management Activities

No specific activities for salmon have been initiated. However, sport fish staff frequently assist and cooperate informally with the Commercial Fisheries Division on projects including: 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.

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 some localities they outrank salmon and whitefish in importance to subsistence economies. The number of Dolly Varden harvested for subsistence purposes in northwestern Alaska exceeds the number taken by sport anglers, but since few community subsistence harvest estimates are available, the actual magnitude of the annual harvest is not known. Fish are captured with gill nets or beach seines during open water, and gill nets or hook and line during winter.

Estimated 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. 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 105 qualifying fish, 32 (30%) have come from this area of northwestern Alaska and one has come from Norton Sound. 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. A total of 21 registered trophy fish were taken from the Wulik River alone, comprising 20% of the total fish registered statewide.

During summer, spawning Dolly Varden are targeted in some northwestern Alaska 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 wide geographic area, harvests in the few rivers with good angler access have been sustainable. In some cases, if such harvests were directed towards a single stock they would not be sustainable.

Recent Fishery Performance

Estimated harvests of Dolly Varden/Arctic char by sport anglers in the Seward Peninsula/Norton Sound Area have averaged about 5,000 fish over the past 16 years (Table 20). In the Noatak-Kobuk-Selawik Area, sport harvests have averaged 1,200 Dolly Varden/Arctic char annually. In addition to harvests, catches have been estimated through the Statewide Harvest Survey since 1990. Estimates of catch (which includes fish that are kept and those released) from 1990 to 1994 have ranged from 6,012 to 25,425 fish in the Seward Peninsula/Norton Sound Area. The data suggest that about 60% of all Dolly Varden/Arctic char captured in the Seward Peninsula/Norton Sound Area are released. Similar comparisons for the Noatak-Kobuk-Selawik Area have been more variable ranging from an estimated catch of 1,658 char of which only 30% were released in 1991 to an estimated catch in 1992 of 7,054 char, of which 91% were released. Harvest and effort levels in both the Seward Peninsula/Norton Sound Area and the Noatak-Kobuk-Selawik Area have remained fairly stable over the past four years (Table 20).

Current Issues

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 predation of salmon eggs or fry may have 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 any predation studies.

Table 20.-Freshwater sport fishing effort and harvests (catches for 1990 to 1994) of Dolly Varden in Seward Peninsula/Norton Sound, and the Noatak-Kobuk-Selawik area of northwestern Alaska 1977-1994. Statistics include Arctic char harvests and catches.

Year	<u>Seward Peninsula/Norton Sound</u>				<u>Noatak-Kobuk-Selawik Area</u>			
	Number of Anglers	Effort in Angler Days	Dolly Varden Harvest	Dolly Varden Catch	Number of Anglers	Effort in Angler Days	Dolly Varden Harvest	Dolly Varden Catch
1977	NR	7,828	1,621	NR	NR	3,487	469	NR
1978	NR	8,379	1,690	NR	NR	4,997	199	NR
1979	NR	NR	NR	NR	NR	2,593	1,772	NR
1980	NR	7,968	5,811	NR	NR	3,841	301	NR
1981	NR	10,879	3,981	NR	NR	5,219	1,177	NR
1982	NR	13,198	6,498	NR	NR	6,840	1,531	NR
1983	NR	12,678	9,779	NR	NR	7,963	2,192	NR
1984	1,597	12,558	4,260	NR	696	5,710	3,804	NR
1985	2,854	18,141	5,695	NR	1,788	6,701	1,557	NR
1986	2,872	17,257	5,381	NR	1,570	5,744	1,300	NR
1987	2,528	20,381	5,506	NR	2,090	9,288	1,372	NR
1988	2,661	19,456	4,437	NR	959	5,248	983	NR
1989	2,560	15,443	7,003	NR	1,028	4,453	999	NR
1990	2,686	18,833	3,765	9,118	991	3,682	806	3,747
1991	3,236	22,118	10,365	25,425	1,606	2,967	1,149	1,658
1992	3,540	22,684	2,382	6,012	1,421	6,145	582	7,054
1993	3,134	18,930	5,907	22,166	1,575	7,809	914	7,190
1994	3,016	18,922	3,071	7,344	1,100	6,036	2,365	10,733
Average	2,789	15,627	5,127	14,013	1,348	5,485	1,287	6,076

NR = no harvest or catch reported.

Ongoing Research and Management Activities

The ADF&G began an effort to assess Dolly Varden populations in waters of the Seward Peninsula in 1991. Abundance 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 was estimated (DeCicco 1993). These data in combination with harvest estimates and observed changes in abundances have been used to guide ADF&G management activities on exploited populations. It has been discovered 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 ADF&G Habitat Division and the Red Dog mine. Data on the abundance of Dolly Varden spawning in the Noatak River system and overwintering in the Wulik River will continue to be collected as an index of population abundance.

NORTHWESTERN ALASKA ARCTIC GRAYLING

Fishery Description and Historical Perspective

In general, the sport fisheries for grayling in the Northwestern Area are small. However, most populations are also quite small when compared to those of Interior Alaska's rivers.

Since 1989, the ADF&G has investigated stock status of grayling populations in several rivers where sport fishing occurs on the Seward Peninsula. The Nome River stock was found to be overexploited, while the Niukluk, Fish, Pilgrim, Snake and Sinuk rivers populations are believed to sustain current levels of harvest. Grayling in these rivers grow rapidly until reaching seven or eight years of age, after which the rate of growth declines with the onset of sexual maturity and reproductive activity. Maximum longevity exceeds 20 years for some of these fish and they may reach a large size.

Grayling densities in Seward Peninsula rivers, except for the Niukluk River which had about 375 grayling per mile in 1991, 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 larger and they are generally older and larger when they first spawn than grayling in Interior Alaska streams. Since they can live many years, some grow to a large size 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, but the density of fish was low, approaching that of the Nome River which has been the most heavily fished stream in the area. The grayling population in the Nome River is depressed and over 90% of the sampled population was age-7 or less in 1991 (DeCicco 1992).

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.

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, exploitation rate of Arctic grayling in the Snake River has ranged from about 18% in 1993 to 1.3% in 1994. In contrast, exploitation rate in 1991 for the Nome River was about 26% on a population that was already at a very low level. The exploitation rate on the Pilgrim River during 1993 and 1994 was about 3.5%. The Sinuk River exploitation rate is about 3%, but, the harvest is taken from an area downstream of where abundance is estimated, and therefore the overall effective exploitation rate is lower. Exploitation on the Fish-Niukluk River system is thought to be less than 10% (DeCicco 1992).

Recent Fishery Performance

Estimated harvests of Arctic grayling by sport anglers in the Seward Peninsula/Norton Sound area have averaged about 3,500 fish over the past 16 years (Table 21). The most recent three year average harvest has been about 3,600 grayling. In the Noatak-Kobuk-Selawik Area, sport harvests have averaged about 2,600 Arctic grayling annually. The most recent three year average harvest in the Seward Peninsula/Norton Sound Area was about 2,300 fish, but in 1992 the lowest harvest occurred within a 16 yr period. In addition to harvest, catches have been estimated using the Statewide Harvest Survey since 1990. Estimates of catch (which includes Arctic grayling that are kept and those released) have ranged from 5,772 in 1992 to 23,200 in 1991. The 1994 estimate was 6,853. Comparing these data to recent estimates, anglers in the Seward Peninsula/Norton Sound Area release between 78% and 90% of all grayling caught. It is assumed that anglers selectively retain larger size Arctic grayling, but this may not be true on the Seward Peninsula and in the Unalakleet River where the current daily bag and possession limit is five per day with only one over 15 inches. Similar comparisons since 1990 for the Noatak-Kobuk-Selawik Area show that while catches of Arctic grayling have ranged from 3,328 to 7,228 fish, fewer than 1,000 Arctic grayling are retained annually.

Current Issues

There is concern on the part of the public and the ADF&G 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. Other road accessible populations would be vulnerable to overexploitation if fishing practices and motivations were to change.

Ongoing Research and Management Activities

The ADF&G began an ongoing active effort to assess Arctic grayling populations in waters of the Seward Peninsula in 1989. Abundance, 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 and size at age 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 harvests have resulted. It is anticipated that the Nome River grayling population will recover to allow some level of harvest in the near future. Periodic assessment of grayling populations will be continued so the chances of a stock being overexploited can be minimized.

Table 21.-Estimated sport fishing effort and harvests (catches for 1990 to 1994) of Arctic grayling in Seward Peninsula/Norton Sound area, and in the Noatak-Kobuk-Selawik area of northwestern Alaska 1977-1994.

Year	Seward Peninsula/Norton Sound				Noatak-Kobuk-Selawik Area			
	Number Of Anglers	^a Effort in Angler Days	Arctic Grayling Harvest	Arctic Grayling Catch ^b	Number of Anglers	Effort in Angler Days	Arctic Grayling Harvest	Arctic Grayling Catch ^b
1977	NR	7,828	1,607	NR	NR	3,487	1,407	NR
1978	NR	8,379	1,455	NR	NR	4,997	1,997	NR
1979	NR	NR	NR	NR	NR	2,593	2,145	NR
1980	NR	7,968	1,635	NR	NR	3,841	1,790	NR
1981	NR	10,879	2,104	NR	NR	5,219	5,346	NR
1982	NR	13,198	6,225	NR	NR	6,840	3,421	NR
1983	NR	12,678	8,241	NR	NR	7,963	4,715	NR
1984	1,597	12,558	2,349	NR	696	5,710	2,753	NR
1985	2,854	18,141	4,501	NR	1,788	6,701	2,943	NR
1986	2,872	17,257	4,042	NR	1,570	5,744	5,121	NR
1987	2,528	20,381	4,600	NR	2,090	9,288	2,121	NR
1988	2,661	19,456	4,873	NR	959	5,248	2,692	NR
1989	2,560	15,443	4,205	NR	1,028	4,453	1,415	NR
1990	2,686	18,833	1,378	6,119	991	3,682	622	3,328
1991	3,236	22,118	5,121	23,160	1,606	2,967	1,981	5,375
1992	3,540	22,684	492	5,774	1,421	6,145	968	4,991
1993	3,134	18,930	1,584	13,223	1,575	7,809	916	7,228
1994	3,016	18,922	1,331	7,081	1,100	6,036	814	5,472
Average	2,789	15,626	3,279	11,071	1,348	5,485	2,398	5,279

^a Effort values are for all species.

^b Catch includes fish caught and released.

NR = no harvest or catch reported.

KOTZEBUE SOUND SHEEFISH

Fishery Description and Historical Perspective

With the exception of a small stock of sheefish that spawns in the Koyuk River of Norton Sound, spawning stocks of sheefish occur only in the Kobuk and Selawik rivers.

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 to be one of the "crown jewels" of Alaskan fishing. Since the inception of the ADF&G's Trophy Fish Program in 1967, eight out of the nine qualifying sheefish have come from the Kobuk River.

Kotzebue Sound sheefish are distributed throughout the nearshore estuarine areas of Kotzebue Sound. The major concentration is in Hotham Inlet but fish also occur in the Sheshalik and Krusenstern areas as well as in southern Kotzebue Sound, especially in summer (Figure 4). Most 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 best known 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. By mid October spawning is completed and fish disperse to downstream overwintering areas.

The sheefish sport fishery is managed by the ADF&G, Division of Sport Fish. However subsistence fisheries are given priority. The commercial fishery and most of the subsistence harvest takes place through the ice, while sport fisheries are conducted during the summer and fall months. The same population(s) contribute to all harvests.

In Northwestern Alaska, 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, sport harvests are easily sustainable, however, the size of the population(s) is not known, and the magnitude of the subsistence harvest is not known for certain. It is thought that since subsistence practices have not changed appreciably in recent years, the harvests have been relatively stable. It is known that subsistence harvests are much greater than either commercial or sport harvests. In order to ensure sustained yields from this population(s), a management approach involving the subsistence and commercial fisheries for sheefish, is necessary. The current lack of population data on sheefish makes responsible management difficult.

Recent Fishery Performance

Estimated harvests of sheefish by sport anglers in northwestern Alaska have averaged about 1,400 fish over the past 16 years (Table 22). The most recent three year average has been 1,166 fish. In addition to harvests, catches have been estimated through the SHS since 1990. Estimates of sheefish catch (which includes fish that are kept and those released) have ranged from 403 to 3,678. These correspond to harvests since 1990 which indicate that about 60% of all sheefish captured in northwestern Alaska by sport anglers are released.

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 22.-Sport fishing and harvests (catches for 1990 to 1994) of sheefish in Northwestern Alaska, 1977-1994.

Year	Number of Anglers	Effort in ^a Angler Days	Sheefish Harvest	Sheefish Catch ^b
1977	NR	3,487	656	NR
1978	NR	4,997	506	NR
1979	NR	2,593	709	NR
1980	NR	3,841	1,713	NR
1981	NR	5,219	1,263	NR
1982	NR	6,840	2,222	NR
1983	NR	7,963	2,079	NR
1984	717	7,791	3,050	NR
1985	1,922	6,701	1,645	NR
1986	1,649	6,313	3,363	NR
1987	2,191	9,288	1,836	NR
1988	990	5,279	964	NR
1989	1,063	4,453	629	NR
1990	1,008	3,782	151	403
1991	1,795	9,543	603	1,616
1992	1,421	6,145	1,904	3,678
1993	1,575	7,809	1,029	2,273
1994	1,100	6,036	564	958
Average	1,448	5,485	1,383	1,786

^a Effort values are for all species.

^b Catch includes fish caught and released.

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. However, catch and release fishing is viewed as a conservation tool by both ADF&G and anglers. Though sheefish are very sensitive to rough handling, the department believes that if handled gently, they can be released without significant mortality. It is possible that studies to quantify the mortality of sheefish caught and released on sport fishing gear will be undertaken in the near future.

Ongoing Research and Management Activities

The ADF&G Sport Fish Division conducted studies of the ecology, movements, and growth of sheefish between 1966 and 1979. Much of this work was conducted in northwestern Alaska. Alt (1987) summarized past work on sheefish in 1987, but ADF&G has not conducted further studies of sheefish since 1979. A project to estimate the abundance of sheefish spawning in the Kobuk River was intended to begin in 1994, but flooding caused the project to be postponed.

KOTZEBUE AND NORTON SOUND NORTHERN PIKE

Fishery Description and Historical Perspective

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 lowland lakes 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. Northern pike also inhabit the Fish River drainage and have even been observed in the fast clear waters of the Niukluk River downstream to the river mouth. They also 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 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 10,000 fish or more.

Recent Fishery Performance

Estimated harvests of northern pike by sport anglers on the Seward Peninsula have averaged 615 fish since 1977 (Table 23). In addition to harvests, catches have been estimated through the Statewide Harvest Survey since 1990. Estimates of catch (which include fish that are kept and

Table 23.-Freshwater sport fishing effort and harvests (catches for 1990 and 1994) of northern pike in Seward Peninsula/Norton Sound, and the Noatak-Kobuk-Selawik area of northwestern Alaska 1977-1994.

Year	<u>Seward Peninsula/Norton Sound</u>				<u>Noatak-Kobuk-Selawik Area</u>			
	Number of Anglers	Effort in Angler ^a Days	Pike Harvest	Pike Catch ^b	Number of Anglers	Effort in Angler ^a Days	Pike Harvest	Pike Catch
1977	NR	7,828	302	NR	NR	3,487	147	NR
1978	NR	8,379	389	NR	NR	4,997	389	NR
1979	NR	NR	NR	NR	NR	2,593	527	NR
1980	NR	7,968	284	NR	NR	3,841	852	NR
1981	NR	10,879	303	NR	NR	5,219	465	NR
1982	NR	13,198	210	NR	NR	6,840	454	NR
1983	NR	12,678	798	NR	NR	7,963	1,262	NR
1984	1,597	12,558	208	NR	696	5,710	312	NR
1985	2,854	18,141	56	NR	1,788	6,701	383	NR
1986	2,872	17,257	699	NR	1,570	5,744	2,752	NR
1987	2,528	20,381	906	NR	2,090	9,288	813	NR
1988	2,661	19,456	564	NR	959	5,248	1,565	NR
1989	2,560	15,443	648	NR	1,028	4,453	64	NR
1990	2,686	18,833	1,957	4,145	991	3,682	320	1,730
1991	3,236	22,118	1,429	4,257	1,606	2,967	394	1,879
1992	3,540	22,684	479	3,742	1,421	6,145	333	1,666
1993	3,134	18,930	537	2,117	1,575	7,809	559	2,209
1994	3,016	18,922	376	1,731	1,100	6,036	287	1,488
Average	2,726	15,187	615	4,048	1,350	5,305	690	1,749

^a Effort for all species.

NR = no harvest or catch reported.

those released) have ranged from 1,731 in 1993 to 4,257 in 1991. Corresponding harvests since 1990 suggest that more than 70% of all northern pike captured on the Seward Peninsula are released. It is assumed that anglers are selectively retaining the larger northern pike. Most of the harvest of pike on the Seward Peninsula takes place in the Pilgrim or Kuzitrin River drainages. In 1993, about 80% of the entire estimated Seward Peninsula harvest and catch of northern pike came from these two adjacent drainages. These two drainages form a large interconnected wetland area (approximately 380 km²) in their lower reaches, prior to entering Imuruk Basin.

Estimated sport harvests of northern pike in the Noatak-Kobuk-Selawik Area of northwestern Alaska have averaged 690 fish since 1977 (Table 23). Estimated harvests reached a high of 2,752 fish in 1986, and a low of 64 fish in 1989. 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 comparison to other areas of Alaska. Since 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

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 10%, which is well within sustainable levels. However, if harvests increase, management actions may be necessary in this fishery.

Ongoing Research and Management Activities

During 1992 and 1993 the abundance of northern pike in the lower Pilgrim and Kuzitrin rivers was estimated for the first time (Burkholder 1993, 1994). The estimate was 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.

NORTHWESTERN ALASKA - RECENT BOARD OF FISHERIES ACTION

Salmon

The BOF, in 1984, reduced the bag and possession limits in the Nome and Snake rivers to 15 salmon other than king salmon, only five of which could be chum and coho in combination. 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 changed 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.

Two Emergency Orders were issued addressing salmon in the Nome Area in 1992 (Appendix E). 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. In 1993 the Tubutulik and Kwiniuk were again closed to chum salmon fishing. In 1994 fishing for coho was closed in the Nome, Snake, Cripple and Penny rivers.

Other Species

In Northwestern Alaska, prior to 1988, the bag limits for Arctic grayling, Dolly Varden, Arctic char and lake trout in combination was 15 fish per day with only three over 20 inches, the possession limit was two daily bag limits.

Arctic grayling

The Nome Area, where access to a relatively large angling public is provided by the highway system, has most often required restrictive management measures for Arctic grayling. The Board of Fish (BOF) established a separate daily bag and possession limit for Arctic grayling at 10 fish per day for the 1988 regulatory year. The Board also established a separate bag and possession limit for Arctic grayling in all waters between Cape Prince of Wales and Cape Darby on the Seward Peninsula and in the Unalakleet River, of five fish per day, of which only one could be over 15 inches in length. In 1992, concern for the status of three Arctic grayling populations on the Seward Peninsula prompted two Emergency Orders to be placed into effect (Appendix E). One reduced the bag and possession limit in the Snake and Pilgrim rivers to two grayling per day of which only one could be over 15 inches in length. The other closed the Nome and Solomon rivers to the taking of grayling. These Emergency Orders remained in effect following the 1992 season. In 1994, the BOF permanently reduced the Arctic grayling bag limit on the Snake and Pilgrim rivers to two per day with only one over 15 inches.

Dolly Varden and Arctic char

In 1988, the BOF adopted the bag limit of 10 Dolly Varden/Arctic char per day with 10 in possession with exceptions for the Noatak, Wulik and Kivalina rivers where only two of the 10 fish could be over 20 inches in length. In 1992, the Sport Fish Division enacted an Emergency Order limiting the bag and possession limit for Dolly Varden in the Nome River to two fish per day. This Emergency Order was rescinded in 1993. During the November 1994 BOF meeting, an Arctic-Yukon-Kuskokwim Region wide daily bag and possession limit of 10 Dolly Varden or Arctic char with only two over 20 inches in length was instituted in all flowing fresh and salt waters, and a limit of two Dolly Varden or Arctic char was instituted in all 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.

Sheefish

During 1988, the BOF 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. The 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.

Northern Pike

The current bag and possession limit of 10 fish per day has been in place since 1987 when the BOF established a daily bag limit for this species for the first time. No changes have been made or proposed since then.

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APPENDIX A

Appendix A.—Sport fishing regulation proposals for the AYK Region considered by the Alaska Board of Fisheries in 1994.

Proposal Number 16. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

Establishing a bag and possession limit for Arctic char Dolly Varden in all flowing waters at ten fish, with only two daily and in possession over 20 inches in length. The proposed regulation reads as follows:

(a) Except as otherwise provided in (1)-(11) of this subsection, in all waters of the Arctic-Yukon-Kuskokwim area other than the Tanana River drainage, bag limits, possession limits, and size limits are as follows:

	Bag Limit	Possession Limit	Size Limit
Arctic char/Dolly Varden			
<u>all flowing waters unless specified</u>	10	10	<u>only two daily and in possession over 20 inches</u>

Proposed by: Alaska Department of Fish and Game.

Amendments: Amended to include salt water; RC 56.

Discussion: The board heard testimony from the staff that it is extremely difficult to distinguish between Arctic char and Dolly Varden. However, these two species have substantially different biological characteristics such that they can not withstand the same exploitation rate; Dolly Varden populations can be exploited at much higher rates than Arctic char populations. Consequently, the board adopted the different bag, possession, and size limits suggested in proposals #16 and #17.

BOF Action: Adopted.

Proposal Number 17. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would establish the bag and possession limit for Arctic char/Dolly Varden in all lakes, unless specified, at two fish. The proposed regulation reads as follows:

(a) Except as otherwise provided in (1)-(11) of this subsection, in all waters of the Arctic-Yukon-Kuskokwim area other than the Tanana River drainage, bag limits, possession limits, and size limits are as follows:

-continued-

	Bag Limit	Possession Limit	Size Limit
Arctic char/Dolly Varden <u>all lakes unless specified</u>	<u>2</u>	<u>2</u>	<u>none</u>

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: The board heard testimony from the staff that it is extremely difficult to distinguish between Arctic char and Dolly Varden. However, these two species have substantially different biological characteristics such that they can not withstand the same exploitation rate; Dolly Varden populations can be exploited at much higher rates than Arctic char populations. Consequently, the board adopted the different bag, possession, and size limits suggested in proposals #16 and #17.

BOF Action: Adopted

Proposal Number 18. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would establish the bag and possession limit for grayling in the Pilgrim River at two fish, with only one over 15 inches in length. The proposed regulation reads as follows:

(a) Except as provided in (1)--(11) of this subsection, in all waters of the Arctic-Yukon-Kuskokwim Area other than the Tanana River drainage, the bag limits, possession limits, and size limits are as follows:

(12) In the Pilgrim River, the bag and possession limit for grayling is 2 fish, only one of which may exceed 15 inches;

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: Staff presented testimony that research on grayling stocks in the Pilgrim River have shown indications of a steady decline over the past four years. These stocks can not sustain an exploitation rate over 15%. Therefore, the board adopted more restrictive bag, possession, and size limits for grayling in these waters.

BOF Action: Adopted

-continued-

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Proposal Number 19. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would establish the bag and possession limit for grayling in the Snake River at two fish, with only one over 15 inches in length. The proposed regulation reads as follows:

(a) Except as provided in (1)--(~~xx~~) of this subsection, in all waters of the Arctic-Yukon-Kuskokwim Area other than the Tanana River drainage, the bag limits, possession limits, and size limits are as follows:

(12) In the Snake River, the bag and possession limit for grayling is 2 fish, of which only one may exceed 15 inches in length;

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: Staff presented testimony that research on grayling stocks in the Snake River have shown indications of a steady decline over the past four years. These stocks can not sustain an exploitation rate over 15%. Therefore, the board adopted more restrictive bag, possession, and size limits for grayling in these waters.

BOF Action: Adopted

Proposal Number 20. 5 AAC 01.230. SUBSISTENCE FISHING PERMITS. Amend this regulation to provide the following:

Insert new section within the regulations governing the whitefish fishery in the upper Chatanika. "Subsistence uses of Chatanika River whitefish by residents of Minto are the priority use of Chatanika River whitefish. The department shall restrict or close whitefish fishing in the upper Chatanika at any time in order to maintain and protect this priority use.

Proposed by: Yukon River Drainage Fisheries Association.

Amendments: None

Discussion: The board does not have the authority to provide a subsistence preference for residents of Minto over other subsistence users. However, the department is required to provide for sustained yield with the highest priority going to the subsistence fishery. The department reported that the whitefish abundance has been decreasing but can not determine if the sport spear fishery is affecting the abundance. In addition, the department is not sure what the subsistence harvest level has been. The board took no action based on the lack of information and the fact that the department is already directed to afford subsistence the highest priority.

BOF Action: No Action

-continued-

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Proposal Number 38. 5 AAC 70.050. WATERS CLOSED TO SPORT FISHING. Amend this regulation to provide the following:

The area north of the Yukon River lying within 5 miles either side of the Dalton Hwy is closed to the taking of salmon (or king salmon) except for that area included on the Ray River from the mouth to a Fish & Game marker located upstream from the mouth 1, 3, or 5 miles and above that marker salmon must be immediately released.

Proposed by: Don Duncan.

Amendments: Amended by opening the Ray River to subsistence fishing and allowing sport fishing for salmon in the Ray River; RC 68.

Discussion: The Ray River has no salmon runs; however, some salmon enter the lower portion of the river as they migrate up the Yukon River. The board heard staff testimony that opening these fisheries would not endanger the sustained yield of these resources, while it would provide increased opportunity.

BOF Action: Adopted

Proposal Number 39. 5 AAC 70.020., BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS, 5 AAC 70.025., METHODS AND MEANS, and 5 AAC 70.050. WATERS CLOSED TO SPORT FISHING. Amend these regulations to provide the following:

The regulation would state that in Craig, Coal Mine #5, and Little Harding lakes

1. Only single hook artificial lures may be used.
2. Closed to all fishing from October 1 through May 14.
3. Daily bag and possession limit is 1 rainbow trout, 18 inch minimum length limit.

Proposed by: Midnight Sun Chapter of Trout Unlimited.

Amendments: The regulations were amended to 1) create a bag and possession limit of one rainbow trout, with a minimum size limit of 18 inches in length, 2) restrict these waters to fishing with unbaited, single-hook, artificial lures only, and 3) create an open fishing season from May 15 through September 30; RC 62.

Discussion: The board heard testimony from the Midnight Sun Chapter of Trout Unlimited requesting that these three stocked landlocked lakes be managed for trophy rainbow trout. The department supported this proposal, suggested amended language, and provided additional information to the board.

BOF Action: Adopted

-continued-

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Proposal Number 40. 5 AAC 70.XXX. NEW SECTION. Adopt a new section in this chapter to provide the following:

- #1. The Dept. of Fish & Game will manage 10% of the stocked lakes for trophy fishing opportunities and they will designate those lakes according to and related to the geographic population centers of the license buying public with respect to the Inter Region (Tanana drainage) or statewide.
- #2. The Dept. will create the Fairbanks Trophy Fish Lakes specifically including “the outboard pit trophy Arctic char fishery”. “The Outboard Board Pit” and other designated waters and or species will be managed for trophy fishing by stocking large fish (hatchery breeders). The limit of trophy fish will be 1/year. Bait is allowed but maximum number of hooks are as follows. Summer duplex hook allowed. Winter ice fishing, bait allowed on single hooks (only 1 line personally attended at all times). Arctic char or (other species on other lakes) may be retained under 14” at current bag limits or at 22” (or other size acceptable). Other species may be kept under normal bag limits. The dept. may adjust seasons, bag limits and methods and means of taking predatory fish (burbot/pike) to promote trophy opportunities rather than poisoning those fish.

Proposed by: Don Duncan.

Amendments: None

Discussion: The board felt that this proposal was too broad, particularly in light of the action taken on Proposal #39. The concept of managing rainbow trout as a trophy species in interior Alaska, an area where they do not occur naturally, is one that needs to be tested in a few lakes before the program is expanded.

BOF Action: Failed

Proposal Number 41. 5 AAC 70.050. CLOSED WATERS.

This proposal would close the Tok River drainage to fishing for Arctic char/Dolly Varden. The proposed regulation reads as follows:

(r) The Tok River drainage is closed to fishing for Arctic char/Dolly Varden.

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: The board heard staff testimony that the stock abundance of Arctic char/Dolly Varden in the Tok River drainage has declined in recent years and that the stock needs to be protected from further exploitation in order for it to increase to its full potential.

BOF Action: Adopted

-continued-

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Proposal Number 42. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS. Amend this regulation for Minto Flats pike as follows:

Perhaps an annual limit, controlled by a punch card issued with our fishing license, could allow lower income individuals access to the resource in an economically viable fashion.

Fish and Game size limits and number limits would provide resource protection.

Proposed by: Ronald Fister

Amendments: None

Discussion: The board heard from the staff that northern pike in the Minto Flats area are fully utilized, and that adoption of this proposal would result in an increased harvest of northern pike in that area. Fish and Wildlife Protection commented that enforcement of this type of regulation would be extremely difficult.

BOF Action: Failed

Proposal Number 43. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would establish a bag and possession limit of five northern pike, of which only one may exceed 30 inches in length, in the Dalton Highway corridor (five miles on either side of the Trans-Alaska Pipeline alignment) north of the Yukon River. The proposed regulation reads as follows:

(a) Except as provided in (1)--(11) of this subsection, in all waters of the Arctic-Yukon-Kuskokwim Area other than the Tanana River drainage, the bag limits, possession limits, and size limits are as follows:

(13) In the Dalton Highway corridor (five miles on either side of the Trans-Alaska Pipeline alignment) north of the Yukon River, the bag and possession limit for northern pike is 5 fish, of which only one may exceed 30 inches in length.

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: Staff presented data which indicated that the recreational use and harvest along the Dalton Highway will increase substantially now that this road is open to the general public. The department recommended adopting a more conservative bag limit for northern pike in the Dalton Highway corridor before the stocks are over-harvested, i.e., be proactive rather than reactive.

BOF Action: Adopted

-continued-

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Proposal Number 44. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would establish a bag and possession limit of one lake trout, with a minimum size limit of 18 inches in length, in the Dalton Highway corridor (five miles on either side of the Trans-Alaska Pipeline alignment) north of the Yukon River. The proposed regulation reads as follows:

- (a) Except as provided in (1)--(11) of this subsection, in all waters of the Arctic-Yukon-Kuskokwim Area other than the Tanana River drainage, the bag limits, possession limits, and size limits are as follows:

(14) In the Dalton Highway corridor (five miles on either side of the Trans-Alaska Pipeline alignment) north of the Yukon River, the bag and possession limit for lake trout is one fish, lake trout less than 18 inches may not be possessed or retained; all lake trout less than 18 inches must be released immediately.

Proposed by: Alaska Department of Fish and Game.

Amendments: The board adopted staff language contained in RC 63, which established a “catch-and-release” regulation for lake trout in the Dalton Highway corridor.

Discussion: Staff presented data which indicated that the recreational use and harvest along the Dalton Highway will increase substantially now that this road is open to the general public. Current harvest and catch data showed that nearly all effort directed toward lake trout is within the Dalton Highway corridor. Distribution of this species is limited to approximately 12 lakes. Stock assessment of lake trout in the 1994 season showed depressed stock status. Due to this new information and because of the life history characteristics of lake trout (slow growing, late to sexually mature), the department recommended adopting a very conservative “catch-and-release” regulation for lake trout in the Dalton Highway corridor before the stocks are over-harvested, i.e., be proactive rather than reactive.

BOF Action: Adopted

Proposal Number 45. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would establish a bag and possession limit of five grayling, with a minimum size limit of 12 inches in length, in the Dalton Highway corridor (five miles on either side of the Trans-Alaska Pipeline alignment) north of the Yukon River. The proposed regulation reads as follows:

- (a) Except as provided in (1)--(11) of this subsection, in all waters of the Arctic-Yukon-Kuskokwim Area other than the Tanana River drainage, the bag limits, possession limits, and size limits are as follows:

-continued-

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(12) In the Dalton Highway corridor (five miles on either side of the Trans-Alaska Pipeline alignment) north of the Yukon river, the bag and possession limit for Arctic grayling is 5 fish. Grayling less than 12 inches may not be possessed or retained; all grayling less than 12 inches must be released immediately.

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: Staff presented data which indicated that the recreational use and harvest along the Dalton Highway will increase substantially now that the road is open to the general public. The department recommended adopting a more conservative bag limit for grayling in the Dalton Highway corridor before the stocks are over-harvested, i.e., be proactive rather than reactive.

BOF Action: Adopted

Proposal Number 46. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS. Amend this regulation to provide the following:

East (middle) fork of the Chena River from its confluence with the north fork to the headwaters of the east fork is designated as a trophy Arctic grayling fishing area. All grayling under 17” must be released immediately. Limit is 1 fish over 17” per year for nonresidents; limit 1 fish per day residents.

Proposed by: Don Duncan.

Amendments: None

Discussion: The staff reminded the board that the Chena River drainage was closed to the taking of grayling in 1990 due to low stock abundance. Furthermore, recent population estimates indicate that this stock is still below the level needed to sustain a consumptive fishery.

BOF Action: No action.

Proposal Number 47. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would expand the portion of the Chatanika River currently closed to the retention of grayling less than 12 inches in length to include the entire Chatanika River drainage. The proposed regulation reads as follows:

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(b) Except as provided in (1)--(8) of this subsection, in the Tanana River drainage bag, possession, and size limits are as follows:

(2) In the following waters, grayling less than 12 inches may not be possessed or retained all grayling less than 12 inches must be released immediately:

(F) the Chatanika River drainage [UPSTREAM FROM DEPARTMENT MARKERS PLACED APPROXIMATELY ONE MILE UPSTREAM FROM THE ELLIOT HIGHWAY BRIDGE].

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: The staff informed the board that nearly all of the road accessible grayling fisheries in the Tanana River drainage have a 12 inch minimum size limit due to the amount of fishing effort that occurs in these fisheries. These restrictions are necessary to ensure the sustained yield in these fisheries. The department indicated that this regulation needed to be expanded to encompass the entire Chatanika River drainage, not just the upper portion of the system.

BOF Action: Adopted

Proposal Number 48. 5 AAC 70.010. FISHING SEASONS, 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS., 5 AAC 70.035. METHODS AND MEANS., and 5 AAC 70.050. CLOSED WATERS.

This proposal would open the Chena River grayling fishery to some conservative level of grayling harvest.

At this time, the staff is uncertain as to the best course of action to recommend. The collection of survival data on Arctic grayling in the Chena River during the summer of 1994 will provide the necessary information on which recommendations can be made. The following is a list of possible options, one or more of which may be recommended after information gathered over the summer is analyzed.

- a) Re-open the entire river or selected portions of the river to consumptive harvest.
- b) Allow a restricted season opening for Chena River Arctic grayling.
- c) Establish daily bag, possession, and size limits consistent with sustained yield estimates.
- d) Continue with the current policy of no harvest.

Proposed by: Alaska Department of Fish and Game.

-continued-

Amendments: None

Discussion: The staff reminded the board that the Chena River drainage was closed to the taking of grayling in 1990 due to low stock abundance. Furthermore, recent population estimates indicate that this stock is still below the level needed to sustain a consumptive fishery. (This is similar to Proposal #46)

BOF Action: No action.

Proposal Number 49. 5 AAC 70.050. CLOSED WATERS.

This proposal would close the Nome River drainage to the taking of grayling. The proposed regulation reads as follows:

(r) The Nome Creek drainage is closed to the taking of grayling.

Proposed by: Alaska Department of Fish and Game.

Amendments: The board adopted the substitute language contained in RC 67.

Discussion: The staff presented information about the construction of a camping and outdoor recreation area in the Nome Creek drainage. Construction personnel and the greatly increased number of visitors anticipated to fish in Nome Creek is expected to exceed the capacity of the creek if a consumptive fishery is maintained. The creek and its grayling population are too small to sustain a consumptive fishery.

BOF Action: Adopted

Proposal Number 50. 5 AAC 70.050. CLOSED WATERS.

This proposal would change the list of waters where grayling may not be possessed or retained during the period April 1 through May 31. The proposed regulation reads as follows:

(i) in the following waters, [Arctic] grayling may not be possessed or retained from April 1 through May 31 [TO THE FIRST SATURDAY IN JUNE]:

- (1) Delta Clearwater River drainage;
- (2) Richardson Clearwater drainage;
- (3) Shaw Creek drainage, and all waters within a two mile radius of its confluence with the Tanana River;
- (4) Salcha River drainage [AND ITS TRIBUTARIES]; and

-continued-

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(5) [THE NOME CREEK DRAINAGE; AND]

(6) [THE] Chatanika River drainage [,UPSTREAM FROM DEPARTMENT MARKERS PLACED APPROXIMATELY ONE MILE UPSTREAM FROM THE ELLIOT HIGHWAY BRIDGE].

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: The staff explained that the sport fishing seasons for these waters were unnecessarily complicated, i.e., the season dates for grayling and northern pike are almost, but not quite, the same. This results in confusion and unintentional violations. Standardizing the season dates makes them easier for the public to understand, without affecting the health of the fishery resources.

BOF Action: Adopted

Proposal Number 51. 5 AAC 70.050. CLOSED WATERS., and 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would establish an open fishing season for grayling in the Tok River drainage from May 15 through October 31 and reduce the bag and possession limit to two fish. The proposed regulations read as follows:

5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS AND SIZE LIMITS.

v In the Tok River drainage, the bag and possession limit for grayling is two fish.

5 AAC 70.050. CLOSED WATERS.

r The Tok River drainage is closed to fishing for grayling from November 1 through May 14.

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: The staff told the board that the Tok River contains the only roadside accessible population of grayling in the Tok area. In 1993, the department estimated the overwinter grayling population in the Tok River at 5,600 fish. Recent harvest estimates average about 1,000 grayling per year from the Tok River; an 18% exploitation rate. The department believes that this exploitation rate is too high to sustain the fishery and the grayling population.

BOF Action: Adopted

-continued-

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Proposal Number 52. 5 AAC 70.050. WATERS CLOSED TO SPORT FISHING. Amend this regulation to provide the following:

Prohibit sport fishing of segregated stocks in terminal areas that are closed to subsistence harvest for those same stocks.

Proposed by: King Cove Advisory Committee

Amendments: None

Discussion: Current law gives a priority to the subsistence use of the fishery resources, requiring all other fisheries on a specific stock to be closed before closing the subsistence fishery harvesting that specific stock. The department confirmed that this was routinely accomplished via the department's emergency order authority when the situation required such action.

BOF Action: Failed

Proposal Number 53. 5 AAC 70. ARCTIC-YUKON-KUSKOKWIM AREA.

This proposal would result in adopting the current sport fishing regulations for the Arctic-Yukon-Kuskokwim Area in the same general format that the Board of Fisheries adopted for the Southeast Alaska, Prince William Sound, and Upper Copper River and Upper Susitna River areas last year. Reformatting the codified sport fishing regulations is a 3-year project which began last year, and contains no substantive changes to the existing regulations.

The proposed format for the codified sport fishing regulations is very similar to the format used in the sport fishing regulations summary booklet which is readily available to the public.

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: The staff explained that this was a continuation of the department's 3-year effort to reformat the sport fishing codified regulations. This process was initiated with concurrence from the board.

BOF Action: Adopted

Proposal Number 69. 5 AAC 70.050. WATERS CLOSED TO SPORT FISHING. Amend this regulation to provide the following:

Close all shallow chum salmon spawning streams (6 inches deep or less) in the Aniak River drainage to sport fishing in years when there is a chum salmon conservation problem or when subsistence fishing is closed.

Proposed by: Central Kuskokwim Advisory Committee.

-continued-

Amendments: None

Discussion: The board heard testimony from the staff that very little of the sport fishing effort takes place in water less than six inches deep. Also, a recent research report regarding the impact of jet boats on the survival of fish eggs in shallow water (by the University of Alaska) indicated that there was no significant effect. Fish and Wildlife Protection stated that this proposal, if adopted, would be virtually impossible to enforce.

BOF Action: Failed

Proposal Number 70. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS. Amend this regulation for the Aniak River as follows:

King salmon - 2 or 3 per day with only 1 over 30”.

Proposed by: Alaska Dream Lodge - Larry Jarrett

Amendments: None

Discussion: The board took no action on this proposal because of the action they took on proposal #71.

BOF Action: No action.

Proposal Number 71. 5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS.

This proposal would increase the bag and possession limit of king salmon in the Kuskokwim River drainage from one fish to three fish. The proposed regulation reads as follows:

(3) In all waters flowing into the Bering Sea from Cape Darby to Cape Prince of Wales[,] and the Unalakleet River drainage [AND THE KUSKOKWIM RIVER DRAINAGE], the bag and possession limit for king salmon is one fish.

Proposed by: Alaska Department of Fish and Game.

Amendments: None

Discussion: The staff presented information regarding the restrictive actions taken in 1988 in all of the Kuskokwim River fisheries to rebuild the king salmon population. Subsequently, as the king salmon population has increased, the guideline harvest levels for king salmon in the commercial fishery have increased from 14,000 to 51,000 without any corresponding increase in the sport fish bag and possession limit. Data was presented showing that the sport harvest of king salmon in the Kuskokwim River drainage averages about 500 fish per year for the past five years, i.e. about one-half of one percent.

BOF Action: Adopted

APPENDIX B

Appendix B. –Sport fishing effort by location in the Arctic-Yukon-Kuskokwim Region, 1980-1994.

Fishery	^a Effort (Angler-Days) by Year														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Tanana Area:															
Chena River ^b	30,654	26,753	40,535	40,902	40,223	27,133	35,030	25,065	31,851	37,562	29,361	21,138	12,654	21,649	27,194
Piledriver Slough	NR ^c	NR	NR	4,148	4,651	NR	NR	13,267	24,375	22,746	27,705	17,703	13,607	17,263	11,369
Nenana River Drain.	NR	NR	NR	NR	NR	NR	NR	1,575	1,912	1,719	724	1,550	1,863	1,026	1,020
Chatanika River	5,576	4,691	9,417	10,757	8,605	10,231	7,783	11,065	11,642	12,210	11,801	8,085	6,775	7,671	7,272
Salcha River	8,858	8,090	14,126	11,802	8,449	13,109	13,792	10,576	7,494	9,704	9,783	11,242	4,833	7,313	7,653
Delta Clearwater R.	4,240	4,673	4,231	5,867	5,139	8,722	10,137	5,397	5,184	5,368	4,853	5,594	3,862	4,909	3,984
Goodpaster River	NR	NR	NR	1,989	766	2,844	933	3,061	1,037	1,930	2,083	786	1,430	1,162	825
Tanana River	NR	NR	NR	NR	2,195	988	9,449	5,940	4,965	4,850	4,593	5,115	6,102	5840	4,816
Brushkana Creek	NR	NR	NR	NR	NR	NR	550	674	1,114	887	725	666	1,120	1,149	1,277
Shaw Creek	NR	NR	NR	NR	2,195	1,248	2,003	797	NR	488	1,462	773	491	732	541
Richardson Clear.	NR	916	1,365	1,349	NR	NR	NR	NR	NR	1,364	518	1,199	1,355	514	566
Delta R. (below Tangle Lakes)	NR	NR	NR	NR	NR	624	NR	NR	800	388	958	679	790	1,142	1,040
Other Stream	NR	NR	NR	19,054	10,904	12,675	7,378	7,556	10,578	6,168	7,653	4,628	4,164	6,360	5,209
Birch Lake	17,036	14,233	16,677	15,882	13,170	14,444	9,969	15,375	15,607	14,284	15,541	13,893	10,072	10,447	9,880
Quartz Lake	13,994	19,599	18,254	14,162	15,922	16,456	18,486	20,410	19,391	18,299	19,746	15,478	13,486	17,613	14,031
Fielding Lake	NR	1,369	2,764	1,737	871	1,023	1,682	1,032	1,728	1,664	1,255	1,572	1,803	1,827	2,129
Minto Lakes	2,727	2,045	1,791	1,281	1,829	2,011	3,318	1,539	1,564	699	932	1,532	2,401	3,911	6,229
Tangle Lakes	8,168	5,530	9,502	5,513	3,954	5,601	5,122	2,530	2,656	3,991	5,228	6,407	4,791	8,937	7,525
Chena Lakes	NR	NR	NR	NR	11,044	11,288	8,853	9,472	9,404	16,180	12,875	9,444	6,007	6,688	2,828
Harding Lake	NR	NR	NR	NR	1,707	NR	2,064	5,125	3,256	4,935	3,895	5,155	5,068	4,885	4,913
Dune Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	2,296	815	799	854	587	744
East Twin Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	765	1,035	679	950	406	NR
George Lake	1,057	1,351	989	860	1,254	1,127	1,957	1,467	964	610	1,540	1,931	1,067	772	594
Volkmar Lake	NR	458	546	270	NR	1,052	608	NR	NR						
Koole Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	433	686	NR	NR	NR	886
Healy Lake	NR	NR	NR	NR	NR	NR	NR	NR	NR	954	NR	NR	NR	NR	NR
Steese Ponds	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1,785	960	2,142	1,302
Chena Hot Springs Road Ponds	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	2,224	1,206	1,655	2,098
Meadow Road Lakes	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	2,975	1,751	5,894	5,270
Coal Mine Road	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	1,230	565	771	782
Other Lakes	NR	NR	NR	9,813	12,874	6,898	6,431	14,148	19,996	15,924	19,120	10,349	9,669	NR	14,976
Other	39,184	25,391	30,333	NR	533										
Total	131,494	115,099	150,530	145,386	145,752	136,422	144,937	156,061	175,518	186,418	184,887	155,663	120,837	160,117	148,633

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Fishery	Effort (Angler -Days) by Year														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
AYK Region, Yukon River Sub-area:															
Koyukuk River	1,299	852	1,855	6,120	2,194	2,184	6,644	3,151	2,799	3,476	4,790	2,139	3,359	2,378	3,628
Porcupine River	1,360	1,116	930	387	279	624	46	74	730	213	558	1,089	854	644	118
Andreafsky River	616	9	100	118	17	NR	122	72	91	184	415	348	331	451	1,478
Innoko River	26	184	NR ^b	51	35	NR	31	NR	164	219	563	520	85	637	93
Anvik River	13	NR	NR	51	NR	NR	NR	NR	728	795	95	1,609	854	1,905	125
Nulato River	13	NR	14	NR	87	NR	NR	347	NR	553	237	55	107	26	13
Melozitna River	171	37	215	17	87	NR	NR	NR	73	415	47	62	149	24	58
Nowitna River	65	211	517	388	122	312	269	453	946	691	686	1,275	673	446	733
Dall River	250	498	473	405	1,428	139	596	545	217	438	273	359	224	845	455
Chandalar River	228	372	184	120	NR	17	46	149	179	57	249	111	227	NR	81
Charley River	NR	37	43	354	NR	139	NR	135	31	69	152	124	245	247	279
Fortymile River	39	156	373	810	139	139	31	135	273	57	309	285	297	356	249
Other above Tanana	459	267	545	220	559	451	232	238	493	350	769	584	1,375	NR	NR
Other below Tanana	526	357	473	455	558	642	239	722	710	537	382	567	707	NR	NR
Yukon Dr. Lakes	513	676	366	1,179	854	1,214	942	550	420	1,318	3,154	508	758	460	485
Other Yukon River	1,261	1,905	4,945	564	121	2,411	259	446	443	1,100	2,860	1,021	1,876	470	633
Total	6,859	6,677	11,033	11,239	6,480	8,272	9,457	7,017	8,297	10,472	15,539	10,656	10,432	14,011	12,872

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Fishery	Effort (Angler -Days) by Year														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Kuskokwim River Sub-area:															
Kuskokwim Bay/Lower Kuskokwim River															
Kanektok River	1,193	265	1,507	1,517	6,881	4,873	8,825	9,689	12,697	4,176	4,525	3,078	4,972	5,245	6,505
Goodnews River	592	NR	503	742	1,010	4,214	229	2,372	1,219	1,315	4,528	1,468	1,451	469	2,038
Kwethluk River	158	NR	115	523	383	173	183	797	NR	1,882	1,048	306	640	47	NR
Aniak River	NR	NR	NR	287	383	87	1,116	507	2,437	4,035	1,964	3,129	2,529	1,426	1,815
Kisaralik River	26	27	187	1,383	NR	NR	NR	362	NR	554	106	281	619	NR	1,463
Kasigluk River	NR	NR	NR	303	NR	NR	NR	NR	NR	115	66	37	203	NR	NR
Other Streams	1,065	560	2,281	574	836	798	153	1,014	4,111	908	371	1,289	690	2,497	3,901
Lakes	407	479	675	NR	227	NR	428	91	NR	469	199	486	507	NR	1,157
Upper Kuskokwim River															
Holitna River	NR	28	387	556	279	312	98	833	346	877	398	1,022	533	NR	949
Hoholitna River	NR	NR	574	NR	NR	NR	NR	54	NR	19	146	NR	NR	NR	NR
Takotna River	131	92	43	540	70	104	46	743	473	606	119	192	25	NR	NR
Salmon River	NR	NR	NR	NR	488	260	NR	NR	62	335	1,274	115	64	NR	NR
Other Streams	4,027	6,810	5,815	5,144	2,648	260	179	1,014	932	566	409	1,078	1,388	NR	NR
Lakes	NR	65	129	860	591	173	31	NR	491	187	292	300	598	NR	NR
Total	7,599	8,326	12,216	12,429	13,796	11,254	11,288	17,476	22,768	16,044	15,495	12,781	14,219	9,684	18,177

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Fishery	Effort (Angler -Days) by Year														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
North Slope Subarea:															
SALTWATER:															
Boat					2,090			34	62	82	34	231	75	70	
Shoreline					3,658	891	955	1,090	743	308	285	523	312	261	
SALTWATER TOTAL				1,282	5,748	891	955	1,124	805	390	319	754	387	331	
FRESHWATER:															
Sagavanirktok River											493	2,282	1,366	2,118	
Other Dalton Hwy Streams					993	1,856	793	686	992	982	399	602	800	1,085	
Other Streams				3,949 ^d	540	1,002	1,634	1,866	807	1,720	1,474	2,383	1,650	1,303	
Dalton Hwy Lakes					662	185	170	668	158	390	852	343	310	218	
Other Lakes				388 ^d	401	556	1,227	912	36	227	636	927	427	545	
FRESHWATER TOTAL:				4,337	2,596	3,599	3,824	4,132	1,993	3,445		6,537	4,553	5,269	
GRAND Total	2,142 ^e	2,601 ^e	4,879 ^e	5,619	8,344	4,490	4,779	5,256	2,541	3,764	4,118	7,291	4,940	5,600	

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Fishery	Effort (Angler -Days) by Year														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Seward Peninsula-Norton Sound Sub-area:															
SALTWATER:															
Boat	NR	NR	NR	2,178	1,934	278	283	688	272	481	1,372	325	2,009	665	1,892
Shoreline		NR	NR	2,088	2,944	1,500	567	344	550	1,768	1,644	1,179	1,324	1,210	746
SALTWATER TOTAL			NR	4,266	4,878	1,778	850	1,032	822	2,249	2,966	1,504	3,333	1,875	2,638
FRESHWATER:															
Nome River			NR	3,908	5,714	5,681	6,023		5,639	6,569	6,609	4,609	6,306	3,562	4,953
Pilgrim River			NR	597					4,729	1,645	1,627	3,085	1,184	1,017	808
Unalakleet River			NR	4,057	2,073	5,528	6,457			1,701	3,957	5,518	2,209	2,118	1,709
Fish-Niukluk River System				1,939					2,183	1,992	2,059	2,470	2,635	3,589	2,859
Sinuk River												885	1,504	874	1,132
Snake River												2,384	2,379	1,468	880
Solomon River												1,057	950	1,404	1,123
Kuzitrin River												750		463	NR
Other Streams				2,058	4,771	6,279	2,889	18,099	6,812	3,487	4,468	1,342	2,172	2,478	2,820
Lakes				119		653	1,888	2,282	93	49	113	18	12	82	NR
FRESHWATER TOTAL:				12,678	12,558	18,141	17,257	20,381	19,456	15,433	18,833	22,118	19,351	17,055	16,284
GRAND Total	7,968	10,879	13,198	16,944	17,436	19,919	18,107	21,413	20,278	17,692	21,799	23,622	22,684	18,930	18,922

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Fishery	Effort (Angler -Days) by Year														
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Kotzebue Area:															
SALTWATER:															
Boat					827	120	31	194		59		186	310	118	62
Shoreline					1,254	192	538	739	31	420	100	1,248	78	498	387
SALTWATER TOTAL					2,081	312	569	933	31	479	100	1,434	388	616	449
FRESHWATER:															
Kobuk River		2,389	2,405	2,148			2,508	4,864		1,465	1,306	2,206	1,526	2,015	919
Noatak River		1,505	1,518	1,372		2,991	1,116	3,313		2,469	1,306	3,708	2,273	2,046	1,442
Wulik River			580	805										NR	NR
Other Streams		1,325	2,337	2,206	5,240	3,159	1,890	1,010	4,702	219	719	1,889	1,331	2,548	2,805
Lakes				1,432	470	239	230	101	546	300	351	306	627	584	421
FRESHWATER TOTAL		5,219	6,840	7,963	5,710	6,389	5,744	9,288	5,248	4,453	3,682	8,109	5,757	7,193	5,587
GRAND Total	3,841	5,219	6,840	7,963	7,791	6,701	6,313	10,221	6,279	4,932	3,782	9,543	6,145	7,809	6,036

^a From Mills (1978-1992).
^b The Chena River and tributaries including Badger Slough.
^c No effort or harvest reported.
^d Estimates include Dalton Highway streams and lakes but specific locations are not recorded.
^e Estimates not specific to location.

APPENDIX C

Appendix C.-Number and species of fish stocked in Tanana River Valley waters, 1993-1994.

AREA	Location	Species	Lifestage	1993	1994	
Delta	Backdown L.	Arctic char	Fingerling	1,200	0	
		Rainbow trout	Fingerling	0	1,383	
	Big D Pond	Arctic char	Subcatchable	0	100	
		Rainbow trout	Catchable	105	100	
	Bluff Cabin L.	Rainbow trout	Fingerling	14,500	0	
	Bolio L.	Arctic char	Fingerling	161,780	0	
			Coho salmon	Subcatchable	0	0
				Fingerling	0	10,000
	Brodie L.	Rainbow trout	Catchable	0	0	
			Arctic char	Fingerling	1,000	0
				Arctic grayling	Fingerling	0
	Bullwinkle L.	Arctic char	Fingerling	0	800	
			Rainbow trout	Fingerling	800	0
	Chet L.	Arctic char	Fingerling	0	1,600	
			Lake trout	Fingerling	0	800
	Coal Mine #5	Rainbow trout	Fingerling	1,875	790	
			Arctic char	Fingerling	2,600	0
			Catchable	0	750	
			Subcatchable	0	0	
	Craig L.	Rainbow trout	Catchable	0	850	
			Subcatchable	0	0	
			Fingerling	3,500	0	
	Crystal L #2	Lake trout	Fingerling	0	11,753	
	Dicks Pond	Arctic char	Fingerling	1,000	1,000	
	Doc L.	Rainbow trout	Fingerling	500	0	
	Donna L.	Rainbow trout	Fingerling	11,750	0	
	Donnelly L.	Arctic char	Fingerling	0	0	
			Rainbow trout	Fingerling	13,000	0
	Forest L.	Rainbow trout	Fingerling	2,515	0	
	Four Mile L.	Lake trout	Fingerling	0	20,000	
			Rainbow trout	Fingerling	20,000	0
	Ghost L.	Arctic char	Fingerling	0	0	
			Lake trout	Fingerling	0	1,000
			Rainbow trout	Fingerling	1,000	0
Hidden L. (Tok)	Rainbow trout	Fingerling	4,000	0		
J Lake	Arctic grayling	Fingerling	3,000	0		

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AREA	Location	Species	Lifestage	1993	1994
Delta		Coho salmon	Fingerling	0	3,000
Continued	Jan L.	Coho salmon	Fingerling	0	9,000
		Rainbow trout	Fingerling	9,130	0
	Kens Pond	Arctic char	Fingerling	1,000	0
		Rainbow trout	Fingerling	0	790
	L Donna L.	Rainbow trout	Fingerling	6,063	0
	Last L.	Arctic char	Fingerling	1,000	0
		Rainbow trout	Fingerling	0	0
	Lisa L.	Rainbow trout	Fingerling	10,125	1,067
	Luke L.	Arctic grayling	Fingerling	0	1,600
	Mark L.	Coho salmon	Fingerling	0	3,600
		Rainbow trout	Fingerling	3,687	0
	Monte L	Rainbow trout	Fingerling	18,071	0
	N Twin L	Lake trout	Fingerling	0	2,000
		Rainbow trout	Fingerling	4,063	1,976
	Nickel L	Arctic grayling	Fingerling	0	500
		Lake trout	Fingerling	0	500
		Rainbow trout	Fingerling	1,250	0
	No Mercy L	Rainbow trout	Fingerling	600	0
	Pauls Pond	Arctic char	Fingerling	1,000	0
		Arctic grayling	Fingerling	0	1,000
	Quartz L	Arctic char	Fingerling	0	30,000
		Chinook salmon	Catchable	12,568	0
		Coho salmon	Subcatchable	7,655	0
			Fingerling	160,600	91,104
		Rainbow trout	Fingerling	420,901	380,406
	Rainbow L	Rainbow trout	Fingerling	9,750	8,600
	Rangeview L	Arctic char	Fingerling	800	0
		Arctic grayling	Fingerling	0	800
		Lake trout	Fingerling	0	800
	Rapids L	Lake trout	Fingerling	0	1,800
		Rainbow trout	Fingerling	1,031	0
	Rich 81	Arctic grayling	Fingerling	600	600
	Robertson L #2	Rainbow trout	Fingerling	3,000	0
	Rockhound L	Rainbow trout	Fingerling	600	0

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AREA	Location	Species	Lifestage	1993	1994
Delta	S Johnson L	Rainbow trout	Fingerling	0	0
Continued	S Twin L	Coho salmon	Subcatchable	0	0
		Rainbow trout	Fingerling	4,063	4,732
	Shaw Pond	Arctic char	Subcatchable	0	300
		Coho salmon	Subcatchable	0	0
		Rainbow trout	Catchable	350	300
	Sheefish L	Arctic char	Fingerling	0	1,600
		Arctic grayling	Fingerling	1,600	0
	Weasel L	Rainbow trout	Fingerling	0	671
	Delta Total			923,632	598,672
Fairbanks	Ballaine L	Rainbow trout	Catchable	0	0
	Bathing Beauty	Arctic char	Subcatchable	0	700
		Arctic grayling	Catchable	0	700
		Chinook salmon	Catchable	0	600
		Rainbow trout	Brood stock	0	165
			Catchable	0	3,901
	Birch L	Arctic char	Subcatchable	0	24,028
		Arctic grayling	Fingerling	20,000	20,000
		Chinook salmon	Catchable	12,861	0
		Coho salmon	Subcatchable	8,830	0
			Fingerling	79,800	44,900
		Rainbow trout	Catchable	12,256	0
			Subcatchable	15,956	24,726
	Chena Hs #30.0	Arctic grayling	Fingerling	600	0
		Rainbow trout	Fingerling	0	0
	Chena Hs #30.9	Rainbow trout	Fingerling	0	600
	Chena Hs #45.5	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	1,600
	Chena Hs #47.9	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	300
	Chena L	Arctic char	Catchable	6,000	0
			Subcatchable	0	10,000
		Arctic grayling	Fingerling	15,000	23,835

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AREA	Location	Species	Lifestage	1993	1994
Fairbanks		Chinook salmon	Catchable	5,209	6,589
Continued		Coho salmon	Catchable	0	0
			Subcatchable	3,160	0
			Fingerling	60,000	15,000
		Rainbow trout	Catchable	16,139	0
			Subcatchable	0	16,628
	Chena R	Arctic grayling	Catchable	64,936	61,435
	Duck Pond #1	Arctic char	Catchable	0	0
		Rainbow trout	Catchable	210	100
	Dune L	Arctic grayling	Fingerling	0	18,000
		Coho salmon	Subcatchable	3,000	0
			Fingerling	0	18,000
		Rainbow trout	Fingerling	18,000	0
	Fun Fish Day	Arctic char	Brood stock	81	0
			Catchable	0	0
		Arctic grayling	Catchable	50	300
		Rainbow trout	Brood stock	585	27
			Catchable	0	499
	Geskakmina L	Coho salmon	Subcatchable	3,000	0
			Fingerling	0	10,634
		Rainbow trout	Fingerling	12,750	0
	Grayling L	Arctic char	Brood stock	1,100	0
			Catchable	0	1,100
		Arctic grayling	Catchable	1,100	1,100
			Fingerling	20,000	0
		Rainbow trout	Catchable	1,096	1,479
	Hanger Pit	Arctic grayling	Fingerling	0	0
		Rainbow trout	Catchable	0	0
			Fingerling	2,600	0
	Harding L	Arctic char	Catchable	10,000	0
			Subcatchable	0	10,000
	Hidden L (Fai)	Arctic char	Brood stock	950	0
			Catchable	0	900
		Arctic grayling	Fingerling	10,000	0
		Rainbow trout	Catchable	1,000	1,232
	Johnson Pit #1	Arctic grayling	Fingerling	2,800	0
		Rainbow trout	Catchable	0	0

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AREA	Location	Species	Lifestage	1993	1994
Fairbanks			Fingerling	0	2,800
Continued	Koole L	Rainbow trout	Fingerling	32,266	32,000
	L Harding L	Coho salmon	Fingerling	22,000	0
		Rainbow trout	Subcatchable	0	2,838
	Les L	Rainbow trout	Fingerling	0	1,800
	Long Pond	Arctic grayling	Fingerling	400	1,400
	Lost L	Arctic char	Brood stock	1,100	0
			Catchable	0	1,000
		Coho salmon	Catchable	0	0
		Rainbow trout	Brood stock	0	57
	Lost L	Rainbow trout	Catchable	4,825	4,773
	Lundgren Pond	Coho salmon	Subcatchable	0	0
			Fingerling	0	600
		Rainbow trout	Catchable	0	303
	Manchu L	Arctic char	Fingerling	8,600	0
		Rainbow trout	Fingerling	0	8,600
	Moose L (Fai)	Arctic grayling	Catchable	1,300	1,300
		Rainbow trout	Catchable	1,366	0
	Nenana City Pond	Coho salmon	Subcatchable	0	0
		Rainbow trout	Brood stock	0	58
			Catchable	0	1,160
	North Pole Pond	Arctic grayling	Catchable	300	300
		Chinook salmon	Catchable	0	715
		Coho salmon	Subcatchable	0	0
		Rainbow trout	Brood stock	0	100
			Catchable	871	800
	Olnes Pond	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	1,600
	Otto L	Arctic grayling	Fingerling	7,231	0
		Coho salmon	Subcatchable	0	0
		Rainbow trout	Catchable	0	1,201
	Outboard Pit	Arctic char	Brood stock	1,501	0
			Catchable	0	1,500
		Chinook salmon	Catchable	0	6,084
		Coho salmon	Subcatchable	0	0

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AREA	Location	Species	Lifestage	1993	1994
Fairbanks		Rainbow trout	Brood stock	0	160
			Catchable	1,500	1,849
Continued	Piledriver Sl	Rainbow trout	Brood stock	1,003	690
			Catchable	44,667	25,090
	Plack Road Pit	Arctic char	Brood stock	300	0
			Catchable	0	100
	Rich 28	Coho salmon	Subcatchable	0	0
			Fingerling	0	0
			Fry	4,400	0
		Rainbow trout	Catchable	0	0
			Fingerling	0	1,600
	Rich 31	Arctic char	Fingerling	900	900
		Coho salmon	Subcatchable	0	0
		Rainbow trout	Catchable	0	0
	Round Pond	Arctic grayling	Fingerling	700	700
		Sansing L	Arctic char	Catchable	0
		Arctic grayling	Fingerling	10,000	0
			Fry	0	0
		Coho salmon	Subcatchable	0	0
		Rainbow trout	Catchable	0	0
			Fingerling	0	1,035
	Silver Fox Pit	Arctic char	Subcatchable	0	600
		Arctic grayling	Fingerling	0	0
		Coho salmon	Subcatchable	0	0
		Rainbow trout	Catchable	0	0
	Steese Hwy 29.5	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	1,800
	Steese Hwy 30.6	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	500
	Steese Hwy 31.6	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	800
	Steese Hwy 33.0	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	1,400
	Steese Hwy 33.5	Arctic grayling	Fingerling	0	0
		Rainbow trout	Fingerling	0	600

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AREA	Location	Species	Lifestage	1993	1994	
Fairbanks Continued	Steese Hwy 34.6	Arctic grayling	Fingerling	0	0	
		Rainbow trout	Fingerling	0	1,200	
	Steese Hwy 35.8	Arctic grayling	Fingerling	0	0	
		Rainbow trout	Fingerling	0	500	
	Steese Hwy 36.6	Arctic grayling	Fingerling	0	0	
		Rainbow trout	Fingerling	0	1,800	
	Steese Hwy 39.2	Arctic grayling	Fingerling	0	0	
		Rainbow trout	Fingerling	0	1,000	
	Summit L (Parks Hwy)	Lake trout	Fingerling	0	13,950	
	Wainwright #6		Arctic grayling	Catchable	300	300
			Rainbow trout	Catchable	0	300
	Weigh Station #1		Arctic grayling	Catchable	300	200
			Chinook salmon	Catchable	0	0
			Rainbow trout	Catchable	250	206
	Weigh Station #2		Arctic grayling	Catchable	300	200
			Chinook salmon	Catchable	0	0
			Rainbow trout	Catchable	250	202
Fairbanks Total				555,699	448,342	

APPENDIX D

Appendix D.-From Mills 1994 FDS 94-28 and Howe et al. 1995 FDS 95-24.

Appendix A98. Tanana River Drainage Area^a sport fish harvest and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	LL	KO	CS	LT	DV AC	RT	GR ^c	GR ^d	WF	SF	NP ^e	NP ^f	BB	OTHER
Upper Chena River	2,865	5,654	6,018	0	0	0	0	0	0	0	0	0	0	70	0	9	10	11	20
Lower Chena River ^g	5,163	12,931	15,631	733	0	0	0	9	0	0	0	0	0	26	0	232	31	1,124	0
Piledriver Slough	4,764	16,749	17,263	0	0	0	0	9	0	0	6,007	289	470	0	0	103	29	568	0
Nenana River Drainage	481	989	1,026	0	0	0	0	0	0	58	0	125	225	0	0	34	0	11	0
Chatanika River	4,270	6,347	7,671	192	0	0	0	0	0	0	0	1,299	702	558	74	1,120	224	0	0
Salcha River	3,672	6,793	7,313	601	0	0	0	194	0	0	0	277	1,491	9	0	24	3	64	0
Delta Clearwater River	1,491	3,627	4,909	0	48	0	0	0	0	0	0	0	437	0	0	0	0	0	0
Goodpaster River	493	838	1,162	0	0	0	0	0	0	0	0	461	127	0	0	7	2	86	0
Brushkana Creek	830	786	1,149	0	0	0	0	0	0	0	0	364	193	0	0	0	0	0	0
Lower Tanana River	321	436	459	0	0	0	0	0	0	0	0	0	0	0	0	101	29	11	0
Middle Tanana River	1,380	3,632	3,862	0	0	0	0	0	0	19	0	11	36	0	9	383	101	2,460	0
Upper Tanana River	526	1,308	1,519	0	96	0	0	0	0	0	0	155	134	9	0	19	9	685	0
Shaw Creek	424	550	732	0	0	0	0	45	0	0	0	318	65	0	0	0	0	161	0
Richardson Clearwater River	368	393	514	0	0	0	0	9	0	0	0	222	183	0	0	0	0	0	0
Delta River (below Tangle Lakes)	407	473	1,142	0	0	0	0	0	0	0	0	277	199	0	0	0	0	0	0
Other Streams	2,885	3,817	6,360	19	134	0	0	17	59	83	208	999	756	103	0	315	58	289	0
Birch Lake	5,825	7,605	10,447	0	0	4,041	0	0	0	0	11,332	0	0	0	0	0	0	0	59
Quartz Lake	9,039	13,520	17,613	0	0	8,977	0	0	0	0	18,699	0	0	0	0	0	0	0	0
Fielding Lake	1,065	1,204	1,827	0	0	0	0	0	276	0	0	264	791	0	0	0	0	32	0
Minto Flats	1,857	2,443	3,911	19	0	0	0	88	0	0	0	234	0	0	17	1,906	170	0	0
Tangle Lakes and Tangle River	4,419	4,459	8,937	0	0	0	0	0	597	0	0	1,853	1,888	157	0	0	0	11	0
Chena Lake (Lake only)	3,386	6,175	6,668	0	0	1,219	0	0	0	595	5,628	150	37	0	0	0	0	0	0
Harding Lake	3,015	4,172	4,885	0	0	0	0	0	132	107	245	234	0	0	0	153	238	0	0
Dune Lake	412	386	587	0	0	300	0	0	0	0	293	0	89	0	0	0	0	0	0
East Twin Lake	372	309	406	0	0	0	0	0	0	0	0	0	0	0	0	250	34	0	0
George Lake	498	493	772	0	0	0	0	0	0	0	0	28	31	0	0	316	126	43	0
Grayling Lake	260	867	795	0	0	0	0	0	0	517	30	0	0	0	0	0	0	0	0
Jan Lake	371	526	658	0	0	0	0	0	0	0	437	8	0	0	0	0	0	0	0
Sansing Lake	335	737	1,374	9	0	0	0	0	0	0	663	0	121	0	0	0	0	0	0
Steese Ponds	1,080	1,920	2,142	0	0	0	0	0	0	97	208	20	246	0	0	45	19	0	0
Chena Hot Springs Road Ponds	992	1,156	1,655	0	0	0	0	0	0	195	226	67	266	0	0	15	4	11	0
Meadow Road Lakes	1,018	3,685	5,894	0	0	984	0	0	286	818	2,157	123	381	0	0	0	0	0	0
Coal Mine Road Lakes	312	654	771	0	0	0	0	0	82	0	59	0	0	0	0	0	0	0	0
Other Lakes	6,051	11,099	14,045	0	0	213	0	0	507	1,384	3,501	445	567	52	0	1,358	235	150	0
TOTAL	33,343^h	126,733	160,117	1,573	278	15,734	0	371	1,939	3,873	49,693	8,223	9,435	984	100	6,390	1,322	5,717	79

^a Tanana River Drainage (Area U): The entire Tanana River watershed, excluding all portions of the Yukon and Kuskokwim Rivers watersheds.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Arctic grayling less than 12 inches.

^d Arctic grayling 12 inches and over.

^e Northern pike 30 inches and under.

^f Northern pike over 30 inches

^g Includes Badger Slough which is sometimes called Chena Slough.

^h Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A99. Tanana River Drainage Area^a sport fish catch and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days		KS	SS	LL	KO	CS	LT	DV		GR ^c	GR ^d	WF	SF	NP ^e	NP ^f	BB	OTHER
			Fished								AC	RT								
Upper Chena River	2,865	5,654	6,018	100	0	0	0	0	303	0	0	0	11,424	5,749	122	0	46	10	11	20
Lower Chena River ^g	5,163	12,931	15,631	2,445	0	0	0	0	257	0	0	0	20,664	6,569	26	65	1,313	118	1,317	0
Piledriver Slough	4,764	16,749	17,263	9	0	0	0	0	18	0	0	23,327	24,957	7,079	43	0	325	51	760	0
Nenana River Drainage	481	989	1,026	0	52	0	0	0	18	0	253	0	2,935	1,663	0	0	254	49	21	0
Chatanika River	4,270	6,347	7,671	625	196	0	0	0	0	0	0	0	10,252	4,031	558	102	3,822	1,020	0	0
Salcha River	3,672	6,793	7,313	1,788	0	0	0	0	1,052	0	0	0	4,571	6,683	17	0	191	3	75	0
Delta Clearwater River	1,491	3,627	4,909	0	1,695	0	0	0	101	0	0	0	3,074	2,638	50	0	0	0	0	0
Goodpaster River	493	838	1,162	0	0	0	0	0	28	0	0	0	1,217	706	0	0	64	2	86	0
Brushkana Creek	830	786	1,149	0	0	0	0	0	0	0	10	0	1,804	1,389	0	0	0	0	0	0
Lower Tanana River	321	436	459	0	0	0	0	0	0	0	78	0	287	104	0	0	473	174	21	0
Middle Tanana River	1,380	3,632	3,862	0	29	0	0	0	9	0	58	0	49	82	47	9	875	142	2,717	0
Upper Tanana River	526	1,308	1,519	0	716	0	0	0	0	0	0	0	242	313	17	0	75	10	889	0
Shaw Creek	424	550	732	0	0	0	0	0	45	0	0	0	793	1,410	0	0	0	0	161	0
Richardson Clearwater River	368	393	514	0	0	0	0	0	9	0	0	0	262	1,530	0	0	0	0	0	0
Delta River (below Tangle Lakes)	407	473	1,142	0	0	0	0	0	9	9	0	0	6,028	2,572	0	0	0	0	0	0
Other Streams	2,885	3,817	6,360	208	1,170	0	0	0	58	100	494	665	6,772	6,142	134	65	1,894	278	311	10
Birch Lake	5,825	7,605	10,447	0	0	6,788	0	0	0	0	0	29,250	0	0	0	0	0	0	0	118
Quartz Lake	9,039	13,520	17,613	0	0	19,233	0	0	0	0	0	43,654	0	0	0	0	0	0	0	0
Fielding Lake	1,065	1,204	1,827	0	0	0	0	0	0	939	0	0	3,707	3,963	9	0	0	0	32	0
Minto Flats	1,857	2,443	3,911	28	0	0	0	0	423	0	0	0	695	37	9	17	14,298	5,238	0	0
Tangle Lakes and Tangle River	4,419	4,459	8,937	0	0	0	0	0	2,668	0	0	0	15,200	8,127	227	0	0	0	21	0
Chena Lake (Lake only)	3,386	6,175	6,668	0	0	2,560	0	0	0	0	2,963	14,310	1,183	98	0	0	0	0	39	0
Harding Lake	3,015	4,172	4,885	0	0	0	0	0	0	438	195	417	435	219	0	0	5,422	619	0	0
Dune Lake	412	386	587	0	0	437	0	0	0	0	0	3,060	491	215	0	0	0	0	0	0
East Twin Lake	372	309	406	0	0	0	0	0	0	0	0	0	0	0	17	0	2,657	428	0	0
George Lake	498	493	772	0	0	0	0	0	0	0	0	0	28	31	0	0	2,339	281	43	0
Grayling Lake	260	867	795	0	0	0	0	0	0	0	750	69	169	27	26	0	35	12	0	0
Jan Lake	371	526	658	0	0	0	0	0	0	0	132	3,034	8	0	0	0	0	0	0	0
Sansing Lake	335	737	1,374	9	0	0	0	0	0	0	29	1,632	230	153	0	0	0	0	0	0
Steese Ponds	1,080	1,920	2,142	0	0	22	0	0	0	20	244	1,752	1,795	246	9	0	202	41	21	0
Chena Hot Springs Road Ponds	992	1,156	1,655	0	0	0	0	0	0	0	195	1,021	960	384	0	0	15	4	11	0
Meadow Road Lakes	1,018	3,685	5,894	0	0	1,353	0	0	1,298	2,591	7,765	1,543	2,179	0	0	0	28	0	0	0
Coal Mine Road Lakes	312	654	771	0	0	0	0	0	0	368	68	692	224	19	0	0	0	0	0	0
Other Lakes	6,051	11,099	14,045	19	0	624	0	0	1,574	3,024	14,051	4,509	2,222	52	56	7,836	628	160	0	
TOTAL	33,343 ^h	126,733	160,117	5,231	3,858	31,017	0	2,330	7,414	11,084	144,699	126,508	66,580	1,363	314	42,164	9,108	6,657	187	

^a Tanana River Drainage (Area U):The entire Tanana River watershed, excluding all portions of the Yukon and Kuskokwim Rivers watersheds.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Arctic grayling less than 12 inches.

^d Arctic grayling 12 inches and over.

^e Northern pike 30 inches and under.

^f Northern pike over 30 inches

^g Includes Badger Slough which is sometimes called Chena Slough.

^h Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A100. Kuskokwim River Drainage Area^a sport fish harvest and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	LT	DV AC	RT	GR	WF	SF	NP	BB	SM	HA	OTHER
SALTWATER:																			
Boat	37	40	37	0	0	0	0	0	0	10	0	0	0	0	0	0	0	19	0
Shoreline	57	38	103	0	17	35	0	33	0	0	0	0	0	0	0	0	0	35	589
SALTWATER TOTAL	94^C	78	140	0	17	35	0	33	0	10	0	0	0	0	0	0	0	54	589
FRESHWATER:																			
Kanektok River	1,171	1,446	3,791	1,006	734	331	0	183	0	378	130	25	0	0	0	0	0	0	0
Aniak River	580	1,028	2,056	300	213	17	10	101	0	260	10	288	0	0	0	0	0	0	0
Goodnews River	385	465	2,276	81	189	53	17	156	9	343	145	17	0	0	0	0	0	0	0
Kwethluk River	297	453	554	0	313	19	0	0	0	97	58	47	0	0	329	107	1,677	0	0
Other Streams	1,486	2,292	4,676	287	590	179	0	258	0	338	134	362	253	54	549	107	1,666	0	0
Lakes	220	284	1,012	0	0	81	0	0	209	73	9	0	0	0	117	0	0	0	0
FRESHWATER TOTAL	3,198^C	5,968	14,365	1,674	2,039	680	27	698	218	1,489	486	739	253	54	995	214	3,343	0	0
GRAND TOTAL	3,257^C	6,046	14,505	1,674	2,056	715	27	731	218	1,499	486	739	253	54	995	214	3,343	54	589

^a Kuskokwim River Drainage (Area V): The Kuskokwim River drainage and all waters flowing into Kuskokwim Bay; adjacent saltwater from Cape Newenham north to the Naskonat Peninsula (north of Nelson Island).

Does not include the Yukon, Tanana or Koyukuk River drainages.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A101. Kuskokwim River Drainage Area^a sport fish catch and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	LT	DV AC	RT	GR	WF	SF	NP	BB	SM	HA	OTHER
SALTWATER:																			
Boat	37	40	37	0	0	0	0	0	0	10	0	0	0	0	0	0	0	19	0
Shoreline	57	38	103	0	17	35	0	66	0	0	0	0	0	0	0	0	0	52	589
SALTWATER TOTAL	94^c	78	140	0	17	35	0	66	0	10	0	0	0	0	0	0	0	71	589
FRESHWATER:																			
Kanektok River	1,171	1,446	3,791	5,245	3,741	1,887	482	4,849	18	10,136	4,106	2,727	102	0	56	0	0	0	0
Aniak River	580	1,028	2,056	1,426	753	79	364	2,412	10	9,340	1,144	5,580	0	626	45	0	0	0	9
Goodnews River	385	465	2,276	469	645	321	269	924	294	8,156	3,994	851	16	0	0	0	0	0	0
Kwethluk River	297	453	554	47	566	19	0	221	0	349	333	166	0	0	526	107	1,677	0	0
Other Streams	1,486	2,292	4,676	2,497	2,668	1,205	17	2,269	0	7,743	3,042	7,085	277	1,326	2,641	107	1,666	0	0
Lakes	220	284	1,012	0	0	91	0	0	992	91	27	187	0	0	453	0	0	0	0
FRESHWATER TOTAL	3,198^c	5,968	14,365	9,684	8,373	3,602	1,132	10,675	1,314	35,815	12,646	16,596	395	1,952	3,721	214	3,343	0	9
GRAND TOTAL	3,257^c	6,046	14,505	9,684	8,390	3,637	1,132	10,741	1,314	35,825	12,646	16,596	395	1,952	3,721	214	3,343	71	598

^a Kuskokwim River Drainage (Area V): The Kuskokwim River drainage and all waters flowing into Kuskokwim Bay; adjacent saltwater from Cape Newenham north to the Naskonat Peninsula (north of Nelson Island). Does not include the Yukon, Tanana or Koyukuk River drainages.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A102. Seward Peninsula-Norton Sound Area^a sport fish harvest and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	DV AC	GR ^c	GR ^d	WF	SF	NP	BB	SM	KC	OTHER
SALTWATER:																		
Boat	338	440	665	0	96	0	139	28	0	0	0	0	0	0	0	0	179	9
Shoreline	335	939	1,210	19	120	0	284	9	205	0	0	0	0	0	0	0	0	49
SALTWATER TOTAL	648e	1,379	1,875	19	216	0	423	37	205	0	0	0	0	0	0	0	179	58
FRESHWATER:																		
Nome River	1,129	3,101	3,562	93	602	0	723	0	917	0	0	0	0	0	0	0	0	0
Pilgrim River	544	1,010	1,017	28	191	10	0	0	448	38	37	0	0	207	0	0	0	0
Unalakleet River	590	1,360	2,118	382	643	0	89	116	427	114	17	8	0	0	0	0	0	0
Fish-Niukluk River System	697	1,527	3,589	9	1,185	0	278	489	1,003	315	270	9	0	75	21	0	0	0
Sinuk River	463	907	874	9	96	0	115	0	536	0	37	0	0	0	0	0	0	0
Snake River	622	1,394	1,468	9	248	0	151	0	331	261	206	0	0	0	0	0	0	0
Solomon River	317	1,580	1,404	28	420	0	259	0	893	0	0	61	0	0	0	0	0	0
Kuzitrin River	293	334	463	0	0	0	0	0	146	55	46	0	0	209	0	0	0	0
Other Streams	727	1,369	2,478	18	182	0	212	49	904	59	129	17	0	46	75	335	0	491
Lakes	24	83	82	0	0	0	0	0	97	0	0	0	0	0	0	0	0	0
FRESHWATER TOTAL	2,777e	12,665	17,055	576	3,567	10	1,827	654	5,702	842	742	95	0	537	96	335	0	491
GRAND TOTAL	3,134e	14,044	18,930	595	3,783	10	2,250	691	5,907	842	742	95	0	537	96	335	179	549

a Seward Peninsula-Norton Sound (Area W): All drainage area north of the Yukon River drainage, including all saltwater north and west of Pastol Bay in Norton Sound; and, south of the Selawik River drainage. Does not include the Selawik River.

b Refer to Appendix A3 for common names and species abbreviations.

c Arctic grayling 15 inches and under.

d Arctic grayling over 15 inches.

e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A103. Seward Peninsula-Norton Sound Areaa sport fish catch and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	DV AC	GR ^c	GR ^d	WF	SF	NP	BB	SM	KC	OTHER
SALTWATER:																		
Boat	338	440	665	0	165	0	295	28	0	0	0	0	0	0	0	0	291	9
Shoreline	335	939	1,210	19	149	0	332	65	205	0	0	0	0	0	0	0	0	78
SALTWATER TOTAL	648^e	1,379	1,875	19	314	0	627	93	205	0	0	0	0	0	0	0	291	87
FRESHWATER:																		
Nome River	1,129	3,101	3,562	121	764	0	1,756	175	5,153	496	73	0	0	0	0	0	0	0
Pilgrim River	544	1,010	1,017	92	325	67	392	254	2,736	1,657	649	0	0	959	11	0	0	0
Unalakleet River	590	1,360	2,118	2,340	1,572	0	605	515	964	682	192	39	0	0	0	0	0	0
Fish-Niukluk River System	697	1,527	3,589	9	1,689	0	909	912	5,838	2,459	2,927	44	0	75	21	0	0	0
Sinuk River	463	907	874	9	143	10	547	28	1,179	674	205	0	0	0	0	0	0	0
Snake River	622	1,394	1,468	9	306	0	429	37	1,003	1,222	392	0	0	0	0	0	0	0
Solomon River	317	1,580	1,404	47	650	0	633	0	1,725	131	9	61	0	0	0	0	0	0
Kuzitrin River	293	334	463	0	0	0	0	0	263	101	187	9	0	751	0	0	0	0
Other Streams	727	1,369	2,478	421	411	10	499	205	2,983	660	507	43	0	120	75	335	0	491
Lakes	24	83	82	0	0	29	0	0	117	0	0	0	0	212	0	0	0	0
FRESHWATER TOTAL	2,777^e	12,665	17,055	3,048	5,860	116	5,770	2,126	21,961	8,082	5,141	196	0	2,117	107	335	0	491
GRAND TOTAL	3,134^e	14,044	18,930	3,067	6,174	116	6,397	2,219	22,166	8,082	5,141	196	0	2,117	107	335	291	578

^a Seward Peninsula-Norton Sound (Area W): All drainage area north of the Yukon River drainage, including all saltwater north and west of Pastol Bay in Norton Sound; and, south of the Selawik River drainage. Does not include the Selawik River.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Arctic grayling 15 inches and under.

^d Arctic grayling over 15 inches.

^e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A104. Northwest Alaska Areaa sport fish harvest and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	LT	DV ^c AC	DV ^d AC	GR	WF	SF	NP	BB	SM	OTHER
SALTWATER:																		
Boat	76	109	118	0	0	0	0	0	0	0	0	0	0	139	0	0	0	0
Shoreline	303	347	498	0	0	0	0	185	0	0	0	0	9	259	0	0	22	177
SALTWATER TOTAL	329 ^e	456	616	0	0	0	0	185	0	0	0	0	9	398	0	0	22	177
FRESHWATER:																		
Kobuk River	335	880	2,015	0	0	0	0	128	0	0	9	305	8	395	205	0	0	0
Noatak River	607	614	2,046	0	9	0	0	130	28	218	107	322	213	0	36	139	0	0
Other Streams	641	1,012	2,548	0	0	0	0	0	0	210	323	234	8	111	224	0	0	0
Lakes	350	317	584	0	0	0	0	0	206	38	9	55	0	125	94	0	0	0
FRESHWATER TOTAL	1,388 ^e	2,823	7,193	0	9	0	0	258	234	466	448	916	229	631	559	139	0	0
GRAND TOTAL	1,575 ^e	3,279	7,809	0	9	0	0	443	234	466	448	916	238	1,029	559	139	22	177

- ^a Northwest Alaska (Area X): Kotzebue area including drainages of Selawik, Kobuk, Noatak, Wulik, and Kivalina Rivers. All saltwater in the northern half of Kotzebue Sound to and including Point Hope.
- ^b Refer to Appendix A3 for common names and species abbreviations.
- ^c Dolly Varden and Arctic char 20 inches and under.
- ^d Dolly Varden and Arctic char over 20 inches.
- ^e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A105. Northwest Alaska Areaa sport fish catch and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	LT	DV ^c AC	DV ^d AC	GR	WF	SF	NP	BB	SM	OTHER
SALTWATER:																		
Boat	76	109	118	0	0	0	0	0	0	9	9	0	0	232	0	0	0	0
Shoreline	303	347	498	0	0	0	0	185	0	0	88	0	9	647	0	0	22	177
SALTWATER TOTAL	329^e	456	616	0	0	0	0	185	0	9	97	0	9	879	0	0	22	177
FRESHWATER:																		
Kobuk River	335	880	2,015	0	0	0	0	324	0	458	35	1,717	33	1,074	500	0	0	0
Noatak River	607	614	2,046	0	43	0	10	253	102	502	854	1,718	252	0	1,105	150	0	10
Other Streams	641	1,012	2,548	26	0	0	10	9	0	1,959	2,921	3,151	8	111	412	0	0	0
Lakes	350	317	584	0	0	0	0	0	491	240	115	642	0	209	192	0	0	0
FRESHWATER TOTAL	1,388^e	2,823	7,193	26	43	0	20	586	593	3,159	3,925	7,228	293	1,394	2,209	150	0	10
GRAND TOTAL	1,575^e	3,279	7,809	26	43	0	20	771	593	3,168	4,022	7,228	302	2,273	2,209	150	22	187

^a Northwest Alaska (Area X): Kotzebue area including drainages of Selawik, Kobuk, Noatak, Wulik, and Kivalina Rivers. All saltwater in the northern half of Kotzebue Sound to and including Point Hope.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Dolly Varden and Arctic char 20 inches and under.

^d Dolly Varden and Arctic char over 20 inches.

^e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A106. Yukon River Drainage Areaa sport fish harvest and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	LT	DV AC	GR	WF	SF	NP	BB	SM	HA	OTHER
SALTWATER:																		
Boat	26	71	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shoreline	22	12	22	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SALTWATER TOTAL	48^c	83	81	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRESHWATER:																		
Yukon River Drainages (Downstream from																		
Koyukuk River)	568	1,293	3,211	19	619	0	0	73	0	469	558	25	63	346	0	0	0	0
Koyukuk River Drainage	905	1,239	2,378	0	0	0	0	0	31	49	716	0	19	191	0	0	0	0
Nowitna River	250	188	446	0	0	0	0	0	0	0	0	0	61	63	0	0	0	0
Dall River	328	332	845	0	0	0	0	0	0	0	0	0	28	352	118	0	0	0
Yukon River Drainages (Koyukuk River to																		
Fort Yukon)	900	2,269	2,885	85	0	0	0	0	0	0	789	8	175	671	129	0	0	0
Yukon River Drainages (Fort Yukon to																		
Canadian Border)	233	311	580	0	0	0	0	0	0	0	183	0	17	121	0	0	0	0
Other Lakes	162	290	470	0	0	0	0	0	20	0	19	0	0	68	11	0	0	0
Other Streams	1,255	1,906	3,115	9	0	0	0	120	50	10	1,065	140	73	535	21	0	0	0
FRESHWATER TOTAL	3,778^c	7,828	13,930	113	619	0	0	193	101	528	3,330	173	436	2,347	279	0	0	0
GRAND TOTAL	3,800^c	7,911	14,011	122	619	0	0	193	101	528	3,330	173	436	2,347	279	0	0	0

^a Yukon River Drainage (Area Y): All Yukon River drainages (including the Alaska portion of the White River drainage but excluding the Tanana River drainage), from the south side of the Brooks Range to the Bering Sea; and from the Canadian border to the Bering Sea; and all drainages of the Koyukuk River and Alatna Rivers.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A107. Yukon River Drainage Areaa sport fish catch and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	SS	RS	PS	CS	LT	DV AC	GR	WF	SF	NP	BB	SM	HA	OTHER
SALTWATER:																		
Boat	26	71	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shoreline	22	12	22	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SALTWATER TOTAL	48^c	83	81	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FRESHWATER:																		
Yukon River Drainages (Downstream from Koyukuk River)																		
Koyukuk River Drainage	568	1,293	3,211	235	1,023	9	0	624	0	3,716	4,491	175	522	3,257	0	0	0	0
Nowitna River	905	1,239	2,378	0	0	0	0	18	95	59	6,290	0	19	605	0	0	0	0
Dall River	250	188	446	0	0	0	0	0	0	0	0	0	573	1,362	0	0	0	0
Yukon River Drainages (Koyukuk River to Fort Yukon)																		
Fort Yukon	328	332	845	0	0	0	0	0	0	0	607	0	93	2,645	139	0	0	0
Yukon River Drainages (Fort Yukon to Canadian Border)																		
Canadian Border	233	311	580	0	0	0	0	0	0	19	418	0	17	172	0	0	0	0
Other Lakes	162	290	470	0	0	0	0	0	20	18	192	0	0	405	11	0	0	0
Other Streams	1,255	1,906	3,115	94	0	0	0	397	81	349	3,577	201	693	2,340	21	0	0	0
FRESHWATER TOTAL	3,778^c	7,828	13,930	631	1,023	9	0	1,224	196	4,249	21,420	384	2,127	13,502	342	0	0	0
GRAND TOTAL	3,800^c	7,911	14,011	640	1,023	9	0	1,224	196	4,249	21,420	384	2,127	13,502	342	0	0	0

^a Yukon River Drainage (Area Y): All Yukon River drainages (including the Alaska portion of the White River drainage but excluding the Tanana River drainage), from the south side of the Brooks Range to the Bering Sea; and from the Canadian border to the Bering Sea; and all drainages of the Koyukuk River and Alatna Rivers.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A108. North Slope Brooks Range Areaa sport fish harvest and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	PS	CS	LT	DV AC	GR	WF	NP	BB	SM	OTHER
SALTWATER:														
Boat	37	83	70	0	0	0	0	58	0	0	0	0	0	0
Shoreline	52	270	261	0	0	0	0	49	19	0	0	0	0	0
SALTWATER TOTAL	89^c	353	331	0	0	0	0	107	19	0	0	0	0	0
FRESHWATER:														
Sagavanirktok River	370	1,503	2,118	0	0	0	0	448	463	0	0	0	0	0
Other Haul Road Streams	222	469	1,085	0	0	0	10	179	226	0	0	21	0	0
Other Streams	465	678	1,303	0	0	17	9	320	700	0	0	0	0	0
Haul Road Lakes	135	204	218	0	0	0	47	10	28	0	0	0	0	0
Other Lakes	251	188	545	0	0	0	40	28	196	0	85	0	0	0
FRESHWATER TOTAL	1,325^c	3,042	5,269	0	0	17	106	985	1,613	0	85	21	0	0
GRAND TOTAL	1,362^c	3,395	5,600	0	0	17	106	1,092	1,632	0	85	21	0	0

^a North Slope Brooks Range (Area Z): All Alaskan waters, including drainages, north of the Brooks Range and flowing into the Beaufort and Chukchi Seas to the north and east of Point Hope. Does not include Point Hope.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A109. North Slope Brooks Range Areaa sport fish catch and effort by fisheries and species^b, 1993.

	Anglers	Trips	Days Fished	KS	PS	CS	LT	DV AC	GR	WF	NP	BB	SM	OTHER
SALTWATER:														
Boat	37	83	70	0	0	0	0	105	0	0	0	0	0	0
Shoreline	52	270	261	0	0	0	0	88	467	0	0	0	0	0
SALTWATER TOTAL	89^c	353	331	0	0	0	0	193	467	0	0	0	0	0
FRESHWATER:														
Sagavanirktok River	370	1,503	2,118	0	10	0	0	1,275	2,038	105	0	0	0	0
Other Haul Road Streams	222	469	1,085	0	0	0	51	1,032	2,935	87	0	21	0	0
Other Streams	465	678	1,303	0	0	17	18	1,371	2,461	0	0	0	0	0
Haul Road Lakes	135	204	218	0	0	0	129	29	725	0	0	0	0	0
Other Lakes	251	188	545	0	0	0	68	46	719	0	135	0	0	0
FRESHWATER TOTAL	1,325^c	3,042	5,269	0	10	17	266	3,753	8,878	192	135	21	0	0
GRAND TOTAL	1,362^c	3,395	5,600	0	10	17	266	3,946	9,345	192	135	21	0	0

^a North Slope Brooks Range (Area Z): All Alaskan waters, including drainages, north of the Brooks Range and flowing into the Beaufort and Chukchi Seas to the north and east of Point Hope. Does not include Point Hope.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A98.-Tanana River Drainage Area^a sport fish harvest and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days		DV															
			Fished	KS	SS	LL	KO	CS	LT	AC	RT	GR ^c	GR ^d	WF	SF	NP ^e	NP ^f	BB	Other	
Upper Chena River	3,774	6,753	7,912	0	0	0	0	0	0	0	0	0	33	49	0	0	0	0	0	0
Lower Chena River ^g	6,574	16,828	19,280	993	0	0	0	45	0	0	0	16	16	0	0	155	81	592	9	
Piledriver Slough	3,084	11,373	11,369	0	0	0	0	10	0	0	2,673	41	16	39	0	9	0	73	0	
Nenana River Drainage	685	942	1,020	0	440	0	0	7	0	18	0	562	595	0	0	18	0	0	0	
Chatanika River	3,819	6,675	7,272	105	0	0	0	80	0	0	0	1,376	1,283	97	58	767	284	0	37	
Salcha River	3,526	6,312	7,653	714	0	0	0	90	0	0	0	587	1,721	19	0	54	36	21	0	
Delta Clearwater River	2,100	3,361	3,984	0	509	0	0	0	0	0	0	375	1,036	10	0	90	0	0	0	
Goodpaster River	379	494	825	0	0	0	0	0	0	0	0	342	358	309	0	0	0	0	0	
Brushkana Creek	883	705	1,277	0	0	0	0	0	0	9	0	266	410	0	0	0	0	0	0	
Lower Tanana River	458	392	609	0	0	0	0	0	0	0	0	77	85	29	10	511	152	180	0	
Middle Tanana River	1,463	3,039	3,193	0	0	0	0	7	0	9	119	16	236	0	0	224	81	2,191	0	
Upper Tanana River	566	988	1,014	0	0	0	0	7	0	0	0	8	8	194	0	37	179	823	0	
Shaw Creek	458	395	541	0	0	0	0	7	0	0	0	0	515	0	0	36	18	93	0	
Richardson Clearwater River	344	278	566	0	63	0	0	0	0	0	0	130	461	0	0	72	0	0	0	
Delta River (below Tangle Lakes)	479	414	1,040	0	0	0	0	0	0	0	0	69	480	0	0	0	0	0	0	
Other Streams	2,523	3,871	5,209	49	99	0	0	0	0	173	32	1,364	905	155	50	461	108	589	74	
Birch Lake	5,270	8,104	9,880	0	0	2,901	0	0	0	0	7,880	0	0	0	0	18	0	0	0	
Quartz Lake	7,962	10,472	14,031	0	0	5,706	0	0	0	0	11,556	0	0	0	0	0	0	0	0	
Fielding Lake	1,090	1,301	2,129	0	0	0	0	0	52	0	0	253	991	39	0	0	0	73	0	
M into Flats	3,111	3,829	6,267	10	0	0	0	0	0	0	0	57	57	49	48	6,495	1,943	208	0	
Tangle Lakes and Tangle River	4,261	3,889	7,525	0	0	0	0	0	416	0	0	2,539	3,129	0	0	0	0	31	0	
Chena Lake (Lake only)	1,847	2,289	2,828	0	0	605	0	7	0	242	2,812	163	49	0	0	0	0	37	0	
Harding Lake	2,381	4,226	4,913	0	0	0	0	0	66	72	80	0	0	0	0	360	179	31	0	
Dune Lake	557	402	744	0	0	67	0	0	0	0	959	398	304	0	0	0	0	0	0	
George Lake	350	271	594	0	0	0	0	0	0	0	0	0	0	0	0	835	113	52	0	
Grayling Lake	303	988	898	0	0	0	0	0	0	0	111	0	8	0	0	0	18	0	0	
Koole Lake	354	433	886	0	0	0	0	0	0	0	962	0	0	0	0	0	0	0	0	
Steese Ponds	877	847	1,302	0	0	0	0	0	0	27	89	188	65	0	0	36	0	0	0	
Chena Hot Springs Road Ponds	846	1,085	2,098	0	0	0	0	0	0	0	195	359	24	0	0	0	0	0	0	
Meadow Road Lakes	867	4,558	5,270	0	0	962	0	0	544	404	1,493	400	350	0	0	27	0	0	0	
Coal Mine Road Lakes	341	764	782	0	0	0	0	0	251	99	103	0	0	0	0	0	0	0	0	
Hidden Lake	197	843	746	0	0	0	0	0	0	9	191	122	122	0	0	0	0	0	0	
Other Lakes	6,548	10,931	14,976	0	54	109	0	0	253	737	4,145	1,082	645	0	0	2,488	414	208	18	
TOTAL	32,334^h	118,052	148,633	1,871	1,165	10,350	0	260	1,582	1,799	33,400	10,823	13,918	940	166	12,675	3,624	5,165	175	

^a Tanana River Drainage (Area U): The entire Tanana River watershed, excluding all portions of the Yukon and Kuskokwim Rivers watersheds.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Arctic grayling less than 12 inches.

^d Arctic grayling 12 inches and over.

^e Northern pike 30 inches and under.

^f Northern pike over 30 inches

^g Includes Badger Slough which is sometimes called Chena Slough.

^h Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A99.-Tanana River Drainage Area^a sport fish catch and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days Fished	KS	SS	LL	KO	CS	LT	DV AC	RT	GR ^c	GR ^d	WF	SF	NP ^e	NP ^f	BB	Other
Upper Chena River	3,774	6,753	7,912	0	0	0	0	129	0	0	0	17,015	10,178	113	0	46	10	0	0
Lower Chena River ^g	6,574	16,828	19,280	1,308	0	0	0	130	0	0	0	26,624	6,787	136	39	946	90	685	9
Piledriver Slough	3,084	11,373	11,369	0	0	0	0	75	0	0	8,267	22,311	9,013	274	0	233	0	135	0
Nenana River Drainage	685	942	1,020	0	720	0	0	37	0	54	0	3,045	1,670	0	0	708	36	0	0
Chatanika River	3,819	6,675	7,272	278	273	0	0	190	0	54	0	18,986	5,764	436	68	4,602	341	0	194
Salcha River	3,526	6,312	7,653	971	0	0	0	455	0	0	0	6,203	3,791	58	0	191	3	21	0
Delta Clearwater River	2,100	3,361	3,984	0	3,009	0	0	66	0	9	0	4,269	5,037	38	0	179	0	0	0
Goodpaster River	379	494	825	0	0	0	0	43	0	0	0	945	864	309	0	64	2	0	0
Brushkana Creek	883	705	1,277	0	0	0	0	0	0	9	0	2,244	1,473	0	0	0	0	0	0
Lower Tanana River	458	392	609	0	0	0	0	0	0	0	0	779	204	29	10	3,163	565	234	0
Middle Tanana River	1,463	3,039	3,193	19	0	0	0	7	0	9	159	750	1,029	78	10	1,232	314	2,773	19
Upper Tanana River	566	988	1,014	0	0	0	0	7	0	0	0	114	220	388	0	37	1,022	1,041	0
Shaw Creek	458	395	541	0	63	0	0	29	0	0	0	17	678	0	0	143	36	114	0
Richardson Clearwater River	344	278	566	0	91	0	0	73	0	0	0	1,980	3,852	0	0	269	0	0	0
Delta River (below Tangle Lakes)	479	414	1,040	0	0	0	0	0	0	0	0	3,369	3,326	0	0	0	0	0	0
Other Streams	2,523	3,871	5,209	89	226	0	0	0	0	797	454	7,828	6,703	599	80	1,608	290	698	121
Birch Lake	5,270	8,104	9,880	0	0	6,789	0	0	0	0	22,249	0	0	0	0	54	18	0	0
Quartz Lake	7,962	10,472	14,031	0	0	11,212	0	0	0	0	23,675	0	0	0	0	0	0	0	0
Fielding Lake	1,090	1,301	2,129	0	0	0	0	0	213	0	0	3,571	4,086	39	0	0	0	73	0
Minto Flats	3,111	3,829	6,267	10	0	0	0	37	0	0	0	1,514	1,427	136	67	41,840	5,408	218	0
Tangle Lakes and Tangle River	4,261	3,889	7,525	0	0	0	0	0	1,357	0	0	17,165	9,310	88	0	0	0	31	0
Chena Lake (Lake only)	1,847	2,289	2,828	0	0	2,733	0	73	0	583	8,550	726	83	0	0	0	0	0	37
Harding Lake	2,381	4,226	4,913	0	0	0	0	0	280	108	676	24	24	0	0	4,564	995	31	0
Dune Lake	557	402	744	0	0	294	0	0	0	0	2,207	1,293	1,267	0	0	0	0	0	0
George Lake	350	271	594	0	0	0	0	0	0	0	0	0	0	0	0	3,962	415	73	0
Grayling Lake	303	988	898	0	0	0	0	0	0	36	533	954	196	0	0	708	63	0	0
Kooie Lake	354	433	886	0	0	0	0	0	0	0	2,213	0	0	0	0	0	0	0	0
Steese Ponds	877	847	1,302	0	0	0	0	0	15	27	1,099	1,795	246	0	0	36	0	0	0
Chena Hot Springs Road Ponds	846	1,085	2,098	0	0	0	0	0	0	0	1,523	2,643	661	0	0	1,613	0	0	0
Meadow Road Lakes	867	4,558	5,270	0	272	1,598	0	0	934	1,198	5,122	2,766	1,142	0	0	90	0	0	18
Coal Mine Road Lakes	341	764	782	0	0	0	0	0	648	502	954	481	24	0	0	0	0	0	0
Hidden Lake	197	843	746	0	136	0	0	0	0	36	692	816	489	0	0	0	0	0	0
Other Lakes	6,548	10,931	14,976	0	172	173	0	0	968	2,050	13,004	10,206	3,929	72	0	11,133	1,673	270	18
TOTAL	32,334^h	118,052	148,633	2,675	4,962	22,799	0	1,351	4,415	5,472	91,377	160,433	83,473	2,793	274	77,421	11,281	6,397	416

^a Tanana River Drainage (Area U): The entire Tanana River watershed, excluding all portions of the Yukon and Kuskokwim Rivers watersheds.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Arctic grayling less than 12 inches.

^d Arctic grayling 12 inches and over.

^e Northern pike 30 inches and under.

^f Northern pike over 30 inches

^g Includes Badger Slough which is sometimes called Chena Slough.

^h Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A100.-Kuskokwim River Drainage Area^a sport fish harvest and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days							DV										
			Fished	KS	SS	RS	PS	CS	LT	AC	RT	GR	WF	SF	NP	BB	SM	HA	Other	
SALTWATER:																				
Boat	104	131	153	95	45	0	17	175	0	27	0	0	0	48	0	0	0	45	0	
Shoreline	54	71	136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SALTWATER TOTAL	133 ^c	202	289	95	45	0	17	175	0	27	0	0	0	48	0	0	0	45	0	
FRESHWATER:																				
Kanektok River	1,571	1,713	6,505	751	675	313	26	156	18	233	59	0	0	0	0	0	0	0	0	
Aniak River	634	922	1,815	437	507	17	0	231	0	496	8	116	97	88	54	0	2,292	0	0	
Goodnews River	338	274	2,038	163	170	70	32	15	22	132	19	0	0	0	54	0	0	0	0	
Holitna River	375	461	949	40	0	0	0	0	0	0	0	0	0	130	155	0	0	0	18	
Kisaralik River	430	481	1,463	148	72	0	0	58	0	117	124	69	0	0	0	0	0	0	0	
Other Streams	1,286	2,242	3,901	514	1,509	494	51	991	0	243	89	512	86	124	450	20	0	0	0	
Lakes	255	570	1,157	0	0	0	0	0	0	150	0	153	0	0	115	0	0	0	0	
FRESHWATER TOTAL	3,852 ^c	6,663	17,828	2,053	2,933	894	109	1,451	40	1,371	299	850	183	342	828	20	2,292	0	18	
GRAND TOTAL	3,948 ^c	6,865	18,117	2,148	2,978	894	126	1,626	40	1,398	299	850	183	390	828	20	2,292	45	18	

^a Kuskokwim River Drainage (Area V): The Kuskokwim River drainage and all waters flowing into Kuskokwim Bay; adjacent saltwater from Cape Newenham north to the Naskonat Peninsula (north of Nelson Island). Does not include the Yukon, Tanana or Koyukuk River drainages.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A101.-Kuskokwim River Drainage Area^a sport fish catch and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days										DV						
			Fished	KS	SS	RS	PS	CS	LT	AC	RT	GR	WF	SF	NP	BB	SM	HA	Other
SALT WATER:																			
Boat	104	131	153	95	253	0	153	175	0	134	0	0	0	114	0	0	0	45	0
Shoreline	54	71	136	6	11	0	0	26	0	0	0	0	0	0	0	0	0	0	0
SALT WATER TOTAL	133 ^c	202	289	101	264	0	153	201	0	134	0	0	0	114	0	0	0	45	0
FRESH WATER:																			
Kanektok River	1,571	1,713	6,505	1,483	1,322	3,622	2,598	6,386	972	8,270	4,779	1,599	52	0	0	0	0	0	0
Aniak River	634	922	1,815	573	852	87	388	1,342	0	3,115	656	2,022	329	154	698	0	2,292	0	0
Goodnews River	338	274	2,038	230	456	207	528	381	382	3,156	945	1,813	7	0	54	0	0	0	0
Holitna River	375	461	949	110	0	0	0	38	0	9	0	228	0	189	973	0	0	0	18
Kisaralik River	430	481	1,463	196	492	452	98	1,123	59	2,283	1,226	1,920	0	0	18	0	0	0	0
Other Streams	1,286	2,242	3,901	677	2,178	530	751	2,377	0	1,013	652	2,405	93	171	2,461	20	0	0	66
Lakes	255	570	1,157	0	0	0	0	0	448	340	0	943	19	0	179	0	0	0	0
FRESH WATER TOTAL	3,852 ^c	6,663	17,828	3,269	5,300	4,898	4,363	11,647	1,861	18,186	8,258	10,930	500	514	4,383	20	2,292	0	84
GRAND TOTAL	3,948 ^c	6,865	18,117	3,370	5,564	4,898	4,516	11,848	1,861	18,320	8,258	10,930	500	628	4,383	20	2,292	45	84

^a Kuskokwim River Drainage (Area V): The Kuskokwim River drainage and all waters flowing into Kuskokwim Bay; adjacent saltwater from Cape Newenham north to the Naskonat Peninsula (north of Nelson Island). Does not include the Yukon, Tanana or Koyukuk River drainages.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

-continued-

Appendix A102.-Seward Peninsula-Norton Sound Area^a sport fish harvest and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days						DV										
			Fished	KS	SS	RS	PS	CS	AC	GR ^c	GR ^d	WF	SF	NP	BB	SM	HA	KC	Other
SALTWATER:																			
Boat	486	635	1,892	0	371	0	85	0	90	33	98	0	0	0	0	0	66	287	216
Shoreline	289	406	746	0	163	0	911	7	0	0	0	0	0	0	0	0	9	11	65
SALTWATER TOTAL	682 ^e	1,041	2,638	0	534	0	996	7	90	33	98	0	0	0	0	0	75	298	281
FRESHWATER:																			
Nome River	959	3,770	4,953	0	308	0	3,293	0	431	0	16	0	0	0	0	0	0	0	0
Pilgrim River	310	648	808	0	134	9	154	0	63	49	0	0	0	108	0	0	0	0	0
Unalakleet River	698	1,467	1,709	379	2,017	0	402	183	410	235	118	48	0	0	0	1,146	0	0	0
Fish-Niukluk River System	661	1,373	2,859	10	1,122	0	231	119	699	204	302	0	0	99	0	0	0	0	0
Sinuk River	463	643	1,132	0	109	0	145	0	305	0	8	0	0	0	0	0	0	0	0
Snake River	341	787	880	0	145	0	452	7	117	16	16	0	0	0	0	0	0	0	0
Solomon River	315	789	1,123	0	217	0	171	0	197	0	0	19	0	0	0	0	0	0	0
Other Streams	1,013	2,280	2,820	211	961	9	1,207	220	759	163	73	0	0	169	0	4,011	0	0	584
FRESHWATER TOTAL	2,596 ^e	11,757	16,284	600	5,013	18	6,055	529	2,981	667	533	67	0	376	0	5,157	0	0	584
GRAND TOTAL	3,016 ^e	12,798	18,922	600	5,547	18	7,051	536	3,071	700	631	67	0	376	0	5,157	75	298	865

- ^a Seward Peninsula-Norton Sound (Area W): All drainage area north of the Yukon River drainage, including all saltwater north and west of Pastol Bay in Norton Sound; and, south of the Selawik River drainage. Does not include the Selawik River.
- ^b Refer to Appendix A3 for common names and species abbreviations.
- ^c Arctic grayling 15 inches and under.
- ^d Arctic grayling over 15 inches.
- ^e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

-continued-

Appendix D.-Page 18 of 24.

Appendix A103.-Seward Peninsula-Norton Sound Area^a sport fish catch and effort by fisheries and species^b, 1994.

	Anglers	Days							DV										
		Trips	Fished	KS	SS	RS	PS	CS	AC	GR ^c	GR ^d	WF	SF	NP	BB	SM	KC	Other	
SALTWATER:																			
Boat	486	635	1,892	0	525	0	341	219	90	130	98	0	0	0	0	0	287	385	
Shoreline	289	406	746	0	163	0	911	14	0	0	0	0	0	0	0	0	11	65	
SALTWATER TOTAL	682 ^e	1,041	2,638	0	688	0	1,252	233	90	130	98	0	0	0	0	0	298	450	
FRESHWATER:																			
Nome River	959	3,770	4,953	0	368	0	5,380	29	631	452	659	0	0	0	0	0	0	37	
Pilgrim River	310	648	808	0	406	9	350	146	152	82	82	0	0	358	0	0	0	0	
Unalakleet River	698	1,467	1,709	517	2,488	0	1,020	561	1,253	1,119	357	97	0	0	0	1,146	0	0	
Fish-Niukluk River System	661	1,373	2,859	29	1,448	0	2,052	1,271	2,116	1,272	432	56	0	596	0	0	0	46	
Sinuk River	463	643	1,132	0	172	0	348	22	830	194	223	0	0	0	0	0	0	0	
Snake River	341	787	880	60	235	0	648	37	420	175	202	0	0	0	0	0	0	0	
Solomon River	315	789	1,123	0	237	0	699	7	448	147	65	19	0	0	0	0	0	0	
Other Streams	1,013	2,280	2,820	281	1,695	96	2,510	256	1,404	815	577	0	0	777	0	4,011	0	584	
FRESHWATER TOTAL	2,596 ^e	11,757	16,284	887	7,049	105	13,007	2,329	7,254	4,256	2,597	172	0	1,731	0	5,157	0	667	
GRAND TOTAL	3,016 ^e	12,798	18,922	887	7,737	105	14,259	2,562	7,344	4,386	2,695	172	0	1,731	0	5,157	298	1,117	

^a Seward Peninsula-Norton Sound (Area W): All drainage area north of the Yukon River drainage, including all saltwater north and west of Pastol Bay in Norton Sound; and, south of the Selawik River drainage. Does not include the Selawik River.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Arctic grayling 15 inches and under.

^d Arctic grayling over 15 inches.

^e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix D.-Page 19 of 24.

Appendix A104.-Northwest Alaska Area^a sport fish harvest and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days							DV ^c		DV ^d						
			Fished	KS	SS	RS	PS	CS	LT	AC	AC	GR	WF	SF	NP	BB	SM	Other
SALTWATER:																		
Boat	52	52	62	0	0	0	0	0	0	0	0	0	0	48	0	0	0	
Shoreline	210	343	387	0	0	0	0	0	0	18	9	10	7	286	0	0	57	
SALTWATER TOTAL	249 ^c	395	449	0	0	0	0	0	0	18	9	10	7	334	0	0	57	
FRESHWATER:																		
Kobuk River	242	281	919	0	0	0	0	22	19	113	178	29	135	128	10	0	0	
Noatak River	427	506	1,442	0	0	0	226	0	456	330	407	81	0	27	10	0	0	
Other Streams	707	1,771	2,805	0	0	0	51	22	760	642	186	0	95	108	0	0	0	
Lakes	307	268	421	0	0	0	0	55	18	0	33	0	0	24	0	0	0	
FRESHWATER TOTAL	955 ^c	2,826	5,587	0	0	0	51	248	77	1,253	1,085	804	110	230	287	20	0	
GRAND TOTAL	1,100 ^c	3,221	6,036	0	0	0	51	248	77	1,271	1,094	814	117	564	287	20	57	

^a Northwest Alaska (Area Kotzebue area including drainages of Selawik, Kobuk, Noatak, Wulik, and Kivalina Rivers. All saltwater X): in the northern half of Kotzebue Sound to and including Point Hope.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Dolly Varden and Arctic char 20 inches and under.

^d Dolly Varden and Arctic char over 20 inches.

^e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix D.-Page 20 of 24.

Appendix A105.-Northwest Alaska Area^a sport fish catch and effort by fisheries and species^b, 1994.

	Anglers	Days								DV ^c		DV ^d		GR	WF	SF	NP	BB	SM	Other
		Trips	Fished	KS	SS	RS	PS	CS	LT	AC	AC									
SALTWATER:																				
Boat	52	52	62	0	0	0	0	0	0	0	0	0	0	153	0	0	0	0	0	
Shoreline	210	343	387	0	0	0	0	0	0	18	9	10	7	324	0	0	57	0	0	
SALTWATER TOTAL	249 ^e	395	449	0	0	0	0	0	0	18	9	10	7	477	0	0	57	0	0	
FRESHWATER:																				
Kobuk River	242	281	919	0	0	0	0	44	22	19	189	1,593	29	386	586	10	0	0	0	
Noatak River	427	506	1,442	0	0	0	0	336	0	644	321	842	91	0	152	10	0	0	0	
Other Streams	707	1,771	2,805	25	0	0	85	22	0	3,593	5,796	2,653	0	95	152	0	0	0	0	
Lakes	307	268	421	0	0	0	0	235	126	18	374	0	0	598	0	0	0	0	0	
FRESHWATER TOTAL	955 ^e	2,826	5,587	25	0	0	85	402	257	4,382	6,324	5,462	120	481	1,488	20	0	0	0	
GRAND TOTAL	1,100 ^e	3,221	6,036	25	0	0	85	402	257	4,400	6,333	5,472	127	958	1,488	20	57	0	0	

^a Northwest Alaska (Area X): Kotzebue area including drainages of Selawik, Kobuk, Noatak, Wulik, and Kivalina Rivers. All saltwater in the northern half of Kotzebue Sound to and including Point Hope.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Dolly Varden and Arctic char 20 inches and under.

^d Dolly Varden and Arctic char over 20 inches.

^e Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix D.-Page 21 of 24.

Appendix A106.-Yukon River Drainage Area^a sport fish harvest and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days								DV							
			Fished	KS	SS	RS	PS	CS	LT	AC	GR	WF	SF	NP	BB	SM	HA	Other
SALTWATER:																		
Boat	25	13	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Shoreline	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SALTWATER TOTAL	46 ^c	34	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
FRESHWATER:																		
Yukon River Drainages (Downstream from Koyukuk River)	600	1,639	2,093	29	728	0	0	90	0	152	147	0	49	610	0	0	453	
Koyukuk River Drainage	1,183	1,775	3,628	0	0	0	0	0	15	0	2,015	24	29	138	11	0	0	
Yukon River Drainages (Koyukuk River to Fort Yukon)	1,000	1,180	2,297	0	0	0	0	0	0	63	744	0	74	673	0	0	41	
Yukon River Drainages (Fort Yukon to Canadian Border)	513	696	1,503	381	0	0	0	0	0	81	899	7	38	153	124	0	9	
Other Lakes	316	313	633	0	0	0	0	0	44	0	37	0	86	18	0	0	0	
Other Streams	1,170	1,152	2,649	0	0	0	0	0	0	192	732	58	115	376	10	0	0	
FRESHWATER TOTAL	3,689 ^c	6,755	12,803	410	728	0	0	90	59	488	4,574	89	391	1,968	145	0	503	
GRAND TOTAL	3,714 ^c	6,789	12,872	410	728	0	0	90	59	488	4,574	89	391	1,968	145	0	503	

^a Yukon River Drainage (Area Y): All Yukon River drainages (including the Alaska portion of the White River drainage but excluding the Tanana River drainage), from the south side of the Brooks Range to the Bering Sea; and from the Canadian border to the Bering Sea; and all drainages of the Koyukuk River and Alatna Rivers.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A107.-Yukon River Drainage Area^a sport fish catch and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days							DV									
			Fished	KS	SS	RS	PS	CS	LT	AC	GR	WF	SF	NP	BB	SM	HA	Other	
SALTWATER:																			
Boat	25	13	48	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Shoreline	21	21	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
SALTWATER TOTAL	46 ^c	34	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
FRESHWATER:																			
Yukon River Drainages (Downstream from Koyukuk River)	600	1,639	2,093	79	1,018	9	0	185	0	786	1,705	0	229	3,180	7	0	0	2,275	
Koyukuk River Drainage	1,183	1,775	3,628	50	0	0	0	38	15	0	5,728	169	114	483	11	0	0	0	
Yukon River Drainages (Koyukuk River to Fort Yukon)	1,000	1,180	2,297	0	0	0	0	10	0	207	3,286	0	188	2,641	0	0	0	41	
Yukon River Drainages (Fort Yukon to Canadian Border)	513	696	1,503	381	0	0	0	0	0	269	2,186	55	38	726	124	0	0	9	
Other Lakes	316	313	633	0	0	0	0	0	162	19	251	0	190	433	0	0	0	0	
Other Streams	1,170	1,152	2,649	0	91	0	0	118	0	498	2,795	77	362	4,231	10	0	0	536	
FRESHWATER TOTAL	3,689 ^c	6,755	12,803	510	1,109	9	0	351	177	1,779	15,951	301	1,121	11,694	152	0	0	2,861	
GRAND TOTAL	3,714 ^c	6,789	12,872	510	1,109	9	0	351	177	1,779	15,951	301	1,121	11,694	152	0	0	2,861	

^a Yukon River Drainage (Area Y): All Yukon River drainages (including the Alaska portion of the White River drainage but excluding the Tanana River drainage), from the south side of the Brooks Range to the Bering Sea; and from the Canadian border to the Bering Sea; and all drainages of the Koyukuk River and Alatna Rivers.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A108.-North Slope Brooks Range Area^a sport fish harvest and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days							DV						
			Fished	KS	PS	CS	LT	AC	GR	WF	NP	BB	SM	Other		
SALTWATER:																
Boat	65	347	321	0	0	0	0	38	0	0	0	0	0	0		
Shoreline	158	342	326	0	0	0	0	54	0	39	0	0	0	0		
SALTWATER TOTAL	196 ^c	689	647	0	0	0	0	92	0	39	0	0	0	0		
FRESHWATER:																
Sagavanirktok River	404	1,625	1,614	0	0	0	0	387	147	19	0	156	0	0		
Other Streams	730	1,426	2,438	0	0	0	0	110	619	0	0	145	0	0		
Other Lakes	406	568	708	0	0	0	73	9	41	0	0	52	0	0		
FRESHWATER TOTAL	1,148 ^c	3,619	4,760	0	0	0	73	506	807	19	0	353	0	0		
GRAND TOTAL	1,253 ^c	4,308	5,407	0	0	0	73	598	807	58	0	353	0	0		

^a North Slope Brooks Range (Area Z): All Alaskan waters, including drainages, north of the Brooks Range and flowing into the Beaufort and Chukchi Seas to the north and east of Point Hope. Does not include Point Hope.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

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Appendix A109.-North Slope Brooks Range Area^a sport fish catch and effort by fisheries and species^b, 1994.

	Anglers	Trips	Days					DV							
			Fished	KS	PS	CS	LT	AC	GR	WF	NP	BB	SM	Other	
SALTWATER:															
Boat	65	347	321	0	0	0	0	313	0	0	0	0	0	0	
Shoreline	158	342	326	0	0	0	0	270	0	39	0	0	0	0	
SALTWATER TOTAL	196 ^c	689	647	0	0	0	0	583	0	39	0	0	0	0	
FRESHWATER:															
Sagavanirktok River	404	1,625	1,614	0	0	0	0	1,716	2,644	58	0	156	0	0	
Other Streams	730	1,426	2,438	0	16	10	15	636	4,106	10	0	249	0	0	
Other Lakes	406	568	708	0	0	0	312	243	1,802	0	54	208	0	0	
FRESHWATER TOTAL	1,148 ^c	3,619	4,760	0	16	10	327	2,595	8,552	68	54	613	0	0	
GRAND TOTAL	1,253 ^c	4,308	5,407	0	16	10	327	3,178	8,552	107	54	613	0	0	

^a North Slope Brooks Range (Area Z): All Alaskan waters, including drainages, north of the Brooks Range and flowing into the Beaufort and Chukchi Seas to the north and east of Point Hope. Does not include Point Hope.

^b Refer to Appendix A3 for common names and species abbreviations.

^c Angler totals may not equal sum of sites due to some anglers fishing at more than one site.

APPENDIX E
AYK REGION EMERGENCY ORDERS ISSUED
DURING 1993 AND 1994

SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-S-01-93

Issued at Fairbanks, Alaska
May 20, 1993

Effective Date: 11:59 p.m. ADT
Tuesday, June 1, 1993

Expiration Date: July 31, 1993
unless superseded by subsequent
emergency order.

EXPLANATION:

This emergency order closes the following waters to sport fishing for chum salmon from June 1, 1993 until July 31, 1993: Marine waters and freshwater drainages from an ADF&G marker on Elim Point, three-fourths of a mile east of Elim village, to the terminus of the Kwik River (Subdistrict 3 of the Port Clarence Commercial Fishing Area, including the Tubutulik and Kwiniuk river drainages).

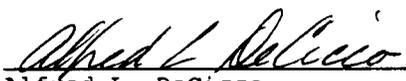
REGULATION:

SAAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS. (e) is amended by adding:

in marine waters and freshwater drainages from an ADF&G marker on Elim Point, three-fourths of a mile east of Elim village, to the terminus of the Kwik River (Subdistrict 3 of the Port Clarence Commercial Fishing Area, including the Tubutulik and Kwiniuk river drainages), chum salmon caught on sport fishing gear between June 1, 1993 and July 31, 1993 may not be retained or possessed.

Carl L. Rosier
Commissioner

By delegation to:


Alfred L. DeCicco
Area Management Biologist

JUSTIFICATION:

Chum salmon escapement needs have not been met in the Kwiniuk River and neighboring streams in recent years. During 1992, only about 12,000 chum salmon passed the counting tower on the Kwiniuk River, well under the escapement goal of 19,500. The projected run for 1993 is expected to be similar to that which occurred in 1992. This low projection coupled with the underlying uncertainty about chum salmon run strength to western Alaska in 1993 requires a conservative approach to management of the fishery.

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Accordingly, a closure of the recreational fishery for chum salmon is required. The Commercial Fisheries Division will assess run strength by various means during the course of the season. If escapement needs have been met or are projected to be met, this restriction will be lifted. If however, escapement and/or subsistence requirements are not satisfied, this closure will remain in effect.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-C-02-93

Issued at Fairbanks, Alaska
May 20, 1993

Effective Date: 11:59 p.m. ADT
Friday, May 28, 1993

Expiration Date: Valid until
superseded by subsequent
regulatory action.

EXPLANATION:

This emergency order rescinds Emergency Order No. 3-C-02-92 and restores the daily bag and possession limit for Dolly Varden in the Nome River to 10 per day from May 28, 1993 until further notice.

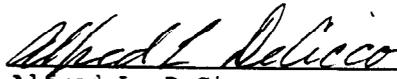
REGULATION:

SAAC 70.010. DAILY BAG AND POSSESSION LIMITS.

(f) effective May 28, 1993, in the Nome River, the daily bag and possession limit for Dolly Varden/Arctic char is 10 fish.

Carl L. Rosier
Commissioner

By delegation to:


Alfred L. DeCicco
Area Management Biologist

JUSTIFICATION:

During stock assessment work conducted by the Sport Fish Division in the fall of 1991 and 1992, about 3,000 and 4,000 Dolly Varden were estimated to be in the Nome River, respectively. During 1992, it was estimated that only about 5% of the Dolly Varden which overwintered in the Nome River in 1991 returned to that river in 1992. Dolly Varden marked in the Nome River were recaptured as far east as the Fish River and as far west as the Chokotsk Peninsula, Russia. Dolly Varden marked in other rivers have also demonstrated movements among drainages in Norton Sound indicating that stocks from many rivers mix while at sea during the summer and enter rivers in mixed stock aggregations to overwinter. As long as Dolly Varden are being heavily harvested in relatively few rivers compared to the number of rivers contributing stocks, harvests of Dolly Varden from the Nome River and other Seward Peninsula rivers with good angler access should be sustainable with a 10 fish per day bag limit. Large mixed stock runs of Dolly Varden are known

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to enter several Norton Sound streams which sustain only minimal sport fishing effort. These runs likely act as a reservoir for stocks which contribute to overwintering populations in the Nome River and other Nome area streams.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-G-03-93

Issued at Fairbanks, Alaska
May 20, 1993

Effective Date: 11:59 p.m. ADT
Friday, May 28, 1993

Expiration Date: Valid until
superseded by subsequent
regulatory action.

EXPLANATION:

This emergency order reduces the daily bag and possession limit for Arctic grayling in the Snake River from 5 per day with only 1 over 15 inches to 2 per day with only 1 over 15 inches from May 28, 1993 until further notice.

REGULATION:

5AAC 70.010. DAILY BAG AND POSSESSION LIMITS.

(f) effective May 28, 1993, in the Snake River, the daily bag and possession limit for Arctic grayling is 2 fish of which only 1 may be over 15 inches in total length.

Carl L. Rosier
Commissioner

By delegation to:


Alfred L. DeCicco
Area Management Biologist

JUSTIFICATION:

It is believed that Arctic grayling populations in Interior Alaska can sustain exploitation rates between 15% and 20% annually. Stock assessment work conducted by the Sport Fish Division in Nome area streams has indicated that Arctic grayling populations in Seward Peninsula waters are longer lived, spawn at an older age and occur at lower densities than in Interior Alaska. It is therefore believed that they cannot sustain exploitation rates greater than 15%. The abundance of Arctic grayling in the entire Snake River drainage was estimated at about 2,400 fish in 1992. The most recent harvest estimate (1991) was about 400 fish (17%). It is therefore prudent to reduce the bag and possession limit for Arctic grayling in this stream in order to ensure sustained yields into the future. A similar action was taken on the Pilgrim in 1992 and appears to be an effective means to stabilize the population while

-continued-

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still allowing some harvest of this species. The department will continue to monitor the status of the Arctic grayling population in the Snake River to assess changes in population structure and impacts of this change in daily bag and possession limit.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-G-04-93

Issued at Fairbanks, Alaska
June 22, 1993

Effective Date: 12:01 a.m.
Saturday, June 26, 1993

Expiration Date: December 31,
1995, unless superseded by
subsequent emergency order.

EXPLANATION:

This emergency order closes Piledriver Slough and 23 Mile Slough to the retention of Arctic grayling from 12:01 a.m., Saturday, June 26, 1993, through December 31, 1995. All Arctic grayling caught in these waters must be released immediately.

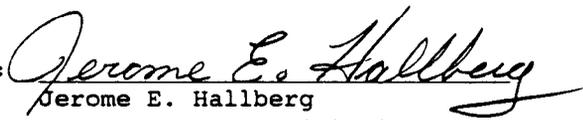
REGULATION:

5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS: is amended to read:

(v) In Piledriver Slough and 23 Mile Slough, Arctic grayling may not be retained or possessed.

Carl L. Rosier
Commissioner

By delegation to:


Jerome E. Hallberg
Area Management Biologist

JUSTIFICATION:

The abundance of Arctic grayling in Piledriver Slough (including 23 Mile Slough) has declined. The estimated abundance of Arctic grayling has dropped nearly 40% from 17,300 fish in 1991, to 14,000 in 1992, to 10,800 in 1993. Department staff estimate that the number of legal size fish (12-inch and greater) in 1993 is about 2,000 grayling. In 1991, (the most recent available harvest estimate) nearly 2,200, Arctic grayling, 12 inches and greater were harvested. The Department believes that the Arctic grayling population in Piledriver Slough is being over-fished. Therefore, a catch and release regulation for the Piledriver (and 23 Mile Slough) Arctic grayling fishery is being implemented to prevent continued over-harvest. Catch and release

-continued-

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regulation will allow continuation of the recreational fishery and provide protection for the resource.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-KS-05-93

Issued at Fairbanks, Alaska
July 16, 1993

Effective Date: 12:01 a.m.
Saturday, July 17, 1993

Expiration Date: December 31,
1993, unless superseded by
subsequent emergency order.

EXPLANATION:

This emergency order increases the daily bag and possession limit for chinook salmon on the Chena River from one to two fish per day effective 12:01 a.m., Saturday, June 17, 1993, and will remain in effect until further notice.

REGULATION:

5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS: is amended to read:

(b) In the Chena River (downstream from a department marker 300 feet downstream from the Chena River flood control structure) the daily bag and possession limit for king salmon is 2 fish, no size limit.

Carl L. Rosier
Commissioner

By delegation to:


Jerome E. Hallberg
Area Management Biologist

JUSTIFICATION:

The Alaska Board of Fisheries authorized the department to issue emergency orders to increase the sport fish bag and possession limits for anadromous fish when the total escapement is projected to exceed the optimum escapement goal by 25 percent. The escapement goal for Chena River king salmon is 6,300 fish. The Department has estimated (through the use of a counting tower) that more than 7,500 king salmon have entered the Chena River. As the spawning escapement is now assured, it is appropriate to liberalize the fishery and provide sport anglers with an opportunity to increase the harvest of king salmon in the Chena River.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-KS-06-93

Issued at Fairbanks, Alaska
July 22, 1993

Effective Date: 12:01 a.m.
Saturday, July 23, 1993

Expiration Date: December 31,
1993, unless superseded by
subsequent emergency order.

EXPLANATION:

This emergency order increases the daily bag and possession limit for chinook salmon on the Salcha River from one to two fish per day effective 12:01 a.m., Friday, June 23, 1993, and will remain in effect until further notice.

REGULATION:

5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS: is amended to read:

(b) In the Salcha River (downstream from a department marker placed approximately 2 1/2 miles upstream from the Richardson Highway Bridge) the daily bag and possession limit for king salmon is 2 fish, no size limit.

Carl L. Rosier
Commissioner

By delegation to:


Jerome E. Hallberg
Area Management Biologist

JUSTIFICATION:

The Alaska Board of Fisheries authorized the department to issue emergency orders to increase the sport fish bag and possession limits for anadromous salmon when the total escapement exceeds or is projected to exceed the optimum escapement goal by 25 percent. The escapement goal for Salcha River king salmon is 7,100 fish. As of July 21 the Department has estimated (through the use of a counting tower) that more than 8,600 king salmon have entered the Salcha River. The Department projects that more than 9,000 king salmon will reach the spawning grounds. As the spawning escapement is now assured, it is appropriate to liberalize the fishery and provide sport anglers with an opportunity to increase the harvest of king salmon in the Salcha River.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-CS-07-93

Issued at Fairbanks, Alaska
August 13, 1993

Effective Date: 12:01 a.m.
Monday, August 16, 1993

Expiration Date: December 31,
1993, unless superseded by
subsequent emergency order

EXPLANATION:

This emergency order closes the Yukon River and all tributaries in the drainage to sport fishing for chum salmon effective 12:01 a.m., Monday, August 16, 1993. The closure will remain in effect until further notice.

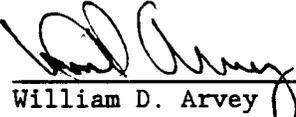
REGULATION:

5 AAC 70.050 WATERS CLOSED TO SPORT FISHING: is amended to read:

(r) The Yukon River and all its tributaries are closed to fishing for chum salmon from August 16 through December 31.

Carl L. Rosier
Commissioner

By Delegation to:


William D. Arvey
Area Management Biologist

JUSTIFICATION:

Department abundance estimates of returning adult chum salmon to the Yukon River indicate that a failure has occurred in the primary returning year classes of fall chum salmon. No commercial fishing has been allowed in the drainage, and the Department is preparing to place additional restrictions upon Yukon and Tanana river subsistence and personal use fisheries. Sonar counts at Pilot Station show that by August 9, when about half the run would have passed in most years, less than 150,000 fall chum salmon had proceeded upriver. Department estimates of total run size from test fishing and sonar counting range from about 350,000 to just over 500,000 fall chum salmon. Since about 400,000 fall chum salmon are needed on the spawning grounds to meet escapement needs, passage rates to date are far behind schedule to provide for both escapement and subsistence needs.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-SS-08-93

Issued at Fairbanks, Alaska
September 3, 1993

Effective Date: 6:00 p.m.
Friday, September 3, 1993

Expiration Date: December 31,
1993, unless superseded by
subsequent emergency order.

EXPLANATION:

This emergency order closes the Yukon River and all its tributaries to the retention of coho salmon by sport anglers effective at 6:00 p.m., Friday, September 3, 1993. This restriction will remain in effect until further notice.

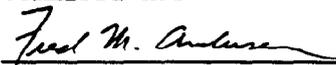
REGULATION:

5 AAC 70.050 WATERS CLOSED TO SPORT FISHING: is therefore amended to read:

(s) The Yukon River and its tributaries are closed to the retention of coho salmon from 6:00 p.m., Friday, September 3, 1993, until December 31, 1993.

Carl L. Rosier
Commissioner

By Delegation to:


Frederick M. Andersen
Acting Regional Supervisor

JUSTIFICATION:

The 1993 coho salmon run to the Yukon and Tanana Rivers is judged to be weak. The Department of Fish and Game estimates salmon run strength using hydro-acoustic counts generated by the sonar counting device at Pilot Station, approximately 120 miles upstream from the mouth of the Yukon River. The cumulative sonar estimate through August 27, 1993, was approximately 37,000 coho salmon, the lowest count since the inception of the project. Although coho salmon have not yet reached spawning streams in Interior Alaska, a closure of the consumptive recreational fishery at this time is warranted to help ensure that conservation needs are met.

Because of the unexpectedly weak run, the Department has closed the personal use fishery, has allowed no commercial harvest, and is imposing a complete closure of the subsistence fishery for coho (and fall run chum salmon) concurrent with this action.

During September and early October, Department staff will monitor coho and fall chum salmon escapement levels in selected streams and will make additional regulation changes if warranted.

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Appendix E1.-Page 13 of 15.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-S-09-93

Issued at Delta Jct., Alaska
October 15, 1993

Effective Date: 6:00 p.m. ADT
Friday, Oct. 15, 1993

Expiration Date: Dec. 31, 1993
unless superseded by subsequent
emergency order.

EXPLANATION:

This emergency order repeals the emergency closure of the Delta Clearwater River to the retention of coho salmon by sport anglers. All other waters of the Yukon River will remain closed to the retention of coho salmon as previously ordered.

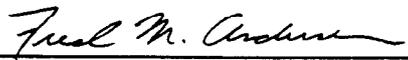
REGULATION:

SAAC 70.050. WATERS CLOSED TO SPORT FISHING IS AMENDED TO READ:

(t) The Yukon River and its tributaries with the exception of the Delta Clearwater River are closed to the retention of coho salmon from 6:00 p.m., Friday, October 15, 1993, until December 31, 1993

Carl L. Rosier
Commissioner

By Delegation to:


Frederick M. Andersen
Regional Supervisor

JUSTIFICATION:

The 1993 coho salmon run to the Yukon and Tanana Rivers was weak based upon hydro-acoustic counts generated by the sonar counting device at Pilot Station and on performance of test fishery indicators in the up-river districts. Because of the weak coho (and fall chum salmon) run, the Department closed the commercial, personal use, subsistence, and sport fisheries to allow adequate escapement to the spawning streams.

The Delta Clearwater River is a significant producer of coho salmon in the Tanana drainage. The Department set an escapement goal of 9,000 coho salmon for the Delta Clearwater River which is intended to provide average levels of consumptive use in the lower river fisheries as well as maintain a sport fishery in the Delta Clearwater River.

Department staff have conducted counts of coho in the Delta Clearwater River and have determined that the escapement goal will be attained. This

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Appendix E1.-Page 15 of 15.

emergency order allows recreational harvest to occur in the Delta Clearwater River only.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-BB-01-94

Issued at Delta Junction, Alaska
May 25, 1994

Effective Date: 6:00 p.m. ADT
Thursday, May 26, 1994

Expiration Date: Valid until
superseded by subsequent
emergency order.

EXPLANATION:

This emergency order closes Fielding Lake to sport fishing for burbot. Any burbot taken in Fielding Lake must be released immediately. This restriction will remain in effect until further notice.

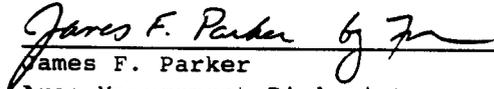
REGULATION:

5AAC 70.050. WATERS CLOSED TO SPORT FISHING is amended to read:

(r) Fielding Lake is closed to the taking of burbot from 6:00 p.m. Thursday, May 26 until further notice.

Carl L. Rosier
Commissioner

By delegation to:


James F. Parker
Area Management Biologist

JUSTIFICATION:

The estimated abundance of harvestable size burbot has declined from approximately 600 fish in 1991 to approximately 200 in 1993. This decline in population size is attributed to high harvest rates in the early 1980s and resulting low reproduction rates in subsequent years. Abundance is expected to remain low unless harvest is eliminated and recruitment of young fish into the adult population is maximized.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-KS-02-94

Issued at Fairbanks, Alaska
July 21, 1994

Effective Date: 6:00 p.m.
Friday, July 22, 1994

Expiration Date: December 31,
1994, unless superseded by
subsequent emergency order.

EXPLANATION:

This emergency order increases the daily bag and possession limit for chinook salmon on the Salcha and Chena Rivers from one to two fish per day effective 6:00 p.m., Friday, July 22, 1994, and will remain in effect until further notice.

REGULATION:

5 AAC 70.020. BAG LIMITS, POSSESSION LIMITS, AND SIZE LIMITS: is amended to read:

(b) In the Salcha River (downstream from a department marker placed approximately 2 1/2 miles upstream from the Richardson Highway Bridge), and in the Chena River (downstream from a department marker 300 feet downstream from the Chena River flood control structure) the daily bag and possession limit for king salmon is 2 fish, no size limit.

Carl L. Rosier
Commissioner

By delegation to:


Jerome E. Hallberg
Area Management Biologist

JUSTIFICATION:

The Alaska Board of Fisheries authorized the department to increase the sport fish bag and possession limits for anadromous fish when the total escapement exceeds or is projected to exceed the established escapement goal by 25 percent. The escapement goal for Salcha River king salmon is 7,100 fish. As of July 20 the Department has estimated that in excess of 11,000 king salmon have entered the Salcha River. Likewise, the escapement goal for Chena River king salmon is 6,300 fish. The Department estimates that more than 8,600 king salmon have entered the Chena River. As the spawning escapement for both rivers is now assured, it is appropriate to liberalize the fishery and provide sport anglers with an opportunity to increase the harvest of king salmon in the Chena River.

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Appendix E2.-Page 3 of 12.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-CS-03-94

Issued at Fairbanks, Alaska
August 4, 1994

Effective Date: August 6, 1994
at 6:00 p.m. ADT.

Expiration Date: December 31, 1994
unless superseded by subsequent
emergency order.

EXPLANATION:

This emergency order closes sport fishing for chum salmon in the lower Yukon River and in a portion of the middle Yukon River effective at 6:00 p.m. Saturday, August 6, 1994. This restriction will remain in effect until further notice.

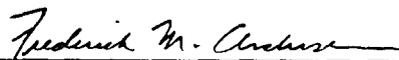
REGULATION:

5AAC 70.050 WATERS CLOSED TO SPORT FISHING is amended to read:

(s) the Yukon River from its mouth, upstream to the mouth of the Koyukuk River is closed to the taking of chum salmon from 6:00 p.m. Saturday, August 6, until further notice.

Carl L. Rosier
Commissioner

by delegation to:


Frederick M. Andersen
Regional Supervisor

JUSTIFICATION:

The abundance of salmon entering the Yukon River is estimated primarily by means of a sonar counting device located approximately 120 miles upstream from the river's mouth. Based on counts generated by the sonar, the Department currently projects that the 1994 run will number only about 550,000 fall chum salmon.

Recognizing the near-term potential for poor returns of fall chum salmon to the Yukon River, the Alaska Board of Fisheries adopted a regulatory management plan which specifies management actions to be taken in the event of runs not sufficient to satisfy escapement objectives and normal subsistence harvest requirements. This plan recommends closure of the sport fishery during fall chum salmon runs thought to consist of fewer than 600,000 fish.

The Department of Fish and Game will continue to monitor run strength and may extend or repeal this restriction depending on run strength estimates generated between now and early September.

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Appendix E2.-Page 5 of 12.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-S-04-94

Issued at Nome, Alaska
12:00 p.m. ADT August 9, 1994

Effective Date: 6:00 p.m. ADT
Tuesday August 9, 1994

Expiration Date: September 30, 1994
unless superseded by subsequent
emergency order.

EXPLANATION:

This emergency order closes the Nome, Snake, Penny and Cripple rivers to sport fishing for coho salmon. Effective 6:00 pm, Tuesday, August 9, 1994 until September 30, 1994, all silver salmon caught in the Nome, Snake, Penny and Cripple rivers must be immediately released.

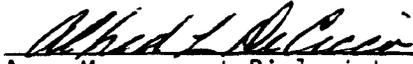
REGULATION:

5AAC 70.050. WATERS CLOSED TO SPORT FISHING is amended by adding:

(s) the Nome, Snake, Penny and Cripple rivers, are closed to sport fishing for coho salmon, all coho salmon caught must be immediately released.

Carl L. Rosier
Commissioner

By delegation to:


Area Management Biologist

JUSTIFICATION:

Although silver salmon runs in eastern Norton Sound have been strong, escapement into the Nome River has lagged behind that observed in 1993. Only about 360 coho had passed the counting tower through Sunday, August 7. This compares with about 1,600 by this date last year. A small number (less than 100) silver salmon were seen on a recent survey of the Snake River. Subsistence fishing restrictions are in effect on the Nome, Snake, Penny and Cripple Rivers. The Nome, Snake, Cripple and Penny rivers are therefore closed to the taking of silver salmon. These restrictions will be lifted if the strength of the coho run will allow for adequate escapement and additional harvest.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-S-05-94

Issued at Fairbanks, Alaska
August 12, 1994

Effective Date: 6:00 p.m. ADT
August 13, 1994

Expiration Date: December 31,
1994 unless superseded by
subsequent emergency order.

EXPLANATION:

This emergency order closes sport fishing for chum salmon in middle and upper portions of the Yukon and Tanana River drainages. Effective at 6:00 p.m. Saturday, August 13, 1994, the Yukon River drainage upstream from the mouth of the Koyukuk River and the Tanana River drainage are closed to the sport harvest of chum salmon. This restriction will remain in effect until further notice. All chum salmon must be immediately released.

REGULATION:

SAAC 70.050. WATERS CLOSED TO SPORT FISHING is amended to read:

(t) the Koyukuk River drainage, the Yukon River drainage upstream from the mouth of the Koyukuk River and the Tanana River drainage are closed to sport fishing for chum salmon effective at 6:00 p.m. ADT Saturday, August 13. All chum salmon must be immediately released.

Carl L. Rosier
Commissioner

By delegation to:


Frederick M. Andersen
Regional Supervisor

JUSTIFICATION:

Recognizing the near-term potential for poor returns of fall chum salmon to the Yukon River, the Alaska Board of Fisheries adopted a regulatory management plan which specifies management actions to be taken in the event of runs not sufficient to satisfy conservation needs and subsistence harvest requirements. This management plan calls for closure of the sport fishery during fall chum salmon runs thought to consist of fewer than 600,000 fish. Accordingly, this closure is being made effective as the early portion of the fall chum run enters the middle and upper portions of the Yukon River watershed.

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Appendix E2.-Page 8 of 12.

The abundance of salmon entering the Yukon River is estimated primarily by means of a sonar counting device located approximately 120 miles upstream from the river's mouth. Based on counts generated by the sonar, the Department currently projects that the 1994 run will number only about 450,000 fall chum salmon.

The Department of Fish and Game will continue to monitor run strength and may modify this restriction as deemed necessary.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-WF-06-94

Issued at Fairbanks, Alaska
September 1, 1994

Effective Date: 12:01 a.m. ADT
Monday, September 5, 1994

Expiration Date: December 31,
1994, unless superseded by
subsequent emergency order.

EXPLANATION:

This emergency order closes the Chatanika River to the taking of whitefish by sport fishermen.

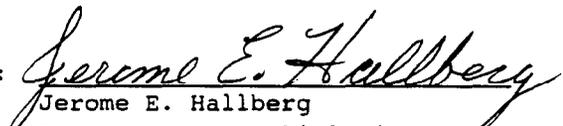
REGULATION:

SAAC 70.050. WATERS CLOSED TO SPORT FISHING is amended to read:

(t) the Chatanika River and its tributaries are closed to the taking of whitefish from Monday, September 5, 1994 until December 31, 1994 unless superseded by a subsequent emergency order.

Carl L. Rosier
Commissioner

By delegation to:


Jerome E. Hallberg
Area Management Biologist

JUSTIFICATION:

The abundance of whitefish in the Chatanika River has declined drastically in recent years. Since 1991, the estimated abundance of least cisco whitefish has decreased an average of 40% annually. Department staff estimated the abundance of least cisco in 1994 at 28,000 fish, down from the 46,000 fish estimated in 1993. Current management strategy requires that a minimum of 40,000 least cisco need to be present in the Chatanika River before sport fishery can occur. Therefore, an emergency order closure of the Chatanika River to recreational fishing for whitefish is necessary to provide for conservation of the spawning stocks and to prevent further decline of whitefish stocks in the Chatanika River.

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Appendix E2.-Page 10 of 12.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.

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SPORT FISHING

Emergency Order

ALASKA DEPARTMENT
OF FISH AND GAME

Under Authority of AS 16.05.060

Emergency Order No. 3-S-07-94

Issued at Fairbanks, Alaska
September 6, 1994

Effective Date: September 6, 1994

Expiration Date: December 31,
1994, at 6:00 p.m. unless
superseded by subsequent
emergency order.

EXPLANATION:

This emergency order re-opens the sport fishing season for chum salmon in Yukon and Tanana river drainages effective at 6:00 p.m. Tuesday, September 6, 1994. This regulation will remain in effect until further notice.

REGULATION:

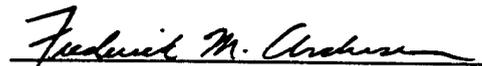
5AAC 70.050. WATERS CLOSED TO SPORT FISHING is amended to read:

(u) the Yukon and Tanana river drainages are open to sport fishing for chum salmon effective at 6:00 p.m. ADT Tuesday, September 6, 1994.

Emergency orders Nos. 3-S-04-94 and 3-S-05-94 are rescinded.

Carl L. Rosier
Commissioner

By delegation to:


Frederick M. Andersen
Regional Supervisor

JUSTIFICATION:

Recognizing the near-term potential for poor returns of fall chum salmon to the Yukon River, the Alaska Board of Fisheries adopted a regulatory management plan which specifies management actions to be taken in the event of runs not large enough to satisfy conservation needs and subsistence fishery requirements. On August 12, based on this plan and on in-season assessment of run strength (primarily data from the Pilot Station sonar), the Department closed subsistence chum salmon fisheries in the lower Yukon and severely restricted the subsistence fisheries in upriver districts. At the same time as these restrictions were imposed, the Department closed the sport fishing season for chum salmon.

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Appendix E2.-Page 12 of 12.

It is now recognized that during a portion of the run, the sonar counting device failed to enumerate all salmon passing the sonar site. Other indicators of run strength, such as test fishwheels, subsistence catches, and tributary escapement monitoring projects, now suggest that the run is much stronger than was previously thought and is judged sufficiently strong to sustain normal levels of subsistence and recreational harvest. For this reason, it is appropriate to re-open the sport fishing season for chum salmon. Subsistence fishing schedules were liberalized on September 5.

The Department of Fish and Game will continue to monitor the abundance of fall run chums and may modify this or other regulations as more information becomes available.

DISTRIBUTION:

The distribution list of this emergency order is available from the Department of Fish and Game office in Fairbanks.