Fishery Management Report No. 00-7

Fishery Management Report for Sport Fisheries in the Arctic-Yukon-Kuskokwim Management Area from 1995 to 1997

by

John Burr

June 2000

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)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

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

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

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

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
and	&
at	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

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

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PREFACE

This report combines fisheries information for 1995 through 1997. This report is organized into two major sections. Section I provides an overview of the Arctic-Yukon-Kuskokwim (AYK) Management Area. Included is a description of the Management Area and sub areas, Board of Fish activities, and management information and activities within the area. Section II provides a more detailed summary of each major fishery, with elaboration on those fisheries most effected by fishing during the reporting period. Included in these summaries are a fishery description; a description of recent performance of the fishery; a description of recent Board of Fishery actions related to the fishery; a discussion of social or biological issues that may be associated with each fishery; and a description of ongoing research and management activities related to each fishery.

SECTION I: MANAGEMENT AREA OVERVIEW

ARCTIC-YUKON-KUSKOKWIM AREA DESCRIPTION

The Arctic Yukon Kuskokwim Management Area (AYKMA) consists of approximately 562,000 km^2 (37% of the entire land area of Alaska) of extremely varied topography, climate, and zoogeography. The management area includes the North Slope of the Brooks Range and Arctic coastal plain, the entire Yukon drainage, and the Kuskokwim drainage upstream of the Aniak River. Included within AYKMA are three of the state's largest river systems (Yukon, Kuskokwim, and Colville), thousands of lakes, and thousands of miles of streams. The area coastline boundary extends from Kuskokwim Bay to Norton Sound (Yukon Kuskokwim Delta) and from Cape Lisburne on the west around northwestern and northern Alaska to the Canadian border on the Arctic Ocean. The area as a whole is sparsely populated. Small communities are scattered along the major river systems of Interior Alaska. On Alaska's north slope, virtually all communities are located along the coast. The communities are invariably located near water, because of the importance of fish and or marine mammals as a food source to native people historically and today.

Access to most of the area is limited to water or air travel. The major river systems provide transportation corridors during winter as well as during open water months. Ground transportation to the north slope is limited to the Dalton Highway (Haul Road) constructed to provide ground transportation to the rich Prudhoe Bay area oil fields. Road access to the Yukon River is provided by the Dalton Highway, by the Steese Highway at Circle and by the Taylor Highway at Eagle. With the exception of the Dalton Highway, these gravel roads are not maintained during winter. There is no road access to the Kuskokwim River drainage.

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 two National Parks and Preserves (Yukon – Charlie and Gates of the Arctic), seven National Wildlife Refuges (Arctic, Yukon Flats, Kanuti, Koyukuk, Nowitna, Innoko and Yukon Delta), the White Mountains National Recreation Area, the Steese National Conservation Area, the National Petroleum Reserve-Alaska (NPRA) and numerous Wild and/or Scenic Rivers, as well as other classifications of federal lands. Lands held by the State of Alaska, native corporations, and other private land owners comprise the remaining landmass. Arvey et al. (1995) provides a detailed description of the geology and geography for each of the sub-areas within the AYK Management Area.

For purposes of reporting and organizing statistics in the Sport Fish Statewide Harvest Survey (SWHS), the AYK Management Area is subdivided into three sub-areas; Yukon (Y), Kuskokwim (V), and Arctic (Z) (Figure 1).

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 2) 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

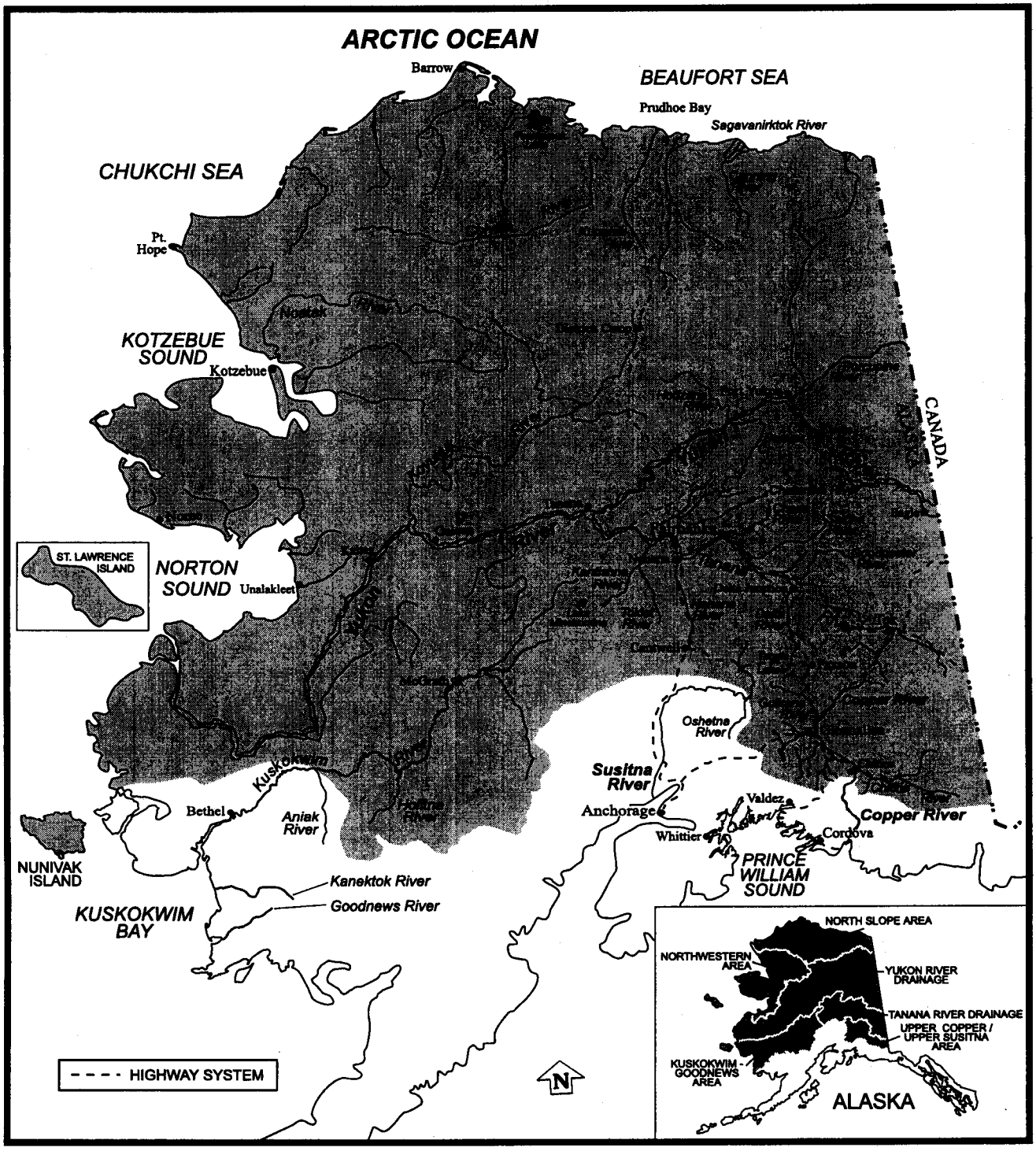

Figure 1.-Map of the Arctic-Yukon-Kuskokwim Management Area.

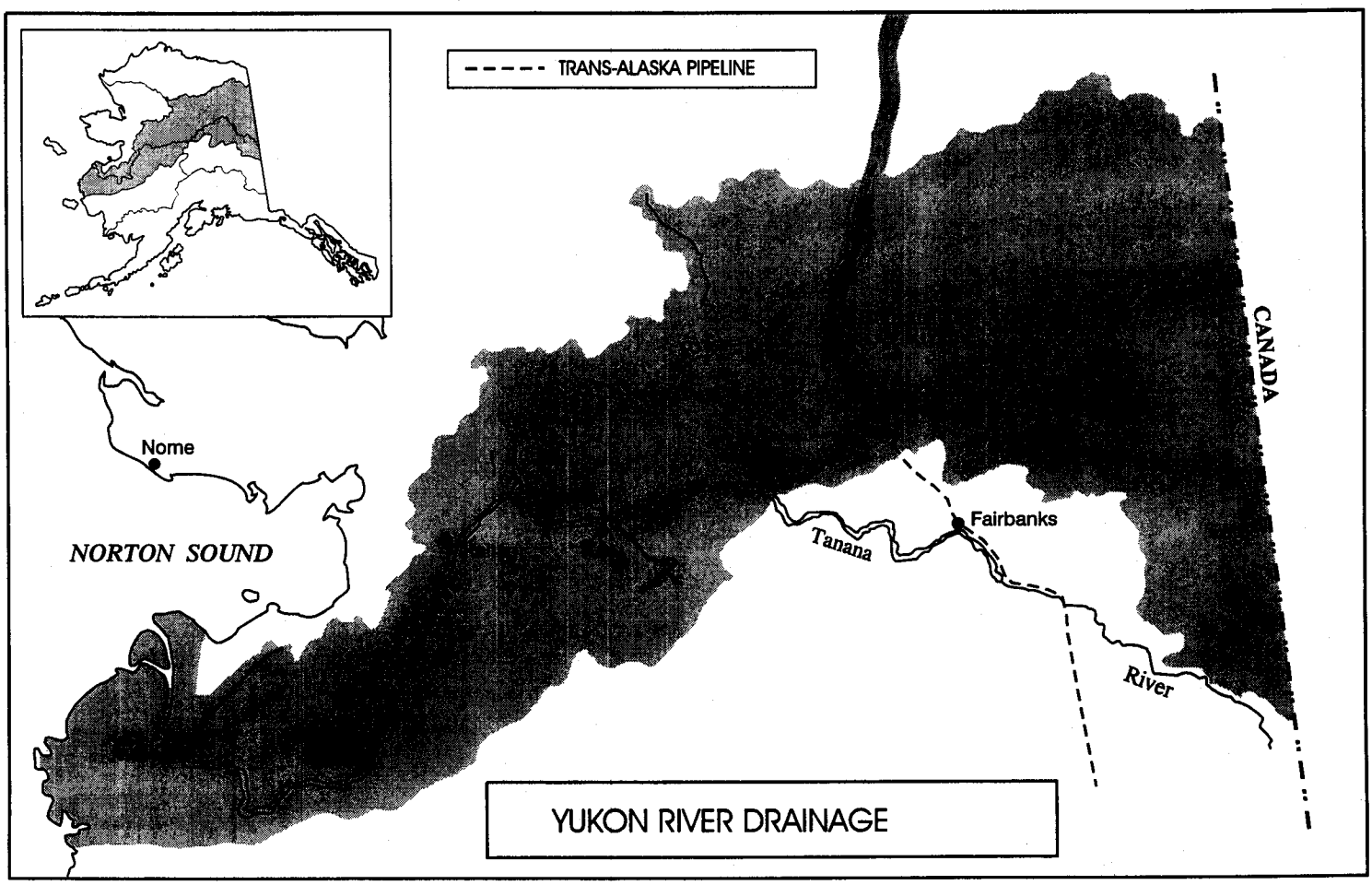

Figure 2.-Map of the Yukon sub-area.

Division reporting purposes. Separate harvest reporting for the two river drainages has been performed since 1990

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 conclusive of adjacent marine waters, adjacent saltwater from Cape Newenham north to the Naskonat Peninsula (north of Nelson Island) and Nunivak Island. 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. Most of the sport fishing effort, catch and harvest that is reported by the SWHS for the Kuskokwim Area (Area V –Kuskokwim River and Kuskokwim Bay) comes from waters tributary to Kuskokwim bay or tributaries downstream of and including the Aniak River system.

North Slope Brooks Range Sub-area

The North Slope of the Brooks Range sub-area (statewide harvest Area Z; Figure 4) 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 km^2.

FISHERY RESOURCES

Virtually all freshwater and migratory fish species sought by anglers in Alaska are available in the AYKMA. All populations are wild; there is presently no enhancement of fish populations in the management area. Five species of Pacific salmon, chinook salmon *Oncorhynchus tshawytscha*, coho salmon *Oncorhynchus kisutch*, chum salmon *Oncorhynchus keta*, sockeye salmon *Oncorhynchus nerka*, and pink salmon are available in tributaries of the Yukon and Kuskokwim sub-areas. Chum and pink salmon and occasionally chinook salmon are present on the North Slope in the Colville River drainage and in coastal streams, but in numbers generally too small to attract or support significant sport fisheries.

Popular fisheries for resident species Arctic grayling *Thymallus arcticus*, Dolly Varden *Salvelinus malma*, northern pike *Esox lucius*, and lake trout *Salvelinus namaycush* are supported by lakes and streams adjacent to the Dalton Highway. Unique opportunities to fish for these species as well as inconnu (sheefish) *Stenodus leucichthys*, burbot *Lota lota* and Arctic char *Salvelinus alpinus* in remote wilderness settings exist through out this vast management area. Wild stocks of rainbow trout are found in small numbers in the Kuskokwim River drainage in streams upstream of the Aniak River. Rainbow trout do not occur naturally in drainages north of the Kuskokwim River. 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*. 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 *Chionoecetes bairdi*, King crab *Paralithodes camtschaticius*, and others occur in coastal waters from Bristol Bay northwards, and are occasionally harvested by sport anglers.

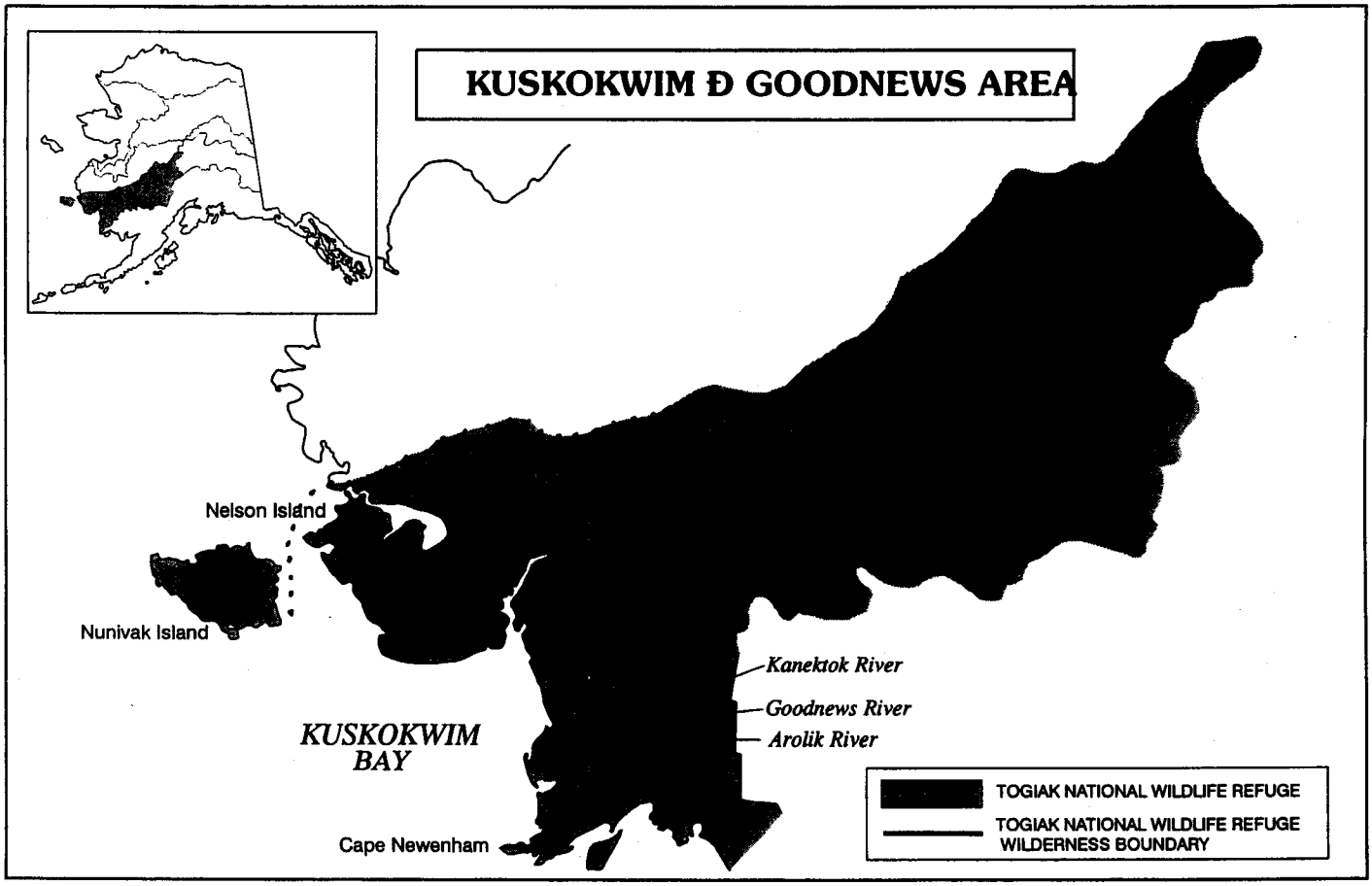

Figure 3.-Map of the Kuskokwim sub-area.

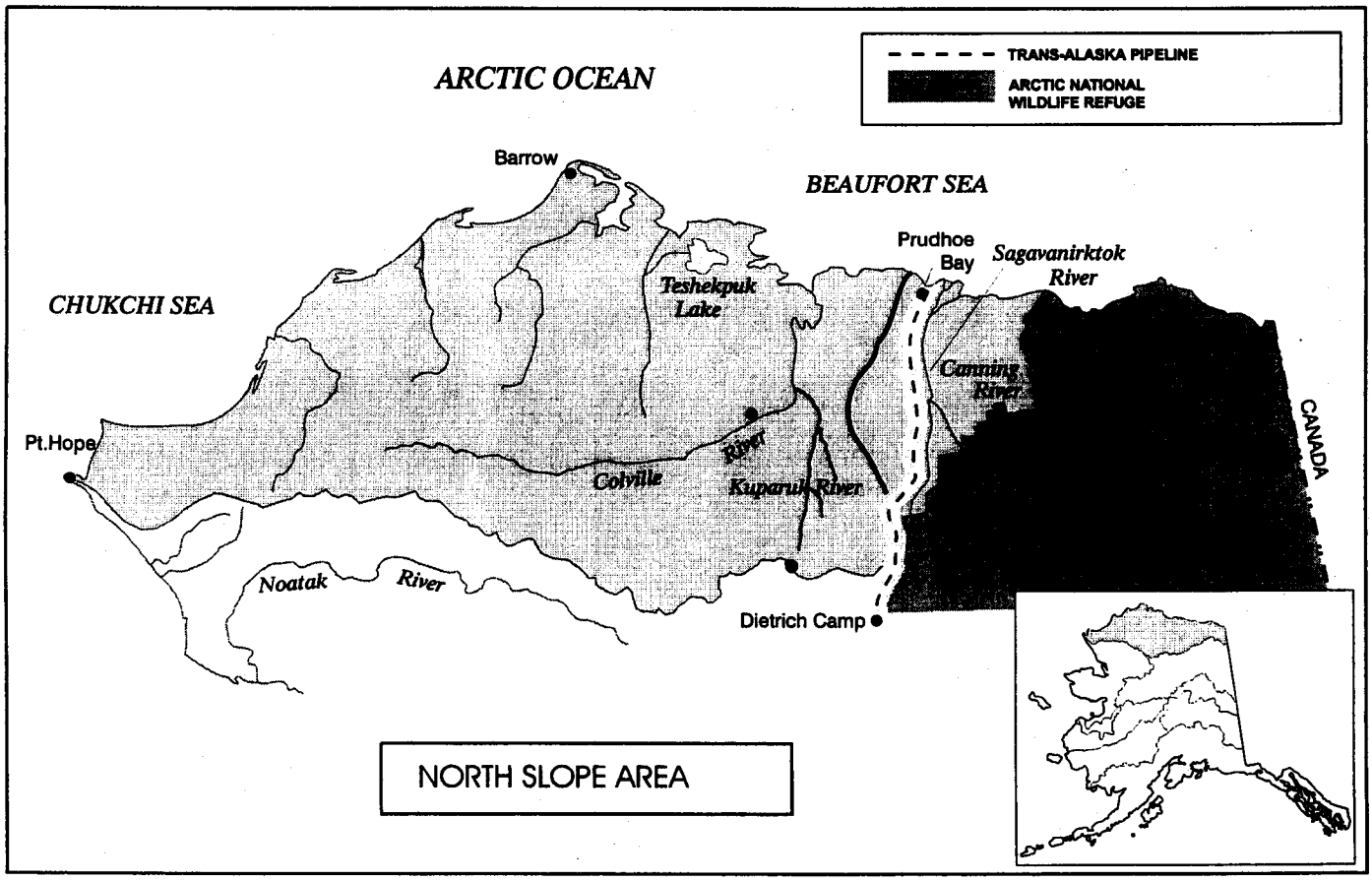

Figure 4.-Map of the North Slope sub-area.

ALASKA BOARD OF FISHERIES ACTIVITIES

Appropriate fishing regulations are developed through a process that the state of Alaska has established by which the Alaska Board of Fisheries (BOF) adopts regulations based on input from all concerned members of the public and the Alaska Department of Fish and Game (ADF&G).

Alaska Board of Fisheries

Under the current operating schedule, the BOF meets on a three year cycle. The Alaska BOF met in Fairbanks from December 2 - 9, 1997 and considered 7 regulatory proposals from the public that would have affected sport fishing in the AYKMA. Oral and written reports by staff of the 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 amended and adopted one of the proposals, substituted a Board Proposal for three proposals and failed to adopt three proposals. A summary of the proposals submitted for BOF action during the 1997 meeting are provided (Appendix A). The Board of fisheries is next scheduled to review regulation proposals for the Arctic, Yukon, Kuskokwim Management Area in the winter of 2000-2001.

Advisory Committees

Public input concerning regulation changes is 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 often attend the committee meetings. In this way, the pubic are afforded the opportunity for direct public interaction with Department staff involved with resource issues of local concern.

During the reporting period, there were at least 15 active Fish and Game advisory committees in the AYKMA. In the Yukon sub-area, active committees included: Eagle, Upper Tanana /Forty Mile, Yukon Flats, Tanana /Rampart /Manley, Ruby, Koyukuk, Grayling /Anvik /Shageluk /Holy Cross, Middle Yukon, and Lower Yukon. An additional committee was activated in the Yukon sub-area during 1998, the Central Advisory Committee. This committee branched off from the Yukon Flats Advisory Committee following a long struggle by Central AK residents to find representation on the Yukon Flats committee. In the upper Kuskokwim sub-area, active committees included: McGrath, and Central Kuskokwim. In the North Slope sub-area, two advisory committees are listed. However struggles with inadequate funding and with very low attendance by members from distant sites in this large area resulted in poor representation by local residents. The North Slope Borough (NSB) formed a North Slope Borough Fish and Game Advisory Committee approximately six years ago which has filled the void created by the inactive “official” advisory committees. The NSB continues to support this advisory effort and appears to provide the needed function.

During 1995-97 Sport Fisheries Division staff participated in meetings of Upper Tanana /Forty Mile, Yukon Flats, Tanana /Rampart /Manley, Koyukuk, Middle Yukon, McGrath, and Central Kuskokwim committees. Division of Commercial Fisheries staff handled most fisheries issues in other Yukon River areas. Staff representing Subsistence Division and Division

of Wildlife Conservation have been active participants in meetings of the NSB advisory committee.

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Specific management objectives for the management area 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.

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.

To date, management plans have been written for the following fisheries.

- North Slope Sport Fishery Management Plan
- Sport Fishery Management for Salmon in the Yukon Drainage
- Sport Fishery Management for Northern Pike in the Yukon Drainage
- Sport Fishery Management for Arctic Grayling in the Yukon Drainage

SPORT ANGLER EFFORT

Recreational anglers effort in the AYKMA has been estimated since 1977 using a mail survey, the Statewide Harvest Survey (SWHS; Mills 1979-1994; Howe et al. 1995-1998).

Estimates of effort in the AYKMA remained more or less stable at about 30,000 angler-days or less until 1993 but have increased in the last five-year period (Table 1, Figure 5). The most

Table 1.-Fishing effort by sub-area for the AYK management area, 1977-1997.

	AYK Area	North Slope Area		Yukon Area		Kuskokwim Area	
Year	Angler-Days	Angler-Days	%[a]	Angler-Days	%	Angler-Days	%
1977	11,638	2,434	21	4,729	41	4,475	38
1978	12,537	1,422	11	6,314	50	4,801	38
1979	16,239	1,526	9	7,714	48	6,999	43
1980	16,748	2,142	13	6,849	41	7,757	46
1981	17,624	2,601	15	6,679	38	8,344	47
1982	28,157	4,879	17	11,034	39	12,244	43
1983	29,237	5,738	20	11,070	38	12,429	43
1984	28,672	8,344	29	6,358	22	13,970	49
1985	24,518	4,490	18	8,670	35	11,358	46
1986	25,479	4,779	19	9,381	37	11,319	44
1987	30,129	5,256	17	7,017	23	17,856	59
1988	34,296	2,541	7	8,261	24	23,494	69
1989	31,287	4,118	13	10,712	34	16,457	53
1990	35,161	3,764	11	15,539	44	15,858	45
1991	31,095	7,291	23	10,749	35	13,055	42
1992	32,175	4,940	15	12,831	40	14,404	45
1993	34,116	5,600	16	14,011	41	14,505	43
1994	36,396	5,407	15	12,872	35	18,117	50
1995	40,610	5,644	14	18,677	46	16,289	40
1996	44,204	6,205	14	14,317	32	23,682	54
1997	58,823	5,987	10	16,666	28	36,170	61
Average							
1977-86	21,085	3,836	18%	7,880	37%	9,370	44%
1987-97	37,117	5,159	14%	12,877	35%	19,081	51%
1993-97	42,830	5,769	13%	15,309	36%	21,753	51%

[a] Percent of AYK area total.

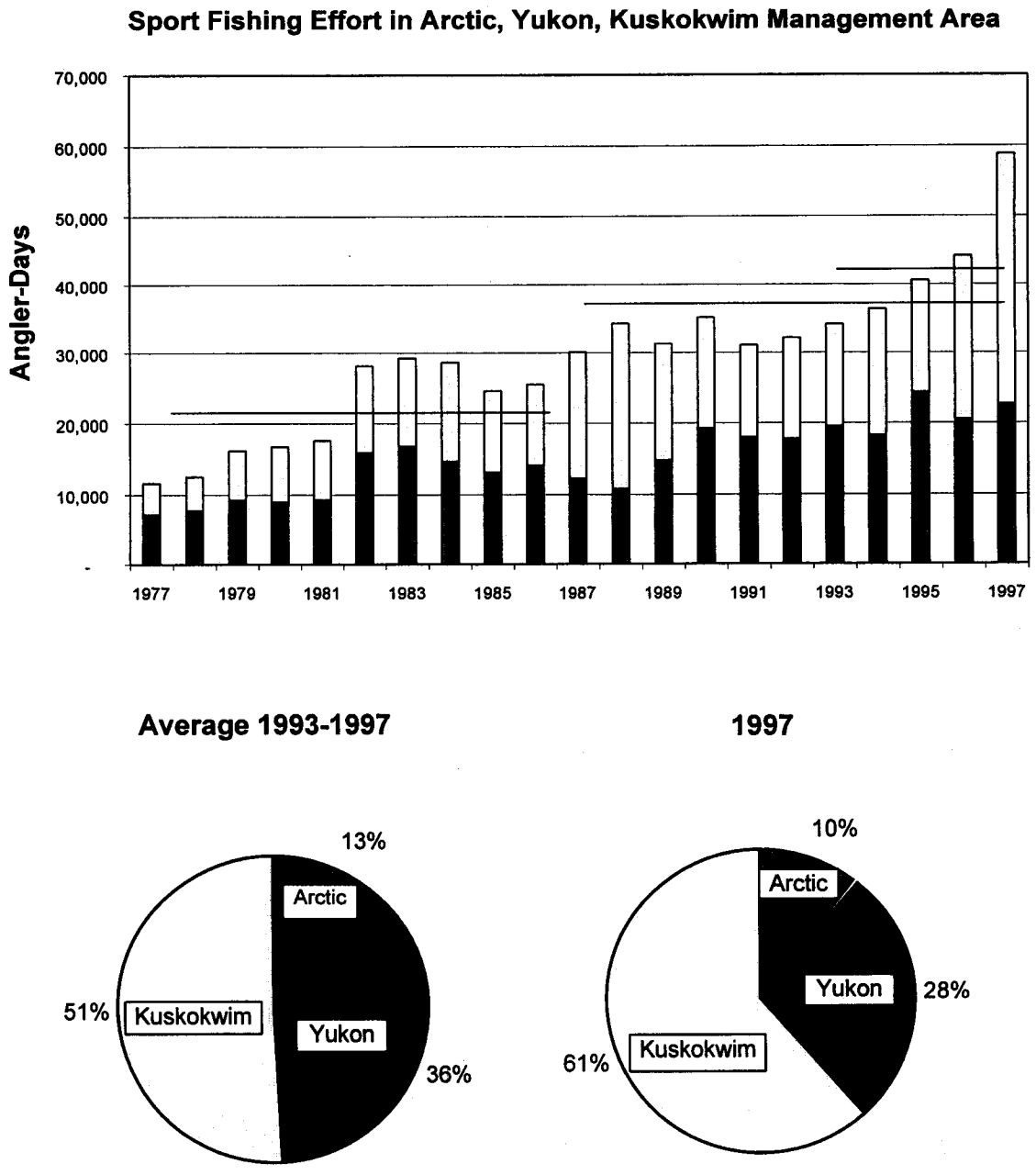

Figure 5.-Sport fishing effort measured in days fished from the Arctic-Yukon-Kuskokwim Management Area. Top panel illustrates number of days fished between 1977 and 1997. Horizontal lines indicate 10-year and five-year averages. Light shading shows Kuskokwim sub-area, dark shading shows Yukon sub-area, medium shading shows North Slope sub-area. Lower panel illustrates proportion of fishing effort in each of the three sub areas during recent years.

recent 11-year average (1987-1997) was 37,117 angler days compared with an average of 42,830 angler days during the most recent 5-year period (Table 1). The estimate of 58,823 angler effort from 1997 was 33% above the next highest estimate and 37% above the recent five-year average.

The fraction of regionwide effort expended in the AYKMA has also increased but at a slower rate. In 1997, the AYKMA provided 18.9% of region-wide effort compared with 16.1% in 1996 (17% increase) and 16.6% in the last five year period (14% increase).

The Kuskokwim sub-area has contributed most to the recent increase in angler effort in the AYKMA (Table 1, Figure 5). Until the early 1980's the Yukon and Kuskokwim drainages provided similar levels of angling effort, each contributing 8-9,000 angler days and about 40% to the AYKMA total (Figure 5). Effort in the North Slope sub-area increased to about 5,000 angler days in the early 1980's but has grown very slowly since then, averaging about 6,000 days of effort during the last five-year period. The recent five-year average effort of 15,309 angler days from the Yukon sub-area represents a growth of about 19% over the 1987-97 average. Similarly, angling effort from the Kuskokwim increased from an average of 19,081 for 1987-97 to the recent five-year average of 21,753 days (14% increase). However, the estimated angler effort (36,170 days) for the Kuskokwim in 1997 is 53% higher than the next highest estimate (23,682 days,1996) and 66% higher than the recent five-year average (Table 1).

SPORT FISH HARVEST AND CATCH AND RELEASE

The vast majority of the AYK management area and its fishable waters occur away from highways and motor vehicle roads of any kind. Small communities are scattered along the major river systems 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 are probably not documented fully.

Sport harvest of all species in the AYK Management Area has averaged 27,232 fish annually since 1987 (Table 2; Figure 6). The most recent five-year data has shown a slight decrease in harvest; averaging 23,492 between 1993 and 1997. Peak harvests were recorded in 1982 and 1983 when approximately 50,000 fish were harvested. The harvest in the AYKMA has been dominated by freshwater resident species, primarily sheefish, Arctic grayling, northern pike and Dolly Varden. More recently, Pacific salmon have composed an increasing percentage of the harvest in the management area; 34% of the average total between 1993 and 1997 compared with 20% before 1987.

Sport catch of all species in the AYK Management Area has been estimated since 1990 (Table 2). Numbers reported as catch include fish that are caught and kept (harvested) and those

Table 2.-Number of fish harvested and total catch by species by recreational anglers within the Arctic Yukon Kuskokwim Management Area, 1977-1997.

	All Fish	Pacific Salmon					
Year	Total	Total	Chinook	Coho	Sockeye	Pink	Chum
Harvest							
1977	12,968	1,040	186	443	69	101	241
1978	19,465	3,243	629	566	85	929	1,034
1979	23,884	1,545	400	537	110	16	482
1980	31,151	3,719	878	2,014	112	112	603
1981	27,439	2,861	1,020	583	117	17	1,124
1982	48,358	4,237	1,121	191	420	388	2,117
1983	51,726	6,432	1,962	1,962	261	703	1,544
1984	30,714	6,403	1,234	3,623	299	351	896
1985	29,293	2,844	1,092	1,168	149	-	435
1986	30,912	6,160	1,002	3,393	420	170	1,175
1987	30,569	7,180	981	4,880	419	18	882
1988	35,711	10,297	2,547	4,675	746	947	1,382
1989	39,725	10,436	2,247	4,497	291	191	3,210
1990	20,991	4,721	1,002	1,586	620	347	1,166
1991	32,042	5,272	929	2,517	694	36	1,096
1992	23,052	6,014	1,359	2,584	247	264	1,560
1993	24,701	6,154	1,796	2,675	715	27	941
1994	25,390	9,000	2,558	3,706	894	126	1,716
1995	18,512	5,235	1,365	2,933	277	16	644
1996	22,356	9,506	2,488	5,478	752	167	621
1997	26,500	9,891	3,074	5,697	587	77	456
Averages							
1977-86	30,591	3,848	952	1,448	204	279	965
		12.6%	3.1%	4.7%	0.7%	0.9%	3.2%
1987-97	27,232	7,610	1,850	3,748	567	201	1,243
		27.9%	6.8%	13.8%	2.1%	0.7%	4.6%
1993-97	23,492	7,957	2,256	4,098	645	83	876
		33.9%	9.6%	17.4%	2.7%	0.4%	3.7%
Catch							
1990	152,896	29,124	3,429	6,717	3,644	7,332	8,002
1991	141,830	20,215	2,937	7,397	3,733	818	5,330
1992	120,014	31,066	5,994	4,114	1,898	9,499	9,561
1993	169,225	36,507	10,324	9,413	3,646	1,142	11,982
1994	126,389	32,201	3,880	6,673	4,907	4,532	12,209
1995	114,862	29,081	7,448	9,532	1,364	310	10,427
1996	177,696	58,282	14,465	18,459	4,599	3,217	17,542
1997	271,337	64,342	21,068	25,934	4,685	1,129	11,526
Averages							
1990-97	159,281	37,602	8,693	11,030	3,560	3,497	10,822
		23.6%	5.5%	6.9%	2.2%	2.2%	6.8%
1993-97	171,902	44,083	11,437	14,002	3,840	2,066	12,737
		25.6%	6.7%	8.1%	2.2%	1.2%	7.4%

-continued-

Table 2.-Page 2 of 2.

Year	Total	Non-Salmon										Other Fish
		Lake Trout	Char[b]	Rainbow Trout	Grayling	Whitefish	Sheefish	Northern Pike	Burbot	Smelt	Halibut	
Harvest												
1977	11,928	520	1,944	220	6,186	221	433	1,861	226	0	0	317
1978	16,222	443	2,125	362	7,566	772	551	3,137	362	0	0	904
1979	22,339	655	2,346	318	14,911	419	554	3,027	91	0	0	18
1980	27,432	939	2,306	664	16,894	284	602	5,054	646	0	0	43
1981	24,578	873	2,964	982	13,442	367	883	4,416	651	0	0	0
1982	44,121	1,813	5,659	755	17,397	1,394	932	6,771	1,802	0	0	7,598
1983	45,294	1,091	8,384	1,678	18,263	3,355	1,087	6,549	555	0	0	4,332
1984	24,311	1,286	3,533	1,442	11,492	221	572	4,207	52	0	0	1,506
1985	26,449	2,226	6,039	659	11,349	490	420	3,209	245	1,750	62	0
1986	24,752	2,033	2,923	504	10,782	4,251	286	3,611	362	0	0	0
1987	23,389	302	5,307	592	13,005	372	526	3,098	151	0	36	0
1988	25,414	254	5,400	1,599	9,538	1,101	1,293	5,872	109	248	0	0
1989	29,289	1,840	5,302	757	12,226	925	1,053	5,301	527	1,324	0	34
1990	16,270	460	2,677	475	7,092	427	430	2,705	1,649	211	144	0
1991	26,770	882	4,798	774	11,474	580	1,495	6,472	200	0	0	95
1992	17,038	928	2,310	404	5,861	552	845	4,342	616	1,136	33	11
1993	18,547	425	3,119	486	5,701	426	490	3,400	514	3,343	54	589
1994	16,390	172	2,475	229	6,231	330	781	2,796	518	2,292	45	521
1995	13,277	319	2,278	429	5,249	100	748	2,592	285	633	21	623
1996	12,850	144	3,205	567	5,144	20	346	2,034	9	1,313	0	68
1997	16,609	481	3,992	1,192	5,442	519	941	3,438	239	28	51	286
Averages												
1977-86	26,743	1,188	3,822	758	12,828	1,177	632	4,184	499	175	6	1,472
	87.4%[a]	3.9%	12.5%	2.5%	41.9%	3.8%	2.1%	13.7%	1.6%	0.6%	0.0%	4.8%
1987-97	19,622	564	3,715	682	7,906	487	813	3,823	438	957	35	202
	72.1%	2.1%	13.6%	2.5%	29.0%	1.8%	3.0%	14.0%	1.6%	3.5%	0.1%	0.7%
1993-97	15,535	308	3,014	581	5,553	279	661	2,852	313	1,522	34	417
	66.1%	1.3%	12.8%	2.5%	23.6%	1.2%	2.8%	12.1%	1.3%	6.5%	0.1%	1.8%
Catch												
1990	123,772	3,733	25,375	12,436	53,931	1,709	2,567	21,183	1,651	714	188	285
1991	121,615	2,708	38,027	11,546	47,641	838	2,034	18,516	210	0	0	95
1992	88,948	3,054	23,823	5,540	33,447	791	2,207	18,679	227	1,136	33	11
1993	132,718	1,776	44,020	12,646	47,361	889	4,079	17,358	577	3,343	71	598
1994	94,188	2,365	23,277	8,258	35,433	908	1,749	16,131	785	2,292	45	2,945
1995	85,781	1,065	21,483	10,532	26,479	190	2,751	21,258	357	633	53	980
1996	119,414	1,768	34,660	16,075	44,461	137	1,758	18,211	36	1,313	55	940
1997	206,995	1,379	65,051	35,405	75,610	1,096	4,007	22,908	522	280	51	686
Averages												
1990-97	121,679	2,231	34,465	14,055	45,545	820	2,644	19,281	546	1,214	62	818
	76.4%	1.4%	21.6%	8.8%	28.6%	0.5%	1.7%	12.1%	0.3%	0.8%	0.0%	0.5%
1993-97	127,819	1,671	37,698	16,583	45,869	644	2,869	19,173	455	1,572	55	1,230
	74.4%	1.0%	21.9%	9.6%	26.7%	0.4%	1.7%	11.2%	0.3%	0.9%	0.0%	0.7%

[a] Percent of all fish from AYKMA.

[b] Includes Dolly Varden and Arctic char.

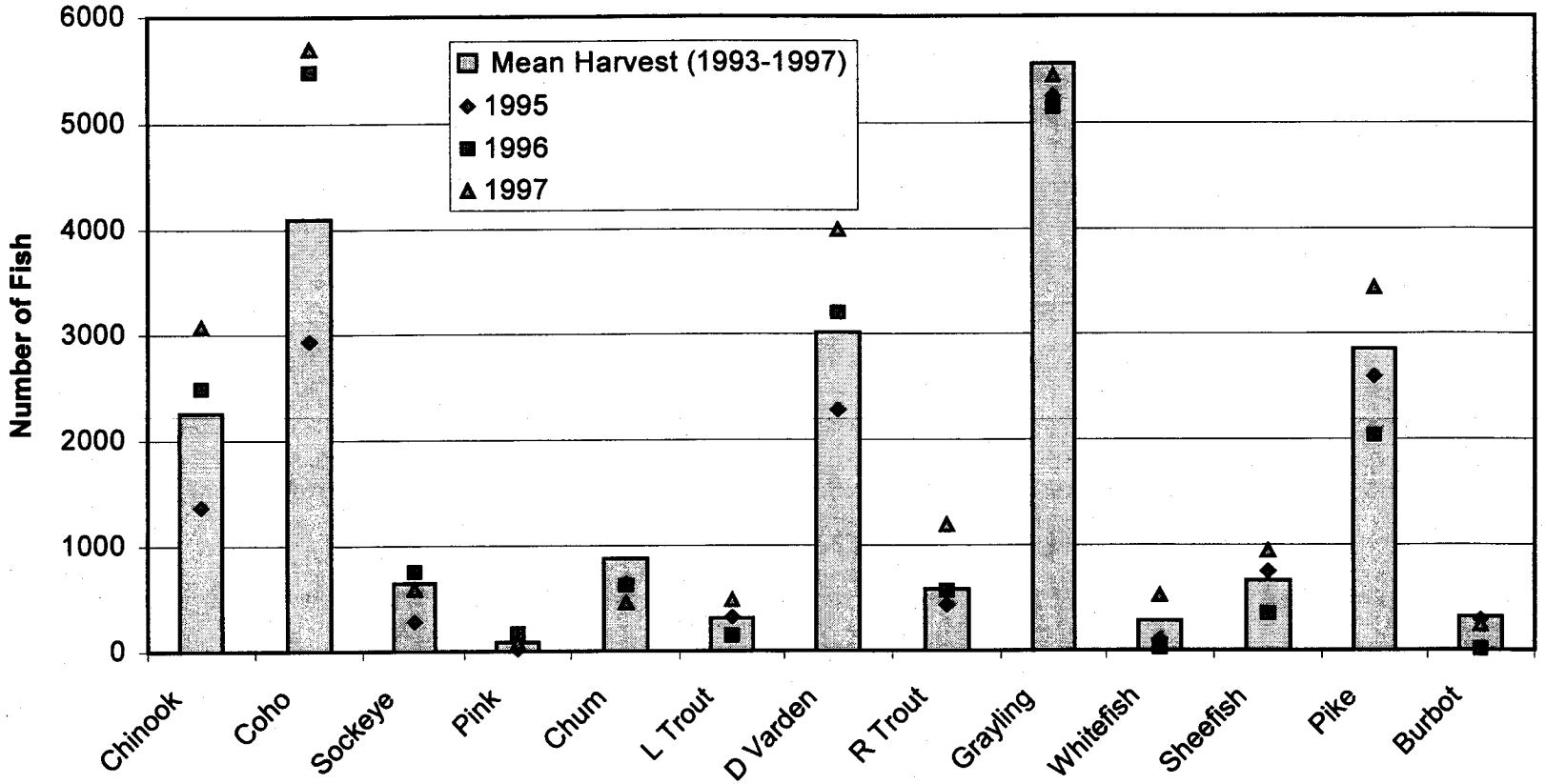

Figure 6.-Estimated harvest from sport fisheries by fish species in waters in the Arctic-Yukon-Kuskokwim Management Area during 1993-1997.

that are caught and released. During the most recent five-year period, eighty-six percent of all fish caught in the AYKMA were released. The proportion of catch and release activity varies by species. For example, only 31% of burbot caught between 1993 and 1997 were released compared with 92% of Dolly Varden/Arctic char.

OTHER USER GROUPS - 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 Yukon River 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 AKYMA, 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 3), 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 AYKMA 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.

Commercial catches have averaged two million salmon annually of all species in the AYK Region from 1977-1997. Poor returns of chum and coho salmon in 1997 particularly for the Kuskokwim area resulted in much lower than average commercial harvests.

MAJOR BIOLOGICAL AND SOCIAL ISSUES

1. Dalton Highway/ Prudhoe Bay recreational fisheries. The opening of the entire length of the Dalton Highway (North Slope Haul Road) to public travel in 1994 provided new access to lakes and streams along the route. Increases in recreational fishing effort and harvest have resulted in reductions in bag limits for northern pike and Arctic grayling and in a no-harvest regulation for lake trout within the highway corridor. Due to the unproductive fisheries habitat in the region, chances for overexploitation of these stocks is considered high.
2. North Slope resource development. Development of extensive oil and gas deposits in and around Prudhoe Bay at the mouth of the Sagavanirktok River and west to the Colville River Delta carries the risk of petroleum contamination of the most important streams on Alaska's North Slope for anadromous Dolly Varden. Resident freshwater fish are also at risk because of limited overwintering habitat that is located in river delta areas where most development currently exists. In addition, new petroleum developments that are under consideration

Table 3.-Commercial harvests of chinook, chum and coho salmon in the Yukon and Kuskokwim areas, 1977- 1997

Year	Area		
	Tanana River	Yukon River[a]	Kuskokwim River[b]
Chinook Salmon:			
1977	1,008	95,749	58,256
1978	635	95,533	63,194
1979	772	126,901	53,314
1980	1,947	152,038	48,242
1981	987	157,031	79,378
1982	981	122,663	79,816
1983	911	146,999	93,676
1984	867	119,037	74,006
1985	1,142	145,046	74,083
1986	950	99,020	44,972
1987	3,338	131,422	65,558
1988	762	100,659	74,552
1989	1,741	100,099	67,003
1990	2,156	93,618	84,706
1991	1,072	105,344	48,170
1992	752	120,419	67,597
1993	1,445	92,665	26,636
1994	2,606	111,234	27,345
1995	2,747	121,305	72,352
1996	447	89,745	22,961
1997	2,728	110,882	47,990
Average			
1977-86	1,020	126,002	66,894
1987-97	1,799	107,036	54,988
1993-97	1,995	105,166	39,457

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Table 3.-Page 2 of 3.

Year	Area		
	Tanana River	Yukon River[a]	Kuskokwim River[b]
Chum Salmon:			
1977	22,990	769,901	298,959
1978	59,996	1,271,320	282,044
1979	63,737	1,134,208	297,167
1980	58,657	1,305,508	561,483
1981	63,472	1,693,965	485,635
1982	30,530	911,475	325,471
1983	61,517	1,241,614	306,554
1984	77,204	999,396	488,482
1985	10,805	1,093,477	224,680
1986	54,703	1,274,166	349,268
1987	11,060	611,481	603,274
1988	65,425	1,692,046	1,443,916
1989	3,429	1,638,443	802,199
1990	65,762	586,128	522,535
1991	68,341	840,886	501,692
1992	26,250	536,349	436,506
1993	3,705	136,411	94,937
1994	65,032	201,708	360,893
1995	154,451	947,020	707,212
1996	93,623	694,240	297,933
1997	44,837	241,602	67,200
Average			
1977-86	50,361	1,169,503	361,974
1987-97	54,720	738,756	530,754
1993-97	72,330	444,196	305,635

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Table 3.-Page 3 of 3.

Year	Area		
	Tanana River	Yukon River[a]	Kuskokwim River[b]
Coho Salmon:			
1977	1,284	37,579	263,728
1978	3,066	23,086	247,271
1979	2,791	14,374	208,683
1980	1,226	2,519	327,908
1981	2,284	21,396	278,587
1982	7,780	29,396	567,451
1983	6,168	7,132	249,018
1984	7,688	74,252	829,965
1985	11,762	4,591	382,096
1986	441	46,814	736,910
1987	0	0	478,594
1988	13,972	72,640	623,719
1989	16,084	67,269	556,312
1990	14,804	27,890	445,062
1991	9,774	0	556,818
1992	7,979	0	772,449
1993	0	0	686,570
1994	4,451	0	856,100
1995	6,900	40,113	555,539
1996	7,142	48,840	1,099,853
1997	0	35,320	166,648
Average			
1977-86	4,449	25,659	409,162
1987-97	7,373	26,552	617,969
1993-97	3,699	24,855	672,942

[a] Yukon River, exclusive of Tanana River.

[b] Kuskokwim River and Kuskokwim Bay.

would extend exploration into the upstream, foothill areas. Critical over-wintering habitat for entire stocks of Dolly Varden are found in isolated sites within these upstream areas.

3. Development of New Sport Fisheries in Rural Alaska. Relatively rapid development of sport fisheries in remote areas has resulted in friction between local residents and the non-local anglers. In many instances, local people have historically enjoyed nearly exclusive use of fishery resources. Sport Fishing guides and other anglers seeking less crowded fishing opportunities in wilderness settings continue to "discover" less well known but potentially high quality fisheries. As currently popular fishing destinations in Bristol Bay and South Central Alaska become increasingly crowed, anglers and guides are likely to continue to be willing to travel farther to participate in Alaska's fisheries. In addition to the social friction caused by this change in use patterns of remote areas and to some extent because of this friction, the Department will increasingly be expected to provide information on the status of stocks for which there is currently only the most rudimentary information. This is likely to be the biggest challenge in the management of sport fisheries in the AYK Management Area. Recent experiences at the Dall and Holitna rivers are examples of the type of challenges that we should anticipate.

4. Rod and Reel Subsistence An agenda change request was submitted to the Alaska Board of Fisheries prior to the 1997-1998 AYK meeting which sought to include rod and reel fishing as a legal method for harvesting fish for subsistence throughout the open water season. Currently rod and reel for subsistence fishing is permitted only through the ice. Harvest of fish with rod and reel during open water periods is regulated by Sport Fishing regulation. The primary concern with this potential change is how to manage for sustainable fish populations with legalization of rod and reel gear for subsistence fishing. We understand that rural resident use patterns have likely incorporated rod and reel in past subsistence harvests, and legalization of this gear will not greatly affect local use patterns. Our greatest concerns relate to changes in urban resident behavior in regards to license sales, visitation to rural fisheries, and harvests of fish populations.

5. 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 lead to resentment towards sport anglers who wish to fish on private and public lands within the AYK Region.

6. Federal Fishery Management for Subsistence in Alaska's navigable waters. Without changes in current state subsistence laws, Federal fishery managers will assume responsibility for ensuring a rural subsistence priority on navigable waters adjacent to or within the boundaries of Federal Conservation units. There is widespread concern that one result of this action will be reduced opportunity for Sport Fishing through out the state. Because of the large amount of Federal Public land within AYKMA and because of the high proportion of subsistence users, this loss of opportunity is of acute concern for sport fishermen in the AYKMA.

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 12.5 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, 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. 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

Galena Yukon River 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 done 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.

Future Projects

A proposal for one major project in the AYK management area is currently under consideration. This project would upgrade access and parking at the Yukon River, Dalton Highway Bridge boat launch.

SECTION II: MAJOR FISHERIES OVERVIEW

Waters within the AYK Management Area offer the most remote and diverse opportunities for anglers available in Alaska. Opportunities to harvest within a wilderness setting trophy northern pike, sheefish, Dolly Varden, lake trout, and Arctic grayling are well known. Sport fishing opportunities for salmon are currently not as well known. However, angling for chinook and coho salmon increased during the reporting period in the Kuskokwim and Yukon areas as pressure on other popular sites outside AYKMA continued to increase. Marine sport fisheries are not an important component in the area.

This section provides a summary of sport fisheries that were considered significant in the AYK Management area during 1995-97. The section includes a discussion of the major sport fisheries in the AYKMA by species. Discussion of each fishery will address 1) historical perspective, 2) fishery objectives, 3) in-season management and recent BOF actions, 4) recent fishery performance (stock status), 5) current issues and 6) recommended management and research programs. Recent fishery performance will focus on data from 1995-1997. Observations regarding the 1998 season may be included for some fisheries, but effort and harvest are not yet available for the 1998 season. Minor fisheries in terms of effort and harvest are discussed jointly at the end of this section. Tables summarizing historic sport fish harvests by species and sub-area is provided for reference (Table 2, Appendix B).

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 distributed throughout the drainage. Coho salmon are less abundant and spawn in large numbers in only few identified 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 locations of spawning sites have 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. Sport fisheries in the Tanana drainage are discussed within the Annual Management Report for the Tanana Management area (Parker and Viavant *In press*). Mills (1977-1993), Howe et al. 1994-1998) and Arvey and Mills (1993) report sport harvests from other streams and drainages in the Yukon watershed, primarily from the Andreafsky, Anvik, Porcupine and Koyukuk rivers and their drainages (Tables 4-6). 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. Sport fishing for salmon is seldom practiced by rural residents compared to the more customary methods such as gill-net and fish wheel, where a larger volume harvest can be taken in

Table 4.-Sport harvest of chinook salmon in the Yukon River drainage (1977-1997).

Harvest	Year										Average
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1977-86
Total	56	360	39	15	6	22	-	13	12	15	54

Harvest	Year											Averages	
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1987-97	1993-97
Yukon R. drainages (Ft. Yukon to Canadian Border)					30	94	-	381	28	-	-	76	82
Fortymile River	-	-	-	-	-	-	-	-	-	-	-	-	-
Charley River	-	-	-	-	-	-	-	-	-	-	-	-	-
Yukon R. drainages (Koyukuk R - Ft Yukon)					10	101	85	-	-	-	-	28	17
Porcupine River	-	-	10	-	10	39	28	-	-	-	-	20	28
Chandalar River	-	-	-	-	-	-	-	-	-	-	-	-	-
Beaver and Nome Creeks	-	-	-	-	-	-	-	-	-	-	-	-	-
Dall River	-	-	-	-	-	-	-	-	-	-	-	-	-
Haul Road Streams	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowitna River	-	-	-	-	-	-	-	-	-	-	-	-	-
Melozitna River	-	-	-	-	-	-	-	-	-	-	-	-	-
Koyukuk River	-	-	-	-	20	-	-	-	-	-	-	2	-
Yukon R. drainages (downstream from Koyukuk R)					93	102	19	29	9	20	24	42	20
Nulato River	-	-	-	-	-	-	-	-	-	-	-	-	-
Anvik River	-	18	30	1	31	94	-	10	-	20	12	20	8
Innoko River	-	-	11	-	-	-	-	-	-	-	-	1	-
Andreafsky River	-	-	45	-	31	8	19	19	9	-	12	13	12
Total	-	91	100	105	143	313	122	410	37	49	35	128	131

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Table 5.-Sport harvest of coho salmon in the Yukon River drainage (1977-1997).

Harvest	Year										Average
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1977-86
Total	31	163	25	-	-	139	52	-	12	161	58

Harvest												Averages	
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1987-97	1993-97
Yukon R. drainages (Ft. Yukon to Canadian Border)					-	24	-	-	-	30	21	25	26
Fortymile River	-	-	-	-	-	-	-	-			-	-	-
Charley River	-	-	-	-	-	-	-	-			-	-	-
Yukon R. drainages (Koyukuk R. – Ft Yukon)					-	130	-	-	-	-	-	130	-
Porcupine River	-	-	-	-	-	81	-	-			-	-	-
Chandalar River	-	-	-	-	-	-	-	-			-	-	-
Beaver and Nome Creeks	-	-	-	-	-	-	-	-			-	-	-
Dall River	-	-	-	-	-	-	-	-			-	-	-
Haul Road Streams	-	-	-	-	-	-	-	-			-	-	-
Nowitna River	-	-	-	-	-	49	-	-			-	-	-
Melozitna River	-	-	-	-	-	-	-	-			-	-	-
Koyukuk River	25	-	40	-	89	-	-	-			-	51	-
Yukon R. drainages (down stream from Koyukuk R.)					341	235	619	728	162	157	12	322	336
Nulato River	-	-	-	-	-	-	-	-	-	-	-	-	-
Anvik River	-	55	22	22	15	-	36	-	-	-	12	15	24
Innoko River	-	-	-	-	89	-	-	-	-	-	-	-	-
Andreafsky River	36	73	123	206	237	235	583	688	162	157	-	227	318
Total	61	183	215	228	430	551	619	728	162	247	132	323	378

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Table 6.-Sport harvest of chum salmon in the Yukon River drainage (1977-1997).

Harvest	Year										Average
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1977-86
Total	16	293	109	-	17	82	349	-	12	202	108

Harvest												Averages	
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1987-97	1993-97
Yukon R. drainages (Ft. Yukon to Canadian Border)					-	24	-	-	-	30	21	25	26
Fortymile River	-	-	-	-	-	-	-	-	-	-	-	-	-
Charley River	-	-	-	-	-	-	-	-	-	-	-	-	-
Yukon R. drainages (Koyukuk R .- Ft. Yukon)					21	168	-	-	-	39	-	76	39
Porcupine River	-	-	-	13	-	8	-	-			-	10	-
Chandalar River	-	-	-	-	-	-	-	-	-	-	-	-	-
Beaver and Nome Creeks	-	-	-	-	-	8	-	-	-	-	-	-	-
Dall River	-	-	-	-	21	-	-	-	-	-	-	-	-
Haul Road Streams	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowitna River	-	-	-	-	-	-	-	-	-	-	-	-	-
Melozitna River	-	-	-	-	-	15	-	-	-	-	-	-	-
Koyukuk River	124	-	10	-	-	23	-	-	90	-	158	37	50
Yukon R. drainages (down stream from Koyukuk R.)					423	175	73	90	99	56	9	132	65
Nulato River	25	-	31	25	-	5	-	-	-	-	-	8	-
Anvik River	-	18	226	101	188	137	18	10	-	-	9	64	7
Innoko River	-	-	21	-	-	-	-	-	-	-	-	-	-
Andreafsky River	35	-	112	76	31	-	55	80	99	56	-	49	58
Total	226	546	997	417	449	618	193	90	189	95	167	362	147

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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 do not reflect the abundance of salmon in the drainage.

Fishery Objectives

The commercial, subsistence, and personal use fisheries are managed by the Commercial Fisheries Management and Development Division using guideline harvest ranges established by the Alaska Board of Fisheries. Management of these fisheries is complex due a wide range of stock specific abundances, overlap of inter and intra-specific run timing, the immense size of Yukon River drainage, allocation between numerous user groups and international management treaties. The ADF&G is unable to manage individual stocks in this mixed stock fishery because of inadequate stock specific information.

Guideline harvest ranges have been established for chinook, summer chum, and fall chum salmon commercial fisheries throughout the Alaskan portion of the Yukon drainage. The ADF&G attempts to manage the commercial fisheries such that the harvest in each district is proportionally similar to respective guideline harvest ranges.

Because of the very limited impact that sport fisheries have on stocks of salmon relative to commercial, subsistence, and personal use fisheries, specific fishery objectives for the sport fisheries have not been established.

Recent Board of Fisheries Action and In-season Management

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 salmon fishing (Burr et al. 1998). A Coho Salmon Management Plan for the drainage was adopted in November 1998. The plan seeks to provide a new directed commercial fishery on coho stocks in the drainage.

Recent Fisheries Performance

Summary of 1995 Yukon Salmon Runs

The chinook, summer chum and fall salmon runs exceeded preseason projections and all were above average in strength. The coho salmon run appeared to be average to below average in abundance. Salmon escapement goals appeared to have been met throughout the drainage. Following several years of decline which began in 1990, chum salmon returns were critically weak in 1993. However, the summer and fall chum salmon runs in 1994 and 1995 were larger than expected from projections. Productivity and survival from the primary brood years appeared to be much higher than that observed from 1990 to 1993.

Commercial salmon harvests were above the most recent previous 5-year average (1990-1994), with the exception of coho roe sales (Bergstrom et al. 1997a). However, declining salmon markets, particularly for chum salmon flesh, had a major impact on the commercial fishery which resulted in limited harvests in some districts. The total estimated harvest including fish harvested for roe sale was 124,052 chinook, 818,414 summer chum, 283,057 fall chum and 47,013 coho salmon (Table 3; Bergstrom et al. 1997a). The 1995 estimated harvests compared to recent five-year averages (1990-1994) were: chinook, 17% above, summer chum, 93% above, fall chum, 241% above, and coho, 44% above.

Age composition of chinook salmon was dominated by a higher than average proportion (74%) of 6-year old fish. The higher proportion of 6-year old chinook in 1995 was anticipated based on higher than average return of 5-year olds in 1994. The summer chum run was composed of 49% age-4, and 47% age-5 fish. The fall chum harvest was dominated by age–4 salmon comprising 64 of all samples. Coho salmon harvests were comprised of 42% age-3 and 58% age-4 fish.

Summary of 1996 Yukon Salmon Runs

As in 1994 and 1995, chum salmon returns were larger than predicted preseason. Declining salmon markets, particularly for chum salmon flesh, and early run timing had major impacts on the Yukon commercial salmon fishery in Alaska resulting in limited harvests in some districts (Bergstrom et al. 1997). The chinook salmon harvest was the lowest since 1976 because of the early run timing and an average to below average overall run size. The total estimated harvest including fish harvested for roe sale was 90,192 chinook, 682,233 summer chum, 105,630 fall chum and 55,982 coho salmon (Table 3; Bergstrom et al. 1997b). The 1996 estimated harvests compared to recent five-year averages (1991-1995) were: chinook, 19% below, summer chum, 41% above, fall chum, 6% above, and coho, 68% above.

Age composition from the commercial harvests indicated that 6-year old chinook accounted for 38% of the harvest. The lower than average proportion of age–6 chinook was consistent with the below average return of age-5 fish in 1995 but inconsistent with the above average escapements in the 1990 parent year. Correspondingly, the percentage of 5 and 7-year old chinook salmon was higher than average. Age composition data from the commercial harvest indicated that age-5 summer chum salmon comprised 59% of the harvest. Age-6 summer chums accounted for an unusually high proportion (7–12%) of the harvest during early summer (up to July 14). Age-4 fall chum salmon accounted for 61% of samples from the commercial harvest. Coho salmon harvests were dominated by age-4 fish which comprised 89% of the sample.

Summary of 1997 Yukon Salmon Runs

Below average summer and fall chum salmon abundance and declining salmon markets, particularly for summer chum salmon flesh and salmon roe, had a major impact on the commercial fishery in general, resulting in limited fishing effort and harvest.

The total estimated harvest for the Alaskan portion of the Yukon drainage in 1997 was 113,610 chinook, 228,252 summer chum, 58,187 fall chum and 35,320 coho salmon (Table 3; Bergstrom et al. 1998). The 1997 estimated harvests compared to recent five-year averages (1992-1996) were: chinook, 4% above, summer chum, 53% below, fall chum, 30% below, and coho, 53% above.

Age composition data from the lower Yukon Area indicated that 6-year old chinook comprised 70.5 of the harvest in 1997 which is higher than normal. The higher proportion of 6-year old chinook in 1997 is consistent with above average return of 5-year olds in 1996 but inconsistent with below average to average escapements in the 1991 parent year. The summer chum harvest was composed of 29.0% age-4, 67.2% age-5, and 3.6% age-6 fish. The fall chum harvest was dominated by age-4 salmon comprising 57.2% of the harvest. Coho salmon harvests were strongly dominated by age-4 fish (92.0).

Estimated sport harvests of chinook salmon from the entire Yukon drainage during 1995, 1996 and 1997 were 37, 49 and 35 fish (Table 4). These harvests are similar to the most recent five-year average of 40 chinook salmon but only about one third of the recent average harvest since

1987. Total sport catch of chinook salmon in the drainage was estimated to be 177, 182, and 158 fish in 1995, 1996 and 1997; all estimates are about two thirds of the recent five year average catch. As in previous years, most of the estimated catch and harvest of chinook salmon is from Yukon drainages downstream from the mouth of the Koyukuk River notably the Anvik and Andreafsky rivers.

Sport harvests of coho salmon during the 1995-1997 period were estimated to be 162, 247, and 132 fish (Table 5). The recent five-year average harvest was 180 coho salmon. Total catch from the sport fishery during the reporting period was estimated to be 542, 297, and 327 and averaged 660 during the 1993-1997 period. Most of the coho fishery occurs downstream of the Koyukuk River primarily in the Anvik and Andreafsky river drainages.

Sport fisheries harvested an estimated 189, 95 and 167 chum salmon in 1995, 1996, and 1997 (Table 6). Total catch of chum salmon from the recreational fisheries during this period were estimated at 734, 481, and 1,134; the average total sport catch from 1993-1997 was 624 chum salmon. The sport harvest of chum salmon is more widely distributed within the drainage than are harvests of chinook or coho. The Koyukuk, Anvik and Andreafsky rivers have contributed most of the catch of this species in recent years.

The sport fisheries for these three principal species of salmon have not experienced any significant growth in recent years. Relative to the size and the productivity of the Yukon system, the estimated sport harvest is extremely light and is unlikely to impact the runs to a measurable degree.

Current Issues

A potential change in jurisdiction over the management of fish stocks in some navigable waters is the primary issue that is likely to affect all users (including recreational anglers) of stocks of salmon in the Yukon sub-area. Recent decisions in federal courts have found that the navigable waters for which the federal government maintains a reserved water right are federal public land. As a result of this determination, the federal land management agencies assert the right to manage fish and wildlife resources to provide a rural subsistence priority. The state of Alaska also provides for a priority subsistence use of these resources but is unable to discriminate between rural and urban users due to constitutional restraints. There is widespread concern that federal management will result in loss of opportunity for non-subsistence uses of fish resources particularly recreational uses.

The adoption of the Coho Salmon Management Plan (Appendix A) for the Yukon drainage is of concern because of the potential loss of recreational opportunity. Recreational fisheries for coho salmon generally occur upstream of areas where a commercial fishery is likely to occur. At this time, recreational fisheries in the Yukon drainage are very limited except in waters of the Tanana drainage. It is difficult to predict the effects a new commercial fishery directed at coho salmon might have on recreational opportunities. The conditions (biological and market) necessary to trigger directed coho salmon fishery are also difficult to assess due to the shortage of in-season information on coho stocks.

Recommended Research and Management Activities

Currently, there is no active research program concerning the salmon sport fishery in the Yukon River drainage because of the minor nature of the fishery. Reconnaissance of sport fisheries for chinook salmon on the Andreafsky and Anvik rivers which are in early stages of development

would provide information needed for future assessments. Given the rapid growth of sport fisheries for chinook and coho salmon in the Kuskokwim sub-area (see discussion in following section), a general investigation of the distribution, timing, and a description of the anglers participating in these developing sport fisheries is recommended.

UPPER KUSKOKWIM RIVER SALMON

Most of the sport fishing effort, catch and harvest that is reported by the SWHS for the Kuskokwim Area (Area V–Kuskokwim River and Kuskokwim Bay) comes from waters tributary to Kuskokwim bay or tributaries downstream of and including the Aniak River system. Sport fishing for salmon and other species upstream of the Aniak River confluence has historically been very limited.

Fishery Description and Historical Perspective

Six species of salmon occur in the Kuskokwim Area, with chum and coho being the most abundant species. Chinook, sockeye and chum salmon enter streams in late May and early June. Coho salmon begin entering streams in mid July with entry continuing into September. Pink salmon occur throughout the drainage but subsistence use and commercial markets are limited. In the Kuskokwim River drainage, most salmon fishing is conducted under commercial and subsistence regulations by local residents.

The Chinook salmon fishery 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. Since 1987 the commercial chinook salmon catch has been incidental to the chum salmon fishery, although, substantial numbers of chinook are still harvested in the commercial fishery.

Coho salmon are abundant in the Kuskokwim River drainage and returns of coho salmon to the Kuskokwim River may be the largest to a single river in Alaska. Coho salmon are the most important species in the commercial fishery both in term of harvest numbers and value to fishermen. A record 1.1 million coho salmon were harvested from the Kuskokwim area in 1996 (Burkey et al. 1997a). 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.

Sport fishing is conducted by persons visiting the area on guided and sometimes personal fishing trips, or in conjunction with hunting activity in the fall. Annual total sport harvests of the four principal species of Pacific salmon from the upper portion of the Kuskokwim drainage have averaged less than 1,000 per year since inception of the Statewide Harvest Survey in 1977 (Mills 1977-1994; Howe et al. 1995-1998). While sport harvests of chinook and coho salmon have increased in recent years in down-river and Kuskokwim Bay areas, growth in the recreational fishery in the upstream area has occurred only very recently (Table 7).

Most of the change observed in the Kuskokwim drainage upstream of the Aniak River has occurred within the Holitna River system. A limited sport fishery for chinook salmon occurs at the George River and other small tributaries in the area. The Salmon River (tributary to the Big River) near Nikolai and McGrath also supports a small sport fishery on a chinook salmon spawning stock by local residents. Except for the Holitna River fishery, estimates of recreational effort or catch are not reported by the SWHS because of the small level of participation in these fisheries.

Fishery Objectives

Fishery objectives for these remote fisheries are identical to general objectives listed in the first chapter of AYKMA report. These objectives are: harvest within sustainable limits, maintenance or enhancement of fishing opportunity, improving physical access, and cost effectiveness of programs and activities.

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. Between 1988 and 1994 the Kuskokwim Area chinook salmon populations increased along with guideline harvest levels for the commercial fishery. In 1994, the BOF reestablished the bag and possession limit for chinook to three fish with only two over 28 inches in length. In 1997 the BOF imposed a season restriction for chinook salmon in the Kuskokwim River drainage downstream and including the Holitna River drainage; open season is May 1 – July 25 (Appendix A).

Recent Fisheries Performance

Summary of 1995 Kuskokwim Salmon Runs

Record number of commercial fishery permits (829 of 832 permits) were fished in the Kuskokwim Area during the 1995 season. The total commercial catch was 72,352 chinook (25% above the recent 10-year average), 198,045 sockeye (22% above average), 555,539 coho (9% below average), 318 pink (average catch for odd year), and 707,212 chum (32% above average). Overall, the 1995 Kuskokwim Area commercial harvest of 1.5 million salmon was approximately 11% above the recent 10-year average (Burkey et al. 1997).

In the Kuskokwim River, weak chum salmon markets and limited processor capacity resulted in fewer commercial openings and openings of shorter duration. Post-season evaluation of the 1995 season for the Kuskokwim River by Commercial Fishery staff suggests that the chum salmon run was probably overharvested. The total commercial and subsistence harvest was estimated to be approximately 670,000 chum salmon. This provided an estimated escapement of approximately 300,000 chum salmon; the minimum desired drainage-wide escapement is 506,000.

In contrast to chum salmon, the highest escapement index on record for chinook salmon was achieved in 1995. The high escapement was likely the result of a combination of a strong run of

Table7.-Sport fishing effort and harvest of principal species in the upper Kuskokwim River drainage (1977-1997).

Average 1977-86		Year 1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	Averages 1987-97	Averages 1993-97
		ALL KUSKOKWIM DRAINAGES UPSTREAM FROM ANIAK RIVER												
Fishing Effort (days fished)														
-		-	1,258	1,539	1,767	944	2,062	1,929	1,754	1,803	1,864	3,262	1,653	2,122
	HARVESTS													
231	Chinook Salmon	63	18	312	41	-	78	102	108	169	265	195	123	168
330	Chum Salmon	98	-	-	216	119	129	225	173	-	105	-	97	101
92	Sockeye Salmon	147	127	11	12	-	57	138	238	-	24	37	72	87
442	Coho Salmon	399	273	112	121	481	445	83	324	170	336	860	328	355
3,004	Arctic Grayling	1,413	1,348	711	653	976	182	184	275	357	270	250	602	267
1,055	Northern Pike	355	1,983	841	71	1,546	358	151	287	346	102	239	571	225
249	Sheefish	308	564	270	53	141	173	45	130	151	-	251	190	115
825	Arctic Char	147	236	163	36	360	114	167	120	78	71	232	157	134
		HOLITNA RIVER												
Fishing Effort (days fished)														
-		833	346	722	398	1,022	480	763	949	640	1,045	2,063	842	1,092
	HARVESTS													
48	Chinook Salmon	42	18	156	-	-	23	68	40	19	235	173	70	107
78	Chum Salmon	42	-	-	14	119	91	208	-	-	28	-	46	47
7	Sockeye Salmon	21	-	-	-	-	-	43	-	-	12	25	9	16
148	Coho Salmon	145	91	-	12	205	130	-	-	170	159	423	121	150
196	Arctic Grayling	543	73	128	18	312	23	-	-	184	121	143	140	90
133	Northern Pike	97	528	82	53	504	145	9	155	166	79	214	185	125
74	Sheefish	217	36	90	53	128	173	45	130	113	-	183	106	94
80	Arctic Char	147	36	50	18	216	-	79	-	52	51	72	66	51
763	Holitna Total	1,254	782	506	168	1,484	585	452	325	704	685	1,233	743	680
6,243	**Total**	2,930	4,549	2,420	1,203	3,623	1,536	1,095	1,655	1,271	1,309	2,086	2,152	1,483

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chinook salmon, the late start of the chum salmon commercial fishery and the shorter length of commercial openings.

The primary tool utilized to assess coho salmon escapement in the Kuskokwim River is the Kogrukluk weir located in the upper Holitna River system which has been operated continuously since 1976. Minimum escapement goals for passage of chinook , chum and coho salmon through the weir have been established. They are 10,000 chinook salmon, 30,000 chum, and 25,000 coho salmon. In 1995, escapement of coho salmon through the Kogrukluk River weir was estimated at 27,856. An estimated 20,630 chinook and 31,265 chum passed through the weir.

Summary of 1996 Kuskokwim Salmon Runs

In 1996 declining commercial markets, particularly for chum salmon flesh resulted in limited commercial harvest. Major processors moved out of the fishery prior to the beginning of the season. All Kuskokwim commercial fisheries were severely impacted by weak markets and very limited processing capacity. The total estimated harvest followed by comparison with recent 10-year average (in parenthesis) including the estimated harvest to produce roe was 22,959 chinook (60% below); 122,260 sockeye (28% below), 1,099,865 coho (75% above); 1,663 pink (97% below even yr); and 301,975 chum (50% below) (Burkey et al. 1998).

Environmental conditions in 1996 were unusual with near record low water levels on the Kuskokwim River coupled with record high water temperatures. The limited commercial harvest resulted in good escapements of all species of salmon in the Kuskokwim River. The coho salmon run was strong and earlier than previously recorded and provided record high escapement (50,555) at the Kogrukluk River weir. This unusually large coho run produced record harvests in the face of reduced commercial effort.

Summary of 1997 Kuskokwim Salmon Runs

Poor returns of chum and coho salmon coupled with low prices resulted in the lowest commercial harvest for Kuskokwim Area salmon fisheries since 1975 (Burkey et al. 1997 BOF). The total estimated harvest including the estimated harvest to produce roe followed by comparison with recent 10-year average (in parenthesis) was 47,990 chinook salmon (14% below average of 55,668), 123,002 Sockeye (27% below avg. of 168,027), 67,200 chum (lowest since 1970 at 88 below avg. of 577,110), 7 pink (odd year avg. 379) and 166,648 coho salmon (lowest since 1976 at 75% below avg. of 663,102). The total Kuksokwim are commercial harvest of 404,847 salmon was 73% below the ten-year average, the lowest since 1975.

Biological escapement goals (BEG's) for the Kogrukluk weir in 1997 were achieved for chinook salmon but not for chum or coho salmon. Estimated passage for each species followed by specific BEG's were as follows: chinook 13,285 (10,000), chum salmon 7,937 (30,000), coho salmon 12,312 (25,000).

Sport fisheries and commercial fisheries for chum salmon were closed by Emergency Order due to the poor escapement of this species. Subsistence users agreed to limit their take of chum salmon.

Preliminary Description of 1998 Kuskokwim Salmon Runs

Total estimated commercial catch for the Kuskokwim area in 1998 was 44,192 chinook (18 below); 129,449 sockeye (21 below), 311,910 coho (51 below); 2,720 pink (83 below even yr);

and 267,059 chum (49 below). The below average harvests were due primarily to low catches in the Kuskokwim River; harvests in Kuskokwim bay were generally near average.

Overall, the 1998 Kuskokwim River salmon runs were among the poorest on record. In the Kuskokwim River, various test and escapement projects indicated low to adequate returns of chinook and sockeye salmon but poor return of chum salmon and below average coho salmon run strength. However, due to unusually high water levels in the Kuskokwim River drainage, escapement projects with the exception of Aniak sonar were unable to operate for significant portions of the chinook, sockeye, and chum runs. The weak chum return resulted in a conservative number of commercial openings. There were no commercial openings for chum salmon in the middle Kuskokwim due to lack of processor interest.

Recreational Fisheries 1995-1997

Sport harvest of all salmon species in the upper Kuskokwim River in 1995, 1996 and 1997 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 1996 and 1997 (Table 7). The estimated harvest of coho salmon during 1997 in the upper drainage was the largest since 1982 in spite of a poor return of the species drainage wide. However, the total recreational harvest of coho salmon for the Kuskokwim River area (5,565 fish, Appendix B2) represents only about 3 of the 166,648 harvested in the commercial fishery. Estimated chinook salmon sport harvests from the upper river area also increased over preceding estimates but have not yet exceeded 300 fish per year. As with coho salmon, recreational harvest of chinook salmon account for an insignificant fraction of the total use of the species in the area (1% since 1993, Appendix B2).

Current Issues

The potential change in jurisdiction over subsistence management discussed previously as an issue for salmon fisheries in the Yukon River applies equally to Kuskokwim area fisheries. In addition, 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.

Recommended Research and Management Activities

A need for information on the growth in the Holitna River sport fishery was identified. A creel survey and test fishing project was initiated in 1998. The goals of the creel survey were to describe the sport fishery in terms of angler demographics, the daily catch per unit effort and the composition of the sport harvest. Test fishing was conducted to gather information on age and size composition of resident and anadromous species. A detailed description of this project and the results is reported by Burr (1999).

HOLITNA RIVER SALMON

Waters of the Holitna River drainage support most of the sport fishing effort and harvest that takes place in the Kuskokwim River drainage upstream of the Aniak River (Tables 7 and 8). During the 1995-1997 period, the Holitna River supported an average of 52% of the total

Table 8.-Sport catch of principal species in the upper Kuskokwim River drainage (1990-1997).

	Year								Averages		
	1990	1991	1992	1993	1994	1995	1996	1997	1990-97	1993-97	1995-97
CATCH FROM ALL KUSKOKWIM DRAINAGES UPSTREAM FROM ANIAK RIVER											
Chinook Salmon						401	883	1,145			810
Chum Salmon						141	343	103			196
Sockeye Salmon						-	337	211			183
Coho Salmon						472	1,318	2,848			1,546
Arctic Grayling						2,036	3,868	5,159			3,688
Northern Pike						2,510	1,473	2,266			2,083
Sheefish						575	206	2,113			965
Arctic Char						1,062	535	2,173			1,257
CATCH FROM THE HOLITNA RIVER											
Chinook Salmon	27	-	109	375	110	91	804	814	291	439	570
Chum Salmon	101	159	471	881	38	327	193	103	284	308	208
Sockeye Salmon	-	76	-	902	-	-	120	75	147	219	65
Coho Salmon	122	205	154	-	-	472	973	1,277	400	544	907
Arctic Grayling	264	1,953	8	372	228	631	2,352	2,552	1,045	1,227	1,845
Northern Pike	317	830	752	842	973	1,488	1,125	2,092	1,052	1,304	1,568
Sheefish	158	372	508	1,317	189	472	206	1,539	595	745	739
Arctic Char	35	3,038	164	1,326	9	430	304	1,093	800	632	609
Holitna Total	1,024	6,633	2,166	6,370	1,547	3,911	6,077	9,574	4,663	5,496	6,521
Total						7,197	9,294	16,091			10,861

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estimated sport effort, 46% of the total estimated harvest and 60% of the total estimated catch from this portion of the Kuskokwim drainage. Sport fisheries that target chinook salmon, coho salmon, sheefish and northern pike in the Holitna River have been identified and are described below.

The Holitna River drainage supports increasingly popular sport fisheries for chinook and coho salmon. Chum and sockeye salmon compose a small portion of the sport catch and harvest and use of these species is largely incidental to the effort directed toward chinook and coho salmon.

Fishery Description and Historical Perspective

The Holitna River is the most important stream for sport fishing in the upper portion of the Kuskokwim drainage because of the diversity and abundance of resident and anadromous species. The Holitna River is one of the most important producers of chinook, chum and coho salmon in the Kuskokwim drainage.

Chinook salmon begin moving into the Holitna river in late June with the peak number usually arriving sometime in early July. The number of sites or "holes" that provide excellent chinook salmon sport fishing in the Holitna River are quite limited. One site popular with local residents is actually downstream of the mouth of the Holitna River near Vreeland Creek, a small tributary of the Kuskokwim River. The most popular hole in the Holitna River is located just downstream of the confluence with the Hoholitna River. Other sites are located near the mouths of other smaller tributary streams farther up the Holitna River. These sites are well known to local anglers and a limited amount of guided fishing has occurred for many years. Historically, guides were either local or were guides from Southwestern Alaska that worked through local residents to provide services.

The Holitna River is experiencing a period of growth that began to accelerate in the mid 1990's. New sport fishing guides have moved into the area seeking quality salmon fishing opportunities in relatively uncrowded settings. The first permanent lodge was established on the Holitna River in 1994 or 1995 near the mouth of the Hoholitna River, one of the most popular sport fishing holes for chinook salmon in the lower river. The lodge and all onsite equipment was burned by an unidentified arson during the winter of 1997. Prior to the 1998 season the owners purchased another site in the vicinity and continued to provide outfitting, guided fishing and big game guiding services. There are presently about seven sport fishing guiding/outfitter businesses operating on the river. The volume of guided angling activity directed at chinook salmon has increased markedly according to local reports.

Guided activity decreases in mid July until coho salmon begin arriving in substantial numbers in early August. The sport fishery for coho salmon is far less concentrated than is the chinook fishery. Sites currently supporting guided coho sportfishing are found from near the mouth of the Holitna upstream to Titnuk Creek (approximately 55 river miles from the mouth). While a portion of guided visitors arriving in August and September travel to the Holitna River with sport fishing as their primary activity, a substantial portion of non-local residents visit to hunt caribou (August) and/or moose (September). For these visitors, fishing is a secondary activity.

Fly-in salmon opportunities also exist in the upper portion of the drainage. At least two guiding businesses provide day trips for chinook and/or coho salmon to upstreams areas (Taylor Creek to Chuilnuk River), although the level of use is currently very limited. Air Taxi operators provide access to the headwaters of the Kogrukluk River for visitors desiring to float downstream to a

pick up point near the weir site. Angling for chinook salmon is a primary activity for these visitors. Concern has been expressed by local residents over the potential for damage to spawning redds by visitors during the spawning season.

Fishery Objectives

Specific objectives have not been identified for salmon fisheries occurring in the Holitna River

Recent Board of Fisheries Action and In-season Management

A total of five proposals were submitted to the Alaska BOF during 1997 concerning use by anglers of the Holitna River. Two of these proposals sought to limit means of access for recreational anglers. The remaining proposals sought changes in sport harvest limits for three species including chinook. The shorted open season for chinook in much of the Kuskokwim system adopted in 1997 and described above applies to the Holitna River fishery. Summaries of these proposals and action taken by the AK BOF are listed in Appendix A.

Recent Fisheries Performance

Estimates of fishing effort directed at individual species are not available from the SWHS. Fishing effort was estimated at 640 days for 1996 from the Holitna River and was similar to estimates since 1987. In 1996 and 1997, fishing effort increased to 1,045 and 2,063 which represent the two highest estimates of effort on record. The estimate for 1997 roughly twice the recent 11-year and 5-year averages (Table 7).

An estimated 19, 235 and 173 chinook salmon were harvested in the Holitna River in 1995, 1996 and 1997 (Table 7). The estimates from 1996 and 1997 are both well above recent five and ten year averages and the 1996 estimate is the highest on record. Catch (both harvested and released) during the last three years was estimated to be 91, 804, and 814 fish (Table 8). During the last five-year period about 75% of all chinook salmon caught were harvested. The most recent data show a seemingly large percentage increase in the level of use of chinook salmon in the Holitna River. But this change is likely indicative of the initial growth of a sport fishery in the early stages of development rather than the accelerated growth of a large, well established fishery.

Harvest of coho salmon was estimated at 170 in 1995, 159 in 1996, and 423 in 1997(Table 7). Catches of coho salmon from the Holitna were estimated to be 472 in 1995, 973 in 1996 and 1,277 in 1997 (Table 8), indicating a release rate of about 70%. These data clearly indicate an increased use of coho salmon by anglers in the Holitna River. The high use of coho salmon in 1996 is not surprising given the record high passage of this species (50,555) through the weir during the 1996 season. In 1997, passage of coho salmon was an estimated 12,312; less than half of the 25,000 escapement goal established for the weir. The record high sport harvest of 423 coho in 1997 during a weak season indicates a significant rise in sport harvest. However, as with the chinook fishery the change likely represents early growth in a young fishery.

Current Issues

A certain level of resentment is present in local residents that have until the last few years enjoyed very low use by outside anglers of the Holitna River area during the summer salmon season. Increasing competition for the limited number of “holes” for chinook salmon fishing is likely to increase. At this time, the level of catch and harvest of salmon species by sport fishermen in comparison to use levels by commercial and subsistence fishermen is functionally insignificant. Without demonstrated local benefits and a sense of local control in the use of the

local resources, expanding opportunity for anglers in this remote area will come at a high price in terms of social costs.

Recommended Research and Management Activities

High catch and harvest of coho salmon documented in 1997 in spite of weak run strength together with increasing levels of fishing effort, indicate a rapidly changing sport fishery. Development since 1996 of on-site lodging facilities catering to anglers along with at least two new fish guiding business in 1998, indicate recent and continued growth. The Department should continue to closely monitor the development of the Holitna sport fisheries. The presence of the Kogrukluk weir in the upper portion of the system together with a long term data base provides a unique opportunity (for AYKMA) to assess catch and harvest with quantitative measures of run strength.

It is recommended that a second creel survey with the goals of determining the proportions of fishing effort directed at key species, the proportion of guided and unguided effort, the demography of anglers participating in sport fishing activity, and angler behavior in relation to current bag and size limits be conducted prior to AYK BOF meeting scheduled for the winter of 2000-2001.

NORTHERN PIKE

Sloughs, interconnected lakes, and the lower sections of large rivers throughout most of the AYKMA 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 AYKMA containing appropriate habitat except on the North Slope of the Brooks Range, where distribution of the species is limited. Bendock and Burr (1985) reported the presence of northern pike only in the Ikpikpuk River on the Arctic coastal plain west of the Colville River, and in middle reaches of the Killik River, tributary to the Colville River.

Fishery Description and Historical Perspective

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).

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

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 within the Yukon River area takes place upstream from Galena. Popular areas include Beaver Creek, Birch Creek, the Yukon Flats near Fort Yukon, Dall River, Hess Creek, Tozitna River, Melozitna River, Nowitna River, and Koyukuk River tributaries.

Down river tributaries also support important sport fisheries for northern pike. New or recently reestablished sport fish guiding businesses are promoting opportunities to catch trophy pike in the Nowitna, Innoko and Anvik rivers. Sport fishing for northern pike on the North Slope is very limited because of the limited geographic distribution of the species and the difficulty of access.

Fishery Objectives

Area-wide fishery objectives have not been established for northern pike in the AYKMA. Northern pike population studies conducted in the Tanana River drainage suggest that abundance and stock composition parameters such as age and size composition respond when annual harvest exploitation rates exceed 16%.

Recent Board of Fisheries Action and In-season Management

Current sport fishing regulations for northern pike in the AYKMA were established in 1987; Prior to 1987, there was no bag, possession, or size limits for northern pike for most of the AYKMA. Proposals submitted by ADF&G to and adopted by the Alaska Board of Fisheries in 1987 established the current background regulation of 10 per day, with no size limit for most of the Yukon, Kuskokwim and North Slope sub-areas. Because of concern for the maintenance of Yukon River northern pike stocks near the Dalton Highway bridge, the BOF adopted a more restrictive regulation of five per day, with only one fish over 30 inches for Yukon River tributaries between the Hodzana and the Tanana rivers.

Opening of the entire Dalton Highway to public travel in 1994 caused concern that increases in recreational use would result in localize 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 (Burr et al. 1998). The northern pike bag and possession limit was reduced to five fish with only one over 30 inches.

In the Kuskokwim area in 1997, the AK BOF restricted northern pike harvest and length limits to five fish with only one over 30 inches for the Kuskokwim drainage downstream of and including the Holitna River. This change was in response to public proposals concerning increased sport fishing use of the area and concerns over freshwater species including northern pike (Appendix A).

Recent Fisheries Performance (Stock Status)

The estimated sport harvest of northern pike in the AYK Management Area has ranged from about 1,800 fish in 1977 to more than 6,700 fish in 1982 (Mills 1979-1994; Howe et al. 1995-1998). During 1995, 1996, and 1997 the estimated harvests of 2,592, 2,034 and 3,438 northern pike were less than the average harvest of 3,823 fish for the previous eleven years (1987 - 1997. Table 2). Total catch of northern pike in AYKMA has changed little since 1990; annual catch of northern pike has averaged about 19,000 fish annually. During the reporting period estimates of catch were 21,258 in 1995, 18,211 in 1996 and 22,908 fish.

Little is known concerning the status of northern pike stocks in much of the AYK Area, but because of limited access, fishing effort is light except on those stocks near towns and villages where angling and subsistence gill netting effort may be more intense.

Most of the catch and harvest of northern pike has come from waters within the Yukon drainage. During the 1995 through 1997 period the Yukon sub-area contributed an average of 81% of the harvest and 79% of the catch of this species in the AYKMA (Table 2, Appendix B1-B3). The

remainder of the catch of northern pike in AYKMA comes from waters of the Kuskokwim drainage.

Yukon Sub-area

Within the Yukon sub-area, most catch of northern pike has come from five primary locations: the Dall, Nowitna, Koyukuk, Innoko and Andreafsky rivers. Between 1987 and 1997 little change was observed in total harvest or catch from the Yukon River reporting area (Table 9). Harvest estimates for 1987-1997 averaged 2,811 compared with 2,173 for 1993-1997. Catch estimates for 1987-1997 averaged 15,081 compared with 14,847 for 1993-1997. While estimates of harvest and catch of northern pike in the Yukon area as a whole showed little change, catches of northern pike in the five locations listed above show a moderately increasing trend (Table 10).

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. The Dall River northern pike sport fishery has been the source of user conflicts and the focus of stock assessment and use survey studies in the last decade. This fishery is discussed separately in a later section.

Nowitna River

The Nowitna River is located approximately 130 km downstream from the mouth of the Tanana River. This major Yukon River tributary enters the Yukon River from the south. It was designated a Wild and Scenic River 1980. Most of the main stem and major tributaries are included in the Nowitna National Wildlife Refuge. Guided and unguided fishing effort is increasing by anglers targeting trophy sized northern pike in a wilderness setting in remote areas of AYK including the Nowitna River. During the most recent five-year period (1993-1997), estimated angler effort has averaged approximately 1,000 angler-days by about 300 guided and unguided anglers (Mills 1994, Howe et al. 1995 - 1998). The number of angling guides officially operating in the refuge has increased from zero in 1992 to six in 1997 (J. Goode, Koyukuk/Nowitna Refuge, Galena, personal communication). Sport fishing occurs throughout the open water season, however, anecdotal reports indicate that the majority of the fishing effort and harvest occurs during September concurrent with hunting activities and within the lower 30 km of the river.

Estimated sport harvests of northern pike from the Nowitna River during the last three years were similar (302, 274, and 230 northern pike, and indicate a somewhat lower level of harvest compared with average harvests since 1987 (Table 10). In contrast, the estimated total catch has generally increased with the two highest estimates on record from 1995 and 1996 (3,049 and 3,798 fish). Between 1993 and 1997, the harvest and catch of northern pike from the Nowitna River accounted for 10% and 18% of the entire Yukon River drainage sport harvest and catch of this species.

Table 9.-Sport harvest of northern pike in the Yukon River drainage (1977-1997).

Harvest	Year										Average
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1977-86
Total	899	2,583	1,446	2,498	2,718	3,551	3,318	2,960	2,132	3,470	2,558

Harvest	Year											Averages	
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1987-97	1993-97
Yukon R. drainages (Ft. Yukon to Canadian Border)					-	103	121	153	-	71	73	74	84
Fortymile River	-	-	-	-	-	-	-	-	-	-	-	-	-
Charley River	-	-	-	17	-	9	38	-	-	-	-	6	8
Yukon R. drainages (Koyukuk R. – Ft. Yukon)					3,102	1,955	671	673	759	178	893	1,176	635
Porcupine River	-	-	-	-	662	342	286	448	29	53	50	170	173
Chandalar River	891	-	-	-	-	196	-	-	30	-	21	103	10
Beaver and Nome Creeks	-	-	-	-	21	558	9	54	126	35	10	74	47
Dall River	866	418	125	372	554	342	352	215	350	274	639	410	366
Haul Road Streams	-	-	-	187	-	-	-	-	116	106	21	39	49
Nowitna River	28	982	548	118	1,617	196	63	161	302	274	230	411	206
Melozitna River	-	36	-	51	-	-	47	18	-	-	115	24	36
Koyukuk River	-	-	52	271	485	650	191	138	99	140	1,364	308	386
Yukon R. drainages (down stream from Koyukuk R.)					515	257	346	610	367	441	390	418	431
Nulato River	-	-	-	34	-	9	-	-	86	-	10	13	19
Anvik River	-	55	82	-	-	128	74	-	11	43	21	38	30
Innoko River	-	18	268	118	118	43	151	9	90	91	127	94	94
Andreafsky River	35	91	58	17	250	17	113	341	30	80	180	110	149
Total	2,492	3,526	3,516	2,474	4,454	3,590	2,347	1,968	1,937	1,690	2,923	2,811	2,173

Table 10.-Total fishing effort, and northern pike catch and harvest from principal fisheries in Yukon River area 1977-1997.

	Yukon	Dall River			Nowitna River			Innoko River			Andreafsky River		
Year	Total	Effort	Number	Percent[a]	Effort	Number	Percent	Effort	Number	Percent	Effort	Number	Percent
Harvest													
1978	2,583	259	177	6.9	-	-	-	-	-	-	-	-	-
1979	1,446	394	723	50.0	-	-	-	-	-	-	-	-	-
1980	2,498	250	499	20.0	-	-	-	-	-	-	-	-	-
1981	2,718	498	1,014	37.3	-	-	-	-	-	-	-	-	-
1982	3,551	473	455	12.8	-	-	-	-	-	-	-	-	-
1983	3,318	405	1,794	54.1	388	378	11.4	51	-	-	118	-	-
1984	2,960	1,428	1,752	59.2	122	78	2.6	35	13	0.4	17	-	0.0
1985	2,132	139	416	19.5	260	260	12.2	-	-	-	-	-	-
1986	3,470	596	1,407	40.5	245	489	14.1	31	-	0.0	122	98	2.8
1987	2,492	545	866	34.8	453	28	1.1	-	-	-	72	35	-
1988	3,526	217	418	11.9	946	982	27.9	164	18	0.5	91	91	2.6
1989	3,516	438	125	3.6	773	548	15.6	206	268	7.6	206	58	1.6
1990	2,474	273	372	15.0	652	118	4.8	415	118	4.8	415	17	0.7
1991	4,454	359	559	12.6	1,238	1,617	36.3	520	118	2.6	348	250	5.6
1992	3,590	224	342	9.5	491	196	5.5	53	43	1.2	331	17	0.5
1993	2,347	845	352	15.0	446	63	2.7	637	151	6.4	451	113	4.8
1994	1,968	455	215	10.9	733	161	8.2	93	9	0.5	1,478	341	17.3
1995	1,937	1,018	350	18.1	1,977	302	15.6	430	90	4.6	1,454	30	1.5
1996	1,690	455	274	16.2	1,082	274	16.2	1,005	91	5.4	983	80	4.7
1997	2,923	1,011	639	21.9	802	230	7.9	1,258	127	4.3	1,052	180	6.2
Averages													
1987-97	2,811	531	410	14.6	872	411	14.6	435	94	3.3	626	110	3.9
1993-97	2,173	757	366	16.8	1,008	206	9.5	685	94	4.3	1,084	149	6.8

-continued-

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Year	Yukon Total	Dall River Effort	Dall River Number	Dall River Percent[a]	Nowitna River Effort	Nowitna River Number	Nowitna River Percent	Innoko River Effort	Innoko River Number	Innoko River Percent	Andreafsky River Effort	Andreafsky River Number	Andreafsky River Percent
Catch													
1990	17,717	273	1,810	10	652	694	4	415	964	5	415	389	2
1991	13,895	359	1,029	7	1,238	2,749	20	520	1,544	11	348	368	3
1992	14,801	224	1,042	7	491	1,426	10	53	171	1	331	145	1
1993	13,502	845	2,645	20	446	1,362	10	637	1,661	12	451	122	1
1994	11,694	455	1,308	11	733	2,868	25	93	18	0	1,478	1,273	11
1995	15,828	1,018	2,463	16	1,977	3,049	19	430	1,039	7	1,454	881	6
1996	14,389	455	1,115	8	1,082	3,798	26	1,005	3,215	22	983	1,059	7
1997	18,820	1,011	3,001	16	802	1,818	10	1,258	3,067	16	1,052	544	3
Averages													
1990-97	15,081	580	1,802	12	928	2,221	15	551	1,460	9	814	598	4
1993-97	14,847	757	2,106	14	1,008	2,579	18	685	1,800	12	1,084	776	6

[a] Percent (%) of total catch or harvest of northern pike in the Yukon area.

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During 1997, a study of the northern pike population inhabiting the lower 15 miles of the Nowitna River was conducted (Burr 1999). The goal of the study was to obtain current information on this pike stock. The study found large numbers of northern pike in mature age and size categories. Based on movements of individually marked fish the it appears that pike using the lower 20 miles of the river are part of a single large stock. The study concluded that the population is currently lightly exploited and that current levels of fishing pressure are within sustainable limits.

Koyukuk River

The Koyukuk River is one of the largest first order tributaries of the Yukon, enters the Yukon River downstream from Galena, about 820 km upstream from the Yukon River mouth. Sport fishing for northern pike is wide spread in the drainage but sites are little known outside local areas. Access to the drainage is by air or boat except for portions of the upper Middle and South forks of the Koyukuk River which have limited accessed from the Dalton Highway. Much of the fishing effort and harvest occurs concurrent with other activities such as float trips in Gates of the Arctic National Park or during September with hunting activities. There is little information about the geographic distribution of fishing effort for northern pike within the huge Koyukuk drainage. Lower Koyukuk tributaries such as the Gisasa, Kateel, Dulbi and Indian rivers provide excellent opportunities and a limited number of sites adjacent to the Dalton Highway support pike populations. Local residents of Galena, and Koyukuk have recently expressed interest in providing guiding services for area waters. Three individuals registered with the Sport Fish Guide Registration program in 1998 but apparently did not take out any clients.

Estimated sport harvests of northern pike from the Koyukuk River drainage during 1995 and 1996 were similar (99 and 140 northern pike). The estimated harvest from 1997 was approximately an order of magnitude higher (1,364 fish) and three to four times greater than the recent five-year (386 fish) and eleven-year (308 fish) averages (Table 9). The Koyukuk drainage provided 5% in 1995 and 8% in 1996 of the total northern pike harvest for the Yukon area. In contrast, during 1997, the harvest of northern pike from the Koyukuk River accounted for 48 of the entire Yukon River drainage sport harvest of this species. Although an estimated harvest of northern pike of less than 1,500 fish in an area the size of the entire Koyukuk drainage is not likely cause for concern, the rate of change, if sustained, would be.

Innoko River

The Innoko River and its tributaries drain a large flat wetlands and the foothills of the Kuskokwim mountains. The Innoko River enters the Yukon River a few miles downstream from the village of Holy Cross. This river system with its extensive wetlands provides excellent habitat for whitefish and northern pike. The lower Innoko and this part of the Yukon River continue to produce some of the largest northern pike in the state. In about 1995 a new sport fish guiding business which caters to anglers seeking catch and release opportunities for trophy sized northern pike, began operating in the lower Innoko, using a large house boat as a movable base of operations. Nearby, on the Anvik River, a long standing sport fishing lodge was renovated and reopened. More recently, additional smaller businesses have begun to provide sport fish guiding services in the Innoko system; two of these business are operated by residents of the Holy Cross area.

Sport fishing effort in the Innoko River has generally increased during the last decade, ranging from less than 100 to more than 1,200 days of fishing effort (Table 10). During this time frame

estimates of harvest of northern pike have changed little averaging about 100 pike per year. In contrast, estimates of total catch have generally increased, climbing to more than 3,000 fish in 1996 and 1997. Most of this increase probably has come from guided anglers taking advantage of the recently developed facilities and services.

Andreafsky River

Near the Yukon River mouth the east and west forks of the Andreafsky River are both high quality sport fishing streams and have been designated Wild and Scenic Rivers. Each fork is a major stream and they drain extensive remote areas of the Nulato Hills between the Yukon River Delta and Norton Sound. As discussed previously, all Pacific salmon species except for sockeye salmon are found in the river along with Arctic grayling and Dolly Varden. Northern pike are found in sloughs and lakes adjacent to the river and provide a small but growing sport fishery for this species. Little is known about the northern pike fishery in the Andreafsky River area. It is likely that northern pike are taken opportunistically by anglers traveling to the area to fish for chinook salmon or other species. However, some anglers may specifically seek the trophy sized pike that reside in the area.

Sport fishing effort in the Andreafsky River has increased during the last five year period averaging approximately 1,000 days of effort (Table10). It is unknown what proportion of this effort is directed at northern pike since the area also supports growing chinook and coho salmon fisheries. Harvest and catch of northern pike remain light but have on average increased during the last five year period, providing about 7% of the total harvest and 6% the total catch of the species in the Yukon drainage (Table10).

Kuskokwim Sub-area

As noted above most of the catch and harvest of northern pike in AYKMA has come from waters within the Yukon drainage. During the 1995 through 1997 period the Kuskokwim sub-area contributed an average of 19% of the harvest and 21% of the catch of this species in the AYKMA (Table 2, Appendices B1 and B2). Just less than half of the sport catch (47%) and harvest (43%) of the species has come from waters upstream of the Aniak River. Between 1995 and 1997 an average of 72% of the catch and 76% of the harvest from the upstream portion of the Kuskokwim area came from the Holitna River drainage (Table 7, Appendix B1, B2). Between 1987 and 1997 estimates of harvest of northern pike from the upper Kuskokwim area declined from an average of 571 pike annually between 1987 - 1997 to 225 per year during the last five-year period. Catch estimates for the upper Kuskokwim area were not available at time of writing. While estimates of harvest of northern pike in the upper Kuskokwim area in general declined, harvests of northern pike from the Holitna showed little change. (Table 7).

Holitna River

The Holitna River sport fishery was discussed in detail in the previous section on Holitna River Salmon. The Holitna River drainage supports increasingly popular sport fisheries for chinook and coho salmon along with resident freshwater species including northern pike. Most of the new guided fishing effort occurring on the Holitna River is targeting chinook and coho salmon. Although northern pike are a secondary target for most anglers, a limited amount of guided fishing directed at northern pike does occur.

Northern pike are distributed throughout the Holitna River valley in appropriate habitat and are available to anglers throughout the summer. Guided anglers may target pike during periods of

high, turbid water when salmon are less available. Like coho salmon, northern pike are often sought by hunters as a secondary activity during their visit to the Holitna River.

An estimated 166, 79 and 214 northern pike were harvested in the Holitna River in 1995, 1996 and 1997 (Table 7). The estimated harvests are similar to historic estimates and do not suggest a major change. Catch of northern pike (both harvested and released) during the last three years was estimated to be 1,488, 1,125, and 2,092 fish (Table 8). These estimates do show a modest increase in the total catch of the species in the Holitna River. It follows that the proportion of northern pike caught and released has increased; between 1990 and 1997 82% were released while in the last three years 91% were released.

Current Issues

Growth of the guided sport fishery for northern pike in the Innoko, Anvik, and Andreafsky rivers is the source of friction with long term residents who express concern over the influx of visitors from outside the area. Like the lower Kuskokwim area, many residents of the lower Yukon River and Yukon Delta hold traditional beliefs and live very traditional subsistence life styles. There is generally very limited acceptance of catch and release fishing as practiced by many visiting anglers.

Long time visitors of the Holitna River assert that the large northern pike that were once readily available in the sloughs of the lower river are no longer present. The increased presence of guiding businesses in the area will likely increase the pressure on all resident species.

Recommended Research and Management Activities

The northern pike sport fishery in AYKMA appears to be in a period of significant change. The Department should continue to closely monitor the development of the Holitna River sport fishery and the development of the Innoko River sport fish guiding businesses. Special effort will be directed at determining the sites from which the SWHS estimated an order of magnitude increase in northern pike harvest from the Koyukuk drainage between 1996 and 1997. If the trend continues, these sites should be highlighted for closer investigation.

DALL RIVER NORTHERN PIKE

Fishery Description and Historical Perspective

Construction of the Dalton Highway in the mid 1970's provided access to the Dall River for anglers. Since that time, a summer season sport fishery has developed which targets mostly northern pike. Local people have expressed concern over encroachment by outside visitors and by what they perceive as a depletion of resources particularly northern pike.

In 1987, residents of Steven Village proposed to the BOF that the northern pike fishery in the Dall River should be closed. The BOF responded to the proposal by restricting allowable harvest of northern pike in the Yukon River and its tributaries from the Tanana to the Hodzana River to five pike (one over 30"). In 1988 and 1989 ADF&G conducted a project designed to assess the population of northern pike residing in the Dall River (Arvey and DeCicco 1989; Arvey and Burkholder 1990). A reliable estimate of population abundance was not obtained because northern pike travel into and out of the Dall River during the open water season. The study found that this pike population extends throughout the Yukon River and its tributaries from as far downstream as Hess Creek and upstream of Stevens Village to at least Old Lost Creek. Data obtained in 1988 and 1989 on the size and age of pike using the Dall River during summer

indicate that a substantial portion of these fish were of large size and old age. The maximum estimated harvest of northern pike from the Dall River occurred in 1984 and was 2,480 fish (1,752 sport, 730 subsistence). All harvest estimates since that time have been less (Mills 1978-1994, Howe et al. 1995-1998). Based on these study findings, the Department concluded that the level of harvest occurring in 1988 and 1989 on this pike population that inhabits a huge geographic area was within sustainable levels.

The Dall River lies within the boundaries of the traditional lands claimed by Stevens Village. Local people continue to express concern about the long term impact of increased visitor use of the Dall River area. Stevens Village residents have alleged that non-resident anglers have damaged private property on the lower Dall River and have acted without respect for the river environment and for the fisheries resource. Waste of fish and other game animals has been reported. Local people are concerned that mortality associated with catch and release fishing may be substantial.

Following the 1989 study, additional information concerning the Dall River northern pike fishery was limited to results of the SWHS. These results found that the average harvest between 1988 (bag limit reduced) and 1994 was 361 fish per year compared with an average of 835 fish prior to 1988. The restrictive bag and size limit appeared to be controlling harvest. Total catch was estimated beginning in 1990 and these data showed up to 87% of the northern pike caught were released. The number of fish harvested did not appear to be increasing. Estimated fishing effort on the river remained stable between 1988 and 1992 varying between 217 and 438 days of effort. Estimated fishing effort in 1993 increased to 845 days, the highest since 1984.

In 1995 and 1996 Stevens Village submitted proposals to the Federal Subsistence Board (FSB) seeking to close the Dall River to hunting and fishing by all but qualified rural residents. The FSB took no action on the proposals primarily because the navigable water in the Dall River is not federal public land and is therefore not within the jurisdiction of the FSB.

During 1995, a project was conducted to again assess the sport fishery for northern pike in the Dall River. This project represented a cooperative effort by Stevens Village Council, the Yukon Flats National Wildlife Refuge and ADF&G. The project was designed to obtain quantitative information on the level of visitor use, fishing effort, and on the catch and harvest of northern pike from the Dall River. The study was also designed to provide a check on the use and harvest estimates provided by the SWHS.

The 1995 survey found that the use of the Dall River during the 1995 season was light (Burr and James 1996). The survey estimated that 330 people (92 non-local) visited the river in 107 boats and stayed for a total of 631 days. Local use was highest in June when 20 of visitors were from Stevens Village; local use dropped to a low level in July. Most (94) of visitors came to fish for northern pike. Sport fishing effort was estimated to be 553 angler days by 300 anglers. Total catch was estimated at 1,325 northern pike of which 340 were kept and 985 were released. Age and length data collected during the 1995 study did not indicate a change in the size or age of northern pike available to anglers since 1988 and 1989. The ranges of lengths and ages sampled in 1995 are consistent with the ranges observed during the earlier studies. Estimates from the SWHS were consistent with estimates from the on site survey on the Dall River. The SWHS estimated that 494 anglers fished 1,018 days catching 2,463 northern pike and harvested 350 (Howe et al. 1996). Although the point estimates from the SWHS for each measure of the sport

fishery were higher than the estimates from the 1995 on-site study, these differences were not functionally or statistically different (Burr and James 1996).

Fishery Objectives

Although specific fishery objectives have not been articulated for the Dall River sport fishery, the overriding goal is to limit harvest to sustainable levels and to maintain sport fishing opportunity for all participants.

Recent Board of Fisheries Action and In-season Management

Two proposals were submitted concerning the Dall River sport fishery in 1997; one by Stevens Village the other by the Yukon Flats Fish and Game Advisory Committee. Both proposals sought to place further restrictions on sport fishing. The BOF took no action on either of the proposals except to repeal an outdated subsistence fishing closure. Summaries of the proposals and action by the BOF are provided in Appendix A.

Recent Fisheries Performance

During the last five-year period (1993-1997) fishing effort at the Dall River has remained at a level similar to the level estimated in 1995 during the on site survey (Table 10). Since 1987, harvest of northern pike has generally decreased although the most recent estimate (639 in 1997) is the highest since the restriction in regulations were adopted in 1988. Catch of northern pike since 1990 appears to be increasing; the estimate for 1997 (3,000) is the highest on record.

Current Issues

The Stevens Village Resource Office aggressively enforced trespass violations on private land (native allotments, corporation lands) during 1998. Representatives from the village talked with anglers about land status, discouraged them from fishing in the area and in a few isolated instances removed legal fishing gear from the water.

The people of Steven Village are frustrated by the increased level of use by non-locals that has occurred since the construction of the Dalton Highway bridge. The village continues to seek recognition of the Traditional Use Lands described in "A Comprehensive Land Use Plan for the Traditional Lands of Stevens Village". The Dall River is an important traditional site to residents of the village and the loss of control is a source of conflict.

Recently representatives of the village have agreed that the level of harvest occurring at the Dall River is likely sustainable. However, they assert that the age and size composition of northern pike have decreased from historic levels. This reflects a change from the long held position that the northern pike population had been harvested beyond sustainable levels by the sport fishery. The Stevens Village Natural Resource Office has expressed a willingness to provide improved assess to private land adjacent to the Dall River concurrent with tighter controls on the sport fishery and potential local benefits. Some residents of Stevens Village have expressed interest in providing sport fish guiding services which also reflects a change in attitudes within the village.

Recommended Research and Management Activities

The Steven Village council has shown a renewed desire to work toward a mutually agreeable solution to the issues surrounding the Dall River sport fishery. The development of a fishery management plan for the Dall River northern pike fishery will be a high priority during 1999. Development of this plan will require the involvement of all interested users

YUKON RIVER ARCTIC GRAYLING

Grayling are an extensively distributed resident freshwater species that occurs 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. 1995-1998) indicate that the heaviest sport utilization has occurred on Koyukuk River tributaries, including those that are crossed by the Dalton Highway. Reported harvests from the Dalton Highway come from road crossings of Koyukuk River tributaries including the Middle Fork Koyukuk River, South Fork Koyukuk River, Jim River, Bonanza Creek, Fish Creek, Kanuti River and others. Road access has also recently been provided to Nome and Beaver creeks. 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 11).

Arvey et al. 1995 reported that most of the harvest of Arctic grayling from the Koyukuk drainage was from streams and lakes adjacent to the Dalton Highway. This conclusion was based on best available information from responses to the SWHS. Most responses simply listed "Koyukuk River tributaries" as the location fished for grayling; assumptions on the geographic distribution of that effort and harvest were based on relatively few site specific responses. More recent information indicates that about 10% of the harvest and 14% of the catch of grayling from the Koyukuk drainage comes from Dalton Highway streams (Howe et al. 1996-1998). Still, given the relatively small portion of the Koyukuk drainage that is accessible from the roadway, grayling stocks along the Dalton Highway are likely subjected to the highest use by anglers in the drainage.

Management of Arctic grayling stocks along the Dalton Highway has been predicated on the concept that large portions of the grayling stock(s) are not readily available to anglers and will replace any localized depletions that might occur near the highway. Nearly all of the fishery occurs within a short distance of the road bed (1/4 mile or less, Bendock 1982, 1983). If localized depletions of grayling near the roadway do occur during a particular season, the negative result would be to reduce angler opportunity but would be unlikely to be cause for concern for the viability of the stock(s). This strategy assumes that a pool of catchable sized fish exists to replace harvested fish before the next fishing season. Starting in 1995 studies were initiated to obtain baseline abundance and composition data for stocks of Arctic in rivers and streams crossed by the Dalton Highway.

Table 11.-Sport harvest of Arctic grayling in the Yukon River drainage (1977-1997).

Harvest	Year										Average
	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1977-86
Total Harvest	2,486	3,976	8,273	9,640	6,176	7,171	8,014	6,856	4,180	5,566	6,234

Harvest	Year											Averages	
	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1987-97	1993-97
Yukon R. drainages (Ft. Yukon to Canadian Border)					553	992	183	899	528	177	1,062	628	570
Fortymile River	13	73	83	119	218	347	261	90	-	-	-	109	70
Charley River	92	36	120	17	129	383	54	416	18	37	461	160	197
Yukon R. drainages (Koyukuk R. – Ft. Yukon)					2,624	701	789	744	466	861	1,771	1,137	926
Porcupine River	-	-	187	203	1,337	180	137	245	-	-	-	208	76
Chandalar River	-	218	31	592	257	353	50	-	-	-	-	136	-
Beaver and Nome Creeks	26	255	-	-	141	323	171	306	53	694	79	186	261
Dall River	-	-	-	-	129	15	-	-	-	-	39	72	39
Haul Road Streams	-	-	-	-	-	-	-	-	217	229	188	-	211
Nowitna River	-	-	-	-	77	84	-	-	-	-	114	25	23
Melozitna River	-	-	354	17	129	68	19	-	18	-	69	61	21
Koyukuk River	6,911	3,439	3,674	2,827	1,582	985	716	2,015	1,174	1,134	1,233	2,335	1,254
Yukon R. drainages (downstream from Koyukuk R.)					708	325	558	147	334	410	181	380	326
Nulato River	297	-	167	-	26	68	-	-	35	112	69	70	43
Anvik River	-	910	21	-	154	143	71	10	52	251	-	147	77
Innoko River	-	-	166	-	-	-	-	-	-	121	30	116	76
Andreafsky River	209	-	82	169	193	38	299	98	62	47	20	111	105
Total Harvest	9,054	6,115	7,491	4,961	5,570	4,171	3,330	4,574	3,421	3,728	3,139	5,050	3,638

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Catch		Year							Averages	
		1991	1992	1993	1994	1995	1996	1997	1987-97	1993-97
Yukon R. drainages (Ft. Yukon to Canadian Border)		1,966	1,661	418	2,186	765	1,000	3,261	1,608	1,526
Yukon R. drainages (Koyukuk R.-Ft. Yukon)		7,242	2,315	5,845	3,286	2,013	4,778	10,955	5,205	5,375
Beaver and Nome Creeks		219	1,300	274	2,417	957	4,009	2,004	1,597	1,932
Haul Road Streams						648	949	897	-	831
Koyukuk River		4,784	4,185	6,290	5,728	4,610	5,955	7,213	5,538	5,959
Yukon R. drainages (downstream from Koyukuk R.)		9,041	4,478	4,491	1,705	1,145	2,172	1,427	3,494	2,188
Total Catch	34,299	23,458	17,300	21,420	15,951	11,454	19,891	16,401	20,022	17,023

The Jim River supports the largest regional stock, as well as the largest harvest by sport anglers (Fish 1997). The Jim River is one of the most accessible of the streams crossed by the Dalton Highway because the roadbed parallels the stream for many miles. In contrast, most other streams in general flow perpendicular to the roadbed. Fish (1997) concluded that catchability of fish in the Jim River is not affected by accessibility from the highway, and that fishing pressure at easily accessible locations along the river is probably not great enough to cause changes in catchability throughout the summer.

In 1997 and 1998 a study using radio telemetry was initiated to determine overwintering and spawning locations of Arctic grayling marked in the Jim River summer fishery, and to determine the fidelity of Arctic grayling to summer feeding grounds in the Jim River. The study (Fish 1998) found that most fish (66%) tagged in the Jim River overwinter in the Jim River (53% downstream of the fishery) while fewer overwinter in the South Fork Koyukuk River (25%), the Mainstem Koyukuk River (8%), and Prospect Creek (3%). During the spawning season, most grayling (84%) were located in the Jim River in the fishery area (37%) or in the lower Jim River (47%). A few fish were also located during spawning season in Fish Creek (7%), Prospect Creek (3% one fish), and the South Fork Koyukuk River(7%). Patterns of habitat use and migration characteristics appear to mimic those of other stocks of Arctic grayling inhabiting unsilted, rapid runoff rivers in Interior Alaska (e.g. within the Tanana Valley). Telemetry data suggest that Arctic grayling in the Jim River are probably a distinct stock of fish that may share overwintering and feeding habitat with other related Koyukuk River stocks

Fishery Objectives

General objectives for Arctic grayling fisheries in the Yukon drainage were listed in the sport fishery management plan for the Yukon River. These objectives are similar for most AYKMA fisheries and are 1) manage sport fisheries for grayling in the Yukon tributaries so that sport harvests do not threaten sustained yield from any stock; 2) promote public awareness of fishing opportunities available to anglers; 3) maintain and improve public access to fishing locations where needed; and, 4) achieve public benefits from the fishery that outweigh the costs of management and research.

Recent Board of Fisheries Action

In 1994, 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. This action was taken in response to increases in recreational use and harvest (Burr et al. 1998). In anticipation of continued increasing recreational use of Nome Creek, the BOF adopted a catch and release only regulation for this small tributary of Beaver Creek.

Recent Fishery Performance

The Yukon sub-area has provided about 65% of the sport harvest and 40% of the catch of Arctic grayling in the AYKMA during the 1987-1997 period (Table 2, Appendix B1). Harvest estimates in 1995-1997 were below recent and historical averages for the drainage (5,050 fish, 1987-1997), while the estimated harvest in 1997 was the lowest on record (Table 11). Catch estimates for the Yukon sub-area have averaged about 20,000 annually since 1990 (Table 11). Estimates from the last three years (11,454, 19,891, and 16,401 fish) are similar to historic levels except for 1995 which was lower than others on record. These data reflect a continued low level of use of the species in the Yukon area as a whole.

Sport Fisheries for Arctic grayling along the Dalton Highway have harvested an average of 211 fish annually (217, 229, 188 fish) during the last three-year period. Total catch from this area has averaged 831 grayling (648, 949, and 897 fish). These results do not indicate an increasing trend in catch or harvest in this roadside fishery. Comparable results for the Dalton Highway prior to 1995 from the SWHS are not available at this time.

In 1994, construction began on a new campground and an expanded road system leading to Nome Creek and its confluence with Beaver Creek. The improved access has resulted in increased visitor use and in increased catch of Arctic grayling in this area. A catch and release only regulation is in place for Nome Creek while the background regulation of 10 per day without size limit applies to Beaver Creek. Estimates of catch of Arctic grayling from Nome and Beaver creeks during the last three years are 957, 4,009 and 2, 004 fish (Table 11). The estimate from 1996 is the highest on record for this fishery and about twice the average annual catch for the most recent five-year period. Harvest of Arctic grayling from Beaver Creek (Nome Creek is closed to harvest) has fluctuated in the last three years from a low of 53 fish in 1995 to an all time high of 694 fish in 1996 (Table 11).

Current Issues

Local roadside depletion of fish stocks near crossings of Koyukuk River tributaries by the Dalton Highway have been 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.

Improved access to Beaver and Nome creeks has resulted in a rapidly growing sport fishery for Arctic grayling. If the fishery continues to expand at recent rates it may be necessary to adjust the liberal bag limit for Beaver Creek

Recommended Research and Management Activities

The concept of "localized depletions" of Arctic grayling within the Dalton Highway corridor continues to be difficult to monitor and/or compensate for with management action given the limited information that exists for these stocks. The current regulations include a size-restricted bag limit of five fish per day. Size-restriction is borrowed from knowledge of Tanana Valley stocks, and is founded on the assumption that Arctic grayling will have the opportunity to mature, spawn and contribute to the population before being harvested as a 12-inch, or larger, fish. However, the effectiveness of this assumption has not been verified for stocks within Dalton Highway drainages. Modeling of growth data indicated that Arctic grayling sampled in the Jim River during 1995 grow slower than Arctic grayling in the Lower Chena River in the Tanana Valley. This study predicted that grayling at age-6 (the age at which Arctic grayling are assumed to be sexually mature) would be 273 mm FL (about 12 in.). Conducting studies to validate the age and size of maturity would provide data to evaluate the rationale behind the 12 inch minimum size restriction of the current regulations.

At present, there appears little concern for overharvest in streams crossed by the Dalton highway, but the phenomenon of localized depletions is still poorly understood. If fishing effort or harvests of Arctic grayling increase, a better understanding of population dynamics of Dalton Highway Arctic grayling stocks, and how they differ from Tanana Valley stocks, will be necessary to allow for more effective management of this species within this region of the State.

Patterns of movement and of seasonal use in the Jim River indicate that Arctic grayling would be at the greatest risk of exploitation during late May and early June when they are on separate spawning grounds. However, fishing effort along the Dalton Highway appears to be most intense during July and August (summer months), while fishing effort during spring spawning periods is probably very low. Future stock assessments should include creel surveys to better characterize the nature of these roadside sport fisheries.

Changes in estimates from the SWHS for the sport fishery on Beaver Creek will be carefully monitored. If the estimated catch of Arctic grayling in 1998 again exceeds historic levels, an assessment of this fishery prior to the AYK BOF meeting scheduled for the winter of 2000-2001 will be recommended.

KUSKOKWIM RIVER DRAINAGE ARCTIC GRAYLING

Fishery Description and Historical Perspective

This remote fishery is almost entirely inaccessible by road and is 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. Local rural residents of the upper Kuskokwim River communities and guided and unguided visitors from outside are the primary participants in this sport fishery.

The Kuskokwim sub-area has provided about 18% of the sport harvest and 40% of the catch of Arctic grayling in the AYKMA during the 1987-1997 period (Table 2, Appendix B2). Harvest estimates in 1995-1997 (845, 663, and 1,232 fish) were below recent and historical averages for the drainage (1,445 fish, 1987-1997); the estimated harvest in 1996 was the second lowest on record. Catch estimates for the Kuskokwim sub-area have averaged about 17,500 annually since 1990 (Appendix B2). Estimates from the last three years (9,598, 18,284, and 46,046 fish) show an increase in catch of the species in the drainage as a whole.

In the upper portion of the Kuskokwim drainage (waters upstream of the Aniak River drainage) harvests of grayling in the last decade(1987-1997) have averaged 602 fish (Table 7) which represents about 42% of the total harvest from the Kuskokwim drainage.

Fishery Objectives

Fishery objectives for these remote fisheries are identical to general objectives listed in the first chapter of AYKMA report. These objectives are: harvest within sustainable limits, maintenance or enhancement of fishing opportunity, improving physical access, and cost effectiveness of programs and activities.

Recent Board of Fisheries Action

Very liberal fishing regulations have been in place for the area in recognition of its remote nature and the minimum level of sport fishing effort exacted. Recent increases in outside use of the Kuskokwim drainage by guided fishermen has resulted in more restrictive regulations for the middle and lower portions of the drainage. In 1997 the BOF adopted a five fish bag limit for the Kuskokwim drainage downstream of the Holitna River. A more restrictive limit of two fish was adopted for the Holitna River and for three Kuskokwim Bay streams (Kanektok, Arolik, and Goodnews rivers). Summaries of proposals and actions by the BOF as given in Appendix A.

Recent Fishery Performance

Between 1995 and 1997 harvest of grayling in the upper Kuskokwim was estimated to be 357, 270, and 250 fish which represents a decline in harvest during the last decade (Table 7). In contrast total catch has increased in each of the past three years; 2,036 in 1995, 3,868 in 1996 and 5,159 in 1997 (Table 8).

During the 1987–1998 period, the Holitna River supported about 51% of the fishing effort in the upper Kuskokwim River while generating about 20% of the harvest of grayling. In the last three years (1995-1997) the Holitna drainage supported about 54% of the effort, 51% of the harvest and 47% of the catch. This information indicates that the growth in the upper Kuskokwim Arctic grayling fishery is occurring primarily in the Holitna drainage.

Current Issues

No current issues are identified.

Recommended Research and Management Activities

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

NORTH SLOPE ARCTIC GRAYLING

Lakes and streams in nearly all of the freshwater drainages of the Arctic coastal plain contain Arctic grayling (USFW 1982).

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. 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.

Sport fishing effort in the North Slope area is light and is divided almost entirely between three key species, Arctic grayling, Dolly Varden/Arctic char and lake trout (Appendix B3). Arctic grayling are the most commonly harvested species in the sub-area (Table 12, Appendix B3). Arctic grayling account for slightly more than one-half of the sport harvest and about 65% of the catch of all species in this sub-area. The average annual harvest of Arctic grayling from 1987 to 1997 was approximately 1,400 fish, with the largest harvest of about 5,500 fish in 1985 (Table 12). Most harvest (52%) and catch(64%) of grayling occurs in waters adjacent to the Dalton Highway. The highway corridor also accounted for nearly 60% of the total fishing effort (days fished) during the last decade.

Fishery Objectives

Fishery objectives for these remote fisheries are identical to general objectives listed in the first chapter of AYKMA report. These objectives are: harvest within sustainable limits, maintenance or enhancement of fishing opportunity, improving physical access, and cost effectiveness of programs and activities.

Table 12.-Sport fishing effort, and harvest and catch of principal species in the North Slope sub-area.

Year	Angler-Days		Lake Trout		Char		Arctic Grayling	
	Total	Haul Road[a]	Total	Haul Road	Total	Haul Road	Total	Haul Road
			Harvest					
1977	2,434		88		241		1,239	
1978	1,422		9		181		678	
1979	1,526		264		364		1,382	
1980	2,142		379		827		1,765	
1981	2,601		454		1,188		2,904	
1982	4,879		629		2,065		4,077	
1983	5,738	911	367	31	2,966	105	2,884	524
1984	8,344	1,620	481	416	1,507	351	2,441	1,247
1985	4,490	1,558	1,707	37	3,489	296	5,382	2,078
1986	4,779	842	415	-	983	322	4,099	907
1987	5,256	2,278	274	50	2,676	1,560	1,932	1,065
1988	2,541	1,265	73	73	1,018	327	983	528
1989	4,118	1,266	482	149	1,031	241	2,113	993
1990	3,764	2,502	168	118	489	219	791	554
1991	7,291	3,535	176	-	1,199	640	3,301	1,921
1992	4,940	2,211	379	293	836	336	1,145	324
1993	5,600	3,421	106	57	1,092	623	1,632	547
1994	5,407	2,926	73	73	589	451	807	371
1995	5,644	3,275	38	38	896	437	983	579
1996	6,205	3,524	18	-	887	426	753	253
1997	5,987	3,800	40	40	741	367	1,071	373
Average								
1977-86	3,836		479		1,381		2,685	
%			9[b]		27[b]		52[b]	
1987-97	5,159	2,728	166	81	1,041	512	1,410	683
%		53[b]	6[b]	49[c]	38[b]	49[c]	52[b]	48[c]
1993-97	5,769	3,389	55	42	841	461	1,049	425
%		59[b]	3[b]	76[c]	41[b]	55[c]	51[b]	40[c]

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Table 12.-Page 2 of 2.

Year	Angler-Days		Lake Trout		Char		Arctic Grayling	
	Total	Haul Road[a]	Total	Haul Road	Total	Haul Road	Total	Haul Road
			Catch					
1990			1,728	1,225	3,744	1,141	5,842	3,240
1991			932	161	2,670	1,635	9,200	4,668
1992			887	556	3,850	1,769	6,608	2,135
1993			266	180	3,946	2,454	9,345	5,505
1994			327	316	3,178	2,371	8,552	5,165
1995			370	319	3,229	1,780	5,427	3,828
1996			781	763	4,811	3,778	6,286	3,608
1997			110	76	2,881	1,462	13,163	7,364
Average								
1990-97			675	450	3,539	2,049	8,053	4,439
%			5[b]	67[c]	28[b]	58[c]	64[b]	55[c]
1993-97			371	331	3,609	2,369	8,555	5,094
%			3[b]	89[c]	28[b]	66[c]	66[b]	60[c]

[a] Lake and streams accessible from the Dalton Highway (includes Prudhoe Bay streams, shoreline, and Sag River tributaries).

[b] Percent (%) of all north slope fish.

[c] Percent (%) of all north slope fish from the Haul Road.

Recent Board of Fisheries Action

In 1994, 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. This action was taken in response to increases in recreational use with the opening of the entire length of the Dalton Highway in 1994 and the potential for increased harvest (Burr et al. 1998).

Recent Fishery Performance

Sport fishing effort is light, averaging less than 6,000 angler days during recent years (Table 12). Total harvest of grayling from the North Slope has on average decreased in the last decade. Estimated harvests in 1995-1997 were 983, 753, and 1,071grayling compared with an average of 1,410 fish for the 1987-1997 period. In contrast to harvest, estimates of catch of this species have generally increased; the estimate from 1997 of 13,163 grayling is the highest on record (Table 12).

The proportion of fishing effort occurring on waters adjacent to the Dalton Highway has increased to 65% during the last five-year period. The harvested of grayling from the Dalton Highway area has decreased to 40% of the North Slope total during this period. In contrast, total catch of grayling from waters adjacent to the highway increased during this period to 60% of the sub-area's catch of the species.

Current Issues

No issues concerning Arctic grayling in the North Slope sub-area have been identified.

Recommended Research and Management Activities

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

DOLLY VARDEN/ARCTIC CHAR

Fishery Description and Historical Perspective

In the AYKMA, Arctic char occur in lakes in the Brooks Mountain Range and in some headwater lakes in the Kuskokwim River drainage. Dolly Varden, a closely related species are common inhabitants of most large rivers on the North Slope in most drainages of the eastern coastal plain from the Canadian Border to the Colville River. The specie is widely distributed throughout the Kuskokwim and Yukon drainages as well. The Department groups Dolly Varden and Arctic char together for regulatory purposes. However, the two species have distinct life history traits. Distribution of Arctic char is very limited in the AYKMA and the vast majority of fisheries are directed toward Dolly Varden. For the purposes of the following discussion this species complex will be referred to as "char"

In most of the AYKMA char provide a minor contribution to the total catch and harvest in comparison to other species. In the Kuskokwim, Yukon and North Slope reporting areas used by the SWHS, char is second only to Arctic grayling among freshwater fish in terms of the catch and harvest (Table 2). This group contributes 13% of the harvest and 22% of the catch from these three areas. However, most of this catch and harvest comes from the lower portion of the Kuskokwim drainage. In recent years while the Kuskokwim drainage accounted for more than 60% of the harvest and 85% of catch of char from the SWHS, estimates from the upper Kuskokwim (upstream of the Aniak River) contributed only 6% of the harvest and 4% of the catch to the Kuskokwim drainage totals. In the Yukon drainage char contribute only about 5% of the catch and harvest to the total numbers in the drainage. In contrast to the Yukon and Upper

Kuskokwim portions of AYKMA, char are a major component of the catch and harvest in the North Slope area contributing nearly 40% of the harvest and 30% of the catch (Table 12, Appendix B3).

In the Kuskokwim and Yukon sub-areas most sport fishing for Dolly Varden occurs during the summer season. On the North Slope most sport fisheries for char target overwintering populations of Dolly Varden either in the fall as the fish return to freshwater from the sea, or in the spring as they move toward the sea to feed.

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

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

Aerial surveys of an index area in the Ivishak River were initiated in 1971 and attempted annually through 1984 as a means of monitoring changes in this stock. The number of char counted in the Ivishak index area ranged from about 8,000 to as many as 36,000 in the 12 years the survey was conducted (Appendix D). In 1989, 1993, and 1995 the survey was again conducted; counts were and 12,650, 3,057, and 27,036 char. The low estimate from 1993 was conducted at least two weeks earlier than other counts and it is likely that many of the fish had not completed the upstream migration. The most recent count of 27,036 is similar to counts obtained between 1979 and 1984.

In the Anaktuvuk River drainage, an index area was established in 1979 and annual counts were attempted through 1984 (Appendix D). Counts ranged from 15,717 to 5,462, declining each year. In 1989 anecdotal reports from local residents and long-time users of this stock indicated that the fish were not present in traditional areas including the overwintering/spawning area near Rooftop Ridge (index area). The primary users of char from this area are Barrow residents that fly into a nearby privately owned airstrip. ADF&G personnel planned to conduct an aerial survey of the Anaktuvuk River in 1989 but the survey was not conducted due to weather conditions. No survey of the Anaktuvuk River char stock has been completed since 1984. Recently, anecdotal reports from local users indicate that the numbers of char in the Anaktuvuk River have returned to “normal” levels in traditional areas.

The Kongakut River is a popular destination for float trips in the eastern most part of the Arctic National Wildlife Refuge (ANWR). Concern by refuge staff and members of the public over perceived declines in the number of char available during summer resulted in a joint project to

assess this stock. In 1995, the project attempted to estimate abundance of char in a section of the river. However, too few fish were captured during the summer sampling period. ADF&G conducted an aerial survey in September of 1995 to determine if there had been a substantial decrease in the number of spawning and overwintering fish that were using the river. The count in 1995 was 14,080 substantially greater than the other two estimates available (Appendix D).

Fishery Objectives

Fishery objectives for these remote fisheries are the general objectives listed in the first chapter of AYKMA report. These objectives are: harvest within sustainable limits, maintenance or enhancement of fishing opportunity, improving physical access, and cost effectiveness of programs and activities.

Recent Board of Fisheries Action

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.

Recent increases in use of the Kuskokwim drainage by guided fishermen has resulted in more restrictive regulations for the middle and lower portions of the drainage. In 1997 the BOF adopted a five fish bag limit but removed the size limit flowing waters in the Kuskokwim drainage downstream of the Holitna River. A more restrictive limit of three fish (without size limit) was adopted for the Holitna River and for three Kuskokwim Bay streams (Kanektok, Arolik, and Goodnews rivers). Summaries of proposals and actions by the BOF as given in Appendix A.

Recent Fishery Performance

In the Yukon sub-area estimates of harvest of char have in general declined in the last three years relative to estimates since 1987. In 1995, 1996, and 1997 estimated harvests were 122, 575, and 251 char compared with the average annual harvest sine 1987 of 508 fish (Appendix B1). Catch estimates from 1995, 1996, and 1997 were 751, 1,345 and 758 fish compared to an average annual catch of 2,584 char since 1990 for the drainage (Appendix B1). The sport use of char in the Yukon drainage continues to be light and is unlikely to change in the next few seasons.

Estimates of catch and harvest of char from the upper portion of the Kuskokwim drainage continue to indicate limited use by sport anglers. Estimates of harvest in the last three years (78, 71, and 232 fish) are similar to the average annual harvest of char since 1987 (157 fish) although the estimate for 1997 is the highest since 1991 (Table 7). Catch estimates from the last three years averaged 1,273 with the estimate for 1997 higher than other available estimates (Table 8). Increases in catch of char in this portion of the Kuskokwim are likely to be the result of incidental catch associated with increases in the guided sport fishery for chinook and coho salmon. Assuming that the salmon fisheries continue to grow, a parallel increase in char catch is anticipated.

Estimates of catch and harvest from the North Slope sub-area in 1995, 1996 and 1997 indicate a stable level of use. Estimates of harvest in the last three years (896, 887, and 741 fish) are slightly less than the average annual harvest of char since 1987 (1,041 fish). Catch estimates from 1995, 1996, and 1997 were 3229, 4,811, and 2,881 fish compared to an average annual catch of 3,539 char since 1990 for the area (Table 12).

A large increase in fishing effort and catch of char and the other two key sport species (Arctic grayling and lake trout) was anticipated with the opening of the entire length of the Dalton Highway to public travel in 1994. To date estimates from the SWHS do not indicate that this has occurred (Table 12). The percentage of fishing effort contributed to the North Slope area by the road corridor during the last three years was 59% compared with an average of 53% since 1987. The percentages of harvest and catch from the Dalton Highway averaged for 1995-1997 were 49% of the harvest and 61% of the catch compared with the longer term averages of 49% and 58%.

As suggested earlier, the remote nature and harsh weather conditions of the North Slope area will likely limit expansion of sport fisheries except along the Dalton Highway. Recent information does not indicate a significant amount of growth in the North Slope fisheries. Anecdotal reports from oil field workers and observations by other state personnel indicate that in 1998 the amount of sport fishing effort directed at char along the causeways in Prudhoe Bay and at migrating char in the Sagavanirktok River near the Dalton Highway increased.

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.

Oil and gas development adjacent to and within the migration routes of char in North Slope carries the potential for serious impacts through contamination of habitat. Char using the Sagavanirktok drainage pass through Prudhoe Bay, one of the most heavily industrialized areas in Alaska. Current plans for oil and gas leases in the foothill region of NPRA are of particular concern. These new lease areas include the critical overwintering/spawning habitat in the spring areas of the Anaktuvuk River drainage.

Recommended Research and Management Activities

The annual aerial counts in the Ivishak and Anaktuvuk index areas should be reestablished with the goal of monitoring changes in these populations. These char stocks are vulnerable to degradation of habitat from industrial development. Results for 1998 from the statewide harvest survey will be closely examined for changes in the level of use of Prudhoe Bay and the Sagavanirtok River that have been indicated by anecdotal reports.

OTHER AYKMA SPORT FISHERIES

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

Fishery Description and Historical Perspective

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 km^2, Philo and Moulton 1993) in the Arctic coastal plain, about 100 km southeast of Barrow.

Lake trout are a long lived, slow growing, and late maturing species, and the 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). Trophy lake trout weighing 8.7 kg (20 lb.) or more, are typically 20 years old. These life history features combined with the short growing season at higher latitudes and altitudes increases the vulnerability of the species to overharvest.

Fishery Objectives

Fishery objectives for these remote fisheries are the general objectives listed in the first chapter of AYKMA report. These objectives are: harvest within sustainable limits, maintenance or enhancement of fishing opportunity, improving physical access, and cost effectiveness of programs and activities.

Sport Division uses a harvest threshold as an indicator of lakes where harvest of lake trout maybe approaching excessive levels (Burr 1992). Studies in Canada (Payne et al. 1991) have suggested that, on average, lakes are unlikely to sustain yields in excess of 0.5 kg / hectare / year. ADFG uses estimates from the SWHS monitor harvests from area lakes and highlights those lakes approaching the threshold level for investigation.

Recent Board of Fisheries Action

The BOF adopted a catch-and-release only regulation for lake trout within the Dalton Highway corridor in 1994. Most of the harvest of lake trout from the North Slope area had been coming from less than a dozen lakes within the corridor.

Recent Fishery Performance

The sport fishery for lake trout in the AYKMA as a whole is currently quite limited. Harvest in 1995, 1996 and 1997 for the entire AYMMA totaled 319, 144 and 481 fish. Harvests for the AYK Management Area since 1977 have ranged from about 2,200 fish in 1985 to a low of 172 in 1994 (Table 2). Harvests in the most recent five year period (1993-1997) averaged about 300 lake trout. During this period about two-thirds of the harvest has come from waters of the Kuskokwim survey area with the remaining harvest roughly divided between the North Slope and the Yukon areas (Appendix B1-B3). However in recent years very little of the harvest of lake trout from the Kuskokwim area has come from waters in the upper portion of the drainage (Howe et al. 1994-1998). In the last three-year period, the upper Kuskokwim has contributed only 8% of the harvest and 3% of the catch of lake trout to the Kuskokwim survey area (Tables 7, 8).

In the North Slope sub-area, lake trout are one of three key species sought by sport fishermen (Appendix B3). Prior to the no-harvest regulation that was adopted for the Dalton corridor in 1994, harvest of lake trout from this roadway made up about 50% of total for the North Slope (Table 12). Less than a dozen lakes within this corridor contain populations of lake trout. Although legal harvest of the species within the Dalton Highway corridor has been eliminated, the proportion of the catch of lake trout from the corridor has on average continued to increase. Prior to the 1995 season, catch of lake trout from the corridor was 63% of the North Slope total; 84% of the total catch has come from the corridor since that time.

Current Issues

Lake trout inhabiting lakes within the Dalton Highway corridor are considered to be especially vulnerable to overexploitation.

Recommended Research and Management Activities

Studies of lake trout populations in lakes within the Dalton Highway corridor have been conducted in recent years (Burr 1989, Burr 1995). These studies found unexpectedly low density of lake trout in lakes within the Dalton corridor. The catch and release regulation that is in effect for the Dalton Highway corridor was proposed because of these results.

More recently, studies of lake trout populations accessible by short flights with float-equipped aircraft have found populations with higher densities and population characteristics which do not indicate overexploitation (Taube 1996, Taube et al. 1997). It should be noted however, that these remote populations are slower growing and are unlikely to sustain levels of harvest supported by lake trout in more productive regions.

National Park Service (NPS) personnel have witnessed increases in visitor use of large lakes in Gates of the Arctic National Park. Local subsistence users of some of these lakes have raised concerns over perceived increases in lake trout and Arctic char harvests. NPS staff have requested that ADFG consider possible joint projects with the federal agencies to assess these stocks. If federal funding is made available, this type of program could provide desired information on important area lake trout populations.

SHEEFISH

Fishery Description and Historical Perspective

Sheefish are large, predatory whitefish found throughout western, interior, and northwestern Alaska. In the AYKMA they do not occur in streams of the North Slope. Alt (1987) recognized distinct stocks of sheefish, with anadromous-estuarine stocks occurring in the Kuskokwim, and lower Yukon, 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. 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. Recent information based on radio telemetry, Floy tagging and on micro-chemical analysis of sheefish otoliths, indicates that sheefish in the mainstem of the Yukon River migrate upstream in September to a spawning area in the Yukon Flats near the village of Circle (Brown 1998). At

least some of these fish travel downstream all the way to the Yukon River Delta to overwinter. It is not certain that spawning grounds have been identified for all major sheefish stocks.

Sheefish are harvested by subsistence, commercial, and sport users with subsistence harvests exceeding all others. In the AYKMA most (>60%) of the sport harvest of sheefish comes from the Yukon River drainage (Table 2, Appendix B1, B2).

The sport fishery for sheefish in the upper portion of the Kuskokwim drainage is growing along with general increased interest in the area by guided anglers. The Holitna River has historically supported a popular fishery for sheefish in the early part of the summer. Sheefish concentrate in the lower Holitna to feed on out-migrating chum salmon.

Fishery Objectives

Fishery objectives for these remote fisheries are: harvest within sustainable limits, maintenance or enhancement of fishing opportunity, improving physical access, and cost effectiveness of programs and activities.

Recent Board of Fisheries Action

Very liberal fishing regulations have been in place for the area in recognition of its remote nature and the minimum level of sport fishing effort exacted. In 1997 a proposal was submitted to the BOF seeking a reduction in bag limit and imposition of a maximum size limit for sheefish in the Holitna River. As a result of this proposal and because of wide spread concern by residents of the Kuskokwim area over increased sport fishing presence, the BOF adopted more restrictive regulations for sheefish for the middle and lower portions of the Kuskokwim drainage including the Holitna River. In 1997 the BOF adopted a five fish bag limit for the Kuskokwim drainage downstream of the Holitna River. A more restrictive limit of two fish was adopted for the Holitna River and for three Kuskokwim Bay streams (Kanektok, Arolik, and Goodnews rivers). Summaries of proposals and actions by the BOF as given in Appendix A.

Recent Fishery Performance

During the most recent five-year period (1993-1997), the sport harvest in the Kuskokwim has ranged from 20 to 495 fish and has averaged 246 fish (Appendix B2). Estimates of catch have averaged about 1,500 (295 to 2,990) sheefish in the 1993-1995 period. Catch in the drainage as a whole appears to be increasing. The upper Kuskokwim (waters upstream from the Aniak River) accounts for about half of the catch and harvest from the Kuskokwim survey area (Tables 7, 8). Most of this comes from the Holitna River drainage. In the last three years the 74% of the harvest and 85% of the catch from the Upper Kuskokwim portion of the drainage has come from the Holitna River. These data reflect the growing fishery in the Holitna River drainage. The estimated catch in 1997 from the Holitna River is the highest on record. Increases in catch of sheefish in this portion of the Kuskokwim are likely to be the result of opportunistic fishing by anglers participating the guided sport fishery for chinook and coho salmon. Assuming that the salmon fisheries continue to grow, a parallel increase in sheefish catch is anticipated.

The average sport harvest from the Yukon River during the most recent five-year period (1993-1997), was 415 fish (326 – 476). Estimates of catch have averaged nearly 1,500 (1,017 to 2,127) sheefish in the 1993-1995 period (Appendix B1). Popular fisheries for this species are located in the Nowitna, Innoko and Porcupine drainages. Recent data do not indicate a shift in the geographical distribution of sheefish fisheries.

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Current Issues

Long term users and residents of the Holitna River area have expressed concern over increased harvest of large sheefish.

Recommended Research and Management Activities

Fisheries for sheefish in the Yukon and Kuskokwim sub-areas are generally light and wide spread. Other than in the Holitna River area, the fisheries do not appear to be concentrated and no potential conservation concerns have been recognized. The Holitna fishery will be monitored along with sport fisheries for chinook and coho salmon, northern pike and Dolly Varden.

New information on the spawning area in the Yukon Flats may provide an opportunity for a new late season trophy sheefish fishery. On site investigation of the general area identified by radio telemetry should be conducted to delineate the spawning areas.

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APPENDIX A

Appendix A1.-Summary of Proposals for AYK Fisheries before the Alaska Board of Fisheries, December 2 – 9, 1997

Proposal Number 193. 5 AAC 70.022. WATERS; SEASONS; BAG, POSSESSION, AND SIZE LIMITS; AND SPECIAL PROVISIONS. 5AAC 01.225 (a)(1)(B). WATERS CLOSED TO SUBSISTENCE FISHING.

Proposal 193 would restrict the sport fishing season to the period July 10 through September 10, reduce the bag and possession limit to two fish of any species, require the retention of the first two fish caught, and rescind the Dall River subsistence fishery closure.

Proposed by: The Native Village of Stevens

Amendments: Amended to take no action **except** to repeal the current subsistence closure.

Discussion: Staff presented testimony that that research conducted by ADFG in 1988 and 1989 and again in 1995 found that the Dall River northern pike population was subjected to only light fishing pressure, that growth in the fishery is currently modest and that current levels of exploitation were within sustainable limits. In the absence of evidence of a conservation concern, the board took no action on the portion of the proposal to restrict sport fishing regulations. The staff testified to the board the there was no objection to re-opening the Dall River to subsistence fishing.

BOF Action: Adopted as amended

Proposal Number 194. 5 AAC 70.022. WATERS; SEASONS; BAG, POSSESSION, AND SIZE LIMITS; AND SPECIAL PROVISIONS.

Proposal 194 would eliminate the northern pike bag and possession limits and create a catch-and-release only fishery for northern pike.

Proposed by: Yukon Flats Fish and Game Advisory Committee.

Amendments: none.

Discussion: Refer to Proposal 193.

BOF Action: no action because of Proposal 193.

-continued-

Proposal Numbers 215, 216, and 217: (5 AAC 70.022. WATERS; SEASONS; BAG, POSSESSION, AND SIZE LIMITS; AND SPECIAL PROVISIONS)

These three proposals would reduce the allowable harvest of three fish species in the Holitna River drainage. **Proposal 215** would reduce the bag and possession limit for northern pike to one pike, or less. **Proposal 216** would reduce the bag and possession limit for king salmon to two fish, no size limit. **Proposal 217** would reduce the bag and possession limit for sheefish to two, 12 pounds or less.

Proposed by: Nick Mellick Jr.

Amendments: The subjects of these three proposals were covered by Board Proposal B

Discussion: Staff presented testimony that current data (up to 1996) on fishing effort, harvest and catch of these three species did not indicate dramatic increases in these fisheries. However there was no information from the most recent fishing season and local reports indicated that the fishery was growing rapidly as a result of increased sport fish guiding activity. ADFG suggested a modest reduction in bag and possession limits as a conservative approach since current information was not available.

BOF Action: No action (covered by Board Proposal Band D)

-continued-

RC 99

SUBSTITUTE LANQUAGE FOR BOARD PROPOSAL B

Submitted by
Kuskokwim Sport Fishery Committee

5 AAC 70.022(a) is amended as follows:

5 AAC 70.022. WATERS; SEASONS; BAG, POSSESSION, AND SIZE LIMITS; AND SPECIAL PROVISIONS.

(a) .....

(1) In the Kuskokwim River drainage downstream of a point located one quarter mile upstream of the confluence of the Kuskokwim River with the Holitna River, and in all waters draining into Kuskokwim Bay south of the Kuskokwim River, the bag and possession limit for northern pike is five fish, only one may be larger than 30 inches in length.

(2) In the Kuskokwim River drainage downstream of a point located one quarter mile upstream of the confluence of the Kuskokwim River with the Holitna River, and in all waters draining into Kuskokwim Bay south of the Kuskokwim River, the bag and possession limit for sheefish is five fish, no size limit.

(3) In the Kuskokwim River drainage downstream of a point located one quarter mile upstream of the confluence of the Kuskokwim River with the Holitna River, and in all waters draining into Kuskokwim Bay south of the Kuskokwim River, the bag and possession limit for Arctic grayling is five fish, no size limit.

(4) In the flowing waters of Kuskokwim River drainage downstream of a point located one quarter mile upstream of the confluence of the Kuskokwim River with the Holitna River, and in all waters draining into Kuskokwim Bay south of the Kuskokwim River, the bag and possession limit for Dolly Varden/Arctic Char is five fish, only 1 over 20 inches in length.

(5) In the Holitna, Kanektok, Arolik, and Goodnews drainages, the daily bag and possession limits are:
   a. Sheefish is two, no size limit;
   b. Arctic grayling is two, no size limit;
   c. Dolly Varden\Arctic Char is three, no size limit.

-continued-

RC 74

BOARD PROPOSAL D

Submitted by
Kuskokwim Sport Fishery Committee

5 AAC 70.022(a) is amended as follows:

5 AAC 70.022. WATERS; SEASONS; BAG, POSSESSION, AND SIZE LIMITS; AND SPECIAL PROVISIONS.

(a) .....

1. In the Kuskokwim River drainage downstream of a point located one quarter mile upstream of the confluence of the Kuskokwim River with the Holitna River, and in all waters draining into Kuskokwim Bay south of the Kuskokwim River, king salmon may only be taken from May 1 through July 25.

-continued-

Proposal Numbers 218 and 219: (5 AAC 70.022. WATERS; SEASONS; BAG, POSSESSION, AND SIZE LIMITS; AND SPECIAL PROVISIONS)

This set of proposals would create the Holitna-Hoholitna Navigable River Drainage Controlled Use Area. **Proposal 218** would restrict the size of motors on boats used in the sport fishery to 40 horsepower or less. **Proposal 219** would restrict the size of aircraft used to transport anglers, fish, fish parts, fishing gear or equipment into or out of the area to six manufacturers seats or less.

Proposed by: Nick Mellick Jr.

Amendments: none

Discussion: The issue that these proposals seek to address is increased use by non-local anglers. The potential conservation concerns in the Holitna drainage were address by reduction in bag limits. Comments by the Department of Law indicated that the Board of Fisheries would need justification based on fishery concerns. Without fishery concerns, the BOF is unlikely able to limit means of access.

BOF Action: No action

Appendix A2.-Board proposal for the Yukon River Coho Salmon Management Plan.

5 AAC 05.369. YUKON RIVER COHO SALMON MANAGEMENT PLAN.

(a) The goal of this plan is to provide for the management of directed commercial coho salmon fishing in the Yukon River. The majority of Yukon River coho salmon spawn in tributaries that flow into the Yukon River from the mouth of the Yukon River up to and including the Tanana River drainage. The management of directed coho salmon fishing during the fall season is complicated by an overlapping run of more abundant fall chum salmon stocks.

(b) For the purpose of (c) of this section, the department shall use the best available information to assess coho salmon abundance including mainstem river sonar passage estimates, test fisheries indices, subsistence and commercial fishing reports, and estimates from escapement monitoring projects.

(c) The department may allow a directed coho salmon fishery under this section in years when

(1) the return of coho salmon measured under (b) of this section is above the average of previous years;
(2) the fall chum salmon return is assessed by the department to be more than 625,000 fish; and
(3) no directed fall chum salmon commercial fishing has occurred or the department determines that it is not expected to occur.

(d) Fall chum salmon harvested during a directed commercial coho salmon fishery under this section will be considered incidental any may only occur on the harvestable surplus of fall chum salmon above 625,000 fish.

(e) In a year when a directed commercial coho salmon fishery is opened under this section in

(1) Districts 1, 2, and 3, the commissioner shall close, by emergency order, the coho salmon fall season no later than September 5;
(2) Subdistricts 4-B, 4-C, and 5-A, and District 6, the commissioner shall close, by emergency order, the coho salmon fall season no later than October 5;
(3) Subdistrict 4-A, the commissioner may open, by emergency order, the directed commercial coho salmon fishery on or after August 20, and shall close the fishery no later than September 15.

(f) In Subdistrict 5-B, 5-C, and 5-D there will be no directed commercial coho salmon fishery unless the department determines that there will be a harvestable surplus of coho salmon.

(g) The department shall distribute, to the extent practicable, the harvest opportunity in the directed coho salmon fishery between districts and subdistricts as follows:

-continued-

(1) 24 hours of combined fishing time in Districts 1, 2, and 3 will be considered equal to 32 hours of fishing time in

(A) Subdistrict 4-A;
(B) Subdistricts 4-B and 4-C combined;
(C) Subdistrict 5-A; and
(D) District 6;

(2) to ensure an orderly and conservative fishery, coho salmon fishing will be managed as follows:

(A) in Districts 1, 2, and 3 combined, fishing time shall not exceed 24 hours in a seven-day period;
(B) in District 4-A, fishing time shall not exceed 32 hours in a seven-day period;
(C) in Subdistricts 4-B and 4-C combined, fishing time shall not exceed 32 hours in a seven-day period;
(D) in Subdistrict 5-A, fishing time shall not exceed 32 hours in a seven-day period;
(E) in District 6, fishing time shall not exceed 32 hours in a seven-day period;

(h) The provisions of this section do not apply after January 1, 2001.

APPENDIX B

Appendix B1.-Yukon sub-area sport fish harvests and catches by species, 1977-1997.

Year	Total	Salmon				
		Chinook	Coho	Sockeye	Pink	Chum
Harvest						
1977	6,145	56	31	0	6	16
1978	11,792	360	163	0	93	293
1979	12,972	39	25	0	16	109
1980	15,271	15	0	0	19	0
1981	12,154	6	0	0	11	17
1982	15,562	22	139	0	41	82
1983	15,208	0	52	0	0	349
1984	12,515	13	0	0	78	0
1985	9,970	12	12	0	0	12
1986	12,761	15	161	0	98	202
1987	14,727	0	61	0	0	226
1988	14,351	91	183	0	0	546
1989	16,709	100	215	0	0	997
1990	11,938	105	228	0	0	417
1991	16,249	143	430	180	0	449
1992	13,408	313	551	58	27	618
1993	10,121	122	619	0	0	193
1994	11,439	410	728	0	0	90
1995	9,306	37	162	0	0	189
1996	8,761	49	247	0	0	95
1997	9,787	35	132	0	0	167
Averages						
1977-86	12,435	54	58	0	36	108
%		0.4	0.5	0.0	0.3	0.9
1987-97	12,436	128	323	22	2	362
%		1.0	2.6	0.2	0.0	2.9
1993-97	9,883	131	378	0	0	147
		1.3	3.8	0.0	0.0	1.5
Catch						
1990	64,317	199	533	0	0	2,149
1991	50,713	316	859	205	77	1,839
1992	45,314	1,242	1,329	107	155	1,960
1993	47,027	640	1,023	9	0	1,224
1994	38,009	510	1,109	9	0	351
1995	34,277	177	542	0	0	734
1996	40,722	182	297	0	0	332
1997	41,037	158	327	0	0	481
Averages						
1990-97	45,177	428	752	41	29	1,134
%		0.9	1.7	0.1	0.1	2.5
1993-97	40,214	333	660	4	0	624
%		0.8	1.6	0.0	0.0	1.6

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Appendix B1.-Page 2 of 2.

	Non-Salmon							
Year	Lake Trout	Char	Grayling	Whitefish	Sheefish	Northern Pike	Burbot	Other Fish
Harvest								
1977	308	88	2,486	55	180	899	43	0
1978	262	823	3,976	511	388	2,583	362	0
1979	173	531	8,273	92	271	1,446	18	0
1980	293	506	9,640	9	251	2,498	60	0
1981	302	197	6,176	18	509	2,718	219	0
1982	720	470	7,171	568	372	3,551	444	0
1983	305	856	8,014	52	259	3,318	10	10
1984	143	143	6,856	182	104	2,960	52	0
1985	485	382	4,180	315	245	2,132	210	0
1986	508	91	5,566	328	214	3,470	122	0
1987	0	541	9,054	206	128	2,492	32	0
1988	0	618	6,115	610	656	3,526	18	0
1989	272	726	7,491	245	757	3,516	367	34
1990	220	391	4,961	322	323	2,474	507	0
1991	434	675	5,570	422	1,341	4,454	160	0
1992	193	672	4,171	248	553	3,590	422	0
1993	101	528	3,330	173	436	2,347	279	0
1994	59	488	4,574	89	391	1,968	145	503
1995	66	122	3,421	82	476	1,937	216	603
1996	0	575	3,728	0	326	1,690	9	46
1997	0	251	3139	202	446	2,923	239	256
Averages								
1977-86	350	409	6,234	213	279	2,558	154	1
%	3	3	50	2	2	21	1	0
1987-97	122	508	5,050	236	530	2,811	218	131
%	1	4	41	2	4	23	2	1
1993-97	45	393	3,638	109	415	2,173	178	282
%	0	4	37	1	4	22	2	3
Catch								
1990	914	2,842	34,299	914	2,251	17,717	509	0
1991	757	5,202	23,458	459	1,495	13,895	160	0
1992	741	3,744	17,300	349	1,569	14,801	25	0
1993	196	4,249	21,420	302	2,127	13,502	342	0
1994	177	1,779	15,951	301	1,121	11,694	152	2,861
1995	155	751	11,454	109	1,335	15,828	288	909
1996	0	1,345	19,891	0	1,463	14,389	18	809
1997	0	758	16,401	202	1,017	18,820	354	522
Averages								
1990-97	368	2,584	20,022	330	1,547	15,081	231	638
%	0.8	6	44	0.7	3	33	0.5	1
1993-97	106	1,776	17,023	183	1,413	14,847	231	1,020
%	0.3	4	42	0.5	4	37	0.6	3

Appendix B2.-Kuskokwim sub-area sport fish harvests and catches by species, 1977-1997.

		Salmon				
Year	Total	Chinook	Coho	Sockeye	Pink	Chum
Harvest						
1977	9,209	130	412	69	95	225
1978	10,761	269	403	85	836	741
1979	12,860	361	512	110	0	373
1980	16,869	863	2,014	112	93	603
1981	14,701	1,014	583	117	6	1,107
1982	29,989	1,099	52	420	347	2,035
1983	33,776	1,962	1,910	261	420	1,195
1984	16,271	1,221	3,623	299	273	896
1985	12,678	1,080	1,156	149	0	423
1986	12,737	987	3,232	420	72	973
1987	14,859	981	4,819	419	18	656
1988	23,189	2,456	4,492	746	892	836
1989	23,111	2,147	4,282	291	191	2,213
1990	11,551	897	1,358	620	347	749
1991	15,099	786	2,087	514	36	647
1992	11,192	1,046	2,033	189	219	927
1993	15,640	1,674	2,056	715	27	731
1994	16,059	2,148	2,978	894	126	1,626
1995	11,192	1,328	2,771	277	16	455
1996	15,898	2,439	5,231	752	167	517
1997	18,855	3,039	5,565	587	77	289
Averages						
1977-86	16,985	899	1,390	204	214	857
%		5	8	1	1	5
1987-97	16,059	1,722	3,425	546	192	877
%		11	21	3	1	5
1993-97	15,529	2,126	3,720	645	83	724
%		14	24	4	1	5
Catch						
1990	80,121	3,230	6,184	3,644	7,332	5,853
1991	82,247	2,621	6,538	3,528	741	3,491
1992	67,028	4,752	2,785	1,791	9,262	7,525
1993	112,252	9,684	8,390	3,637	1,132	10,741
1994	79,511	3,370	5,564	4,898	4,516	11,848
1995	75,462	7,271	8,990	1,364	310	9,693
1996	128,956	14,283	18,162	4,599	3,217	17,118
1997	217,854	20,910	25,607	4,685	1,118	11,045
Averages						
1990-97	105,429	8,265	10,278	3,518	3,454	9,664
%		8	10	3	3	9
1993-97	122,807	11,104	13,343	3,837	2,059	12,089
%		9	11	3	2	10

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Appendix B2.-Page 2 of 2.

	Non-Salmon										
Year	Lake Trout	Char	Rainbow Trout	Grayling	Whitefish	Sheefish	Northern Pike	Burbot	Smelt	Halibut	Other Fish
Harvest											
1977	124	1,615	220	2,461	166	253	962	183			317
1978	172	1,121	362	2,912	261	163	554	0			904
1979	218	1,451	318	5,256	327	283	1,581	73			18
1980	267	973	664	5,489	275	351	2,556	586			43
1981	117	1,579	982	4,362	349	374	1,698	432			0
1982	464	3,124	755	6,149	826	560	3,220	1,358			7,598
1983	419	4,562	1,678	7,365	3,178	828	3,231	462			4,322
1984	662	1,883	1,442	2,195	26	468	1,247	0	0	0	52
1985	34	2,168	659	1,787	175	175	1,040	35	1,750	62	0
1986	1,110	1,849	504	1,117	147	72	122	146	0	0	0
1987	28	2,090	592	2,019	91	398	606	119	0	36	0
1988	181	3,764	1,599	2,440	473	637	2346	91	248	0	0
1989	1,086	3,545	757	2,622	571	296	1,785	12	1,324	0	0
1990	72	1,797	475	1,340	88	107	231	1,125	211	144	0
1991	272	2,924	774	2,603	158	154	2,018	40	0	0	95
1992	356	802	404	545	286	292	752	169	1,136	33	11
1993	218	1,499	486	739	253	54	995	214	3,343	54	589
1994	40	1,398	229	850	183	390	828	20	2,292	45	18
1995	215	1,260	429	845	0	272	655	0	633	21	20
1996	126	1,743	567	663	20	20	344	0	1,313	0	0
1997	441	3,000	1192	1,232	317	495	515	0	28	51	30
Averages											
1977-86	359	2,033	758	3,909	573	353	1,621	328	583	21	1,325
%	2	12	4	23	3	2	10	2	3	0.1	8
1987-97	276	2,166	682	1,445	222	283	1,007	163	957	35	69
%	2	13	4	9	1	2	6	1	6	0	0
1993-97	208	1,780	581	866	155	246	667	47	1,522	34	131
%	1	11	4	6	1	2	4	0.3	10	0.2	0.8
Catch											
1990	1,091	18,789	12,436	13,790	493	316	3,449	1,125	211	188	0
1991	1,019	30,155	11,546	14,983	329	539	4,621	50	0	0	95
1992	1,426	16,229	5,540	9,539	322	638	3,878	169	1,136	33	11
1993	1,314	35,825	12,646	16,596	395	1,952	3,721	214	3,343	71	598
1994	1,861	18,320	8,258	10,930	500	628	4,383	20	2,292	45	84
1995	540	17,503	10,532	9,598	63	1,416	5,430	0	633	53	71
1996	987	28,504	16,075	18,284	137	295	3,822	0	1,313	55	109
1997	1,269	61,412	35,405	46,046	640	2,990	4,088	147	280	51	164
Averages											
1990-97	1,188	28,342	14,055	17,471	360	1,097	4,174	216	1,151	62	142
%	1	27	13	17	0.3	1	4	0.2	1.1	0.1	0.1
1993-97	1,194	32,313	16,583	20,291	347	1,456	4,289	76	1,572	55	205
%	1	26	14	17	0.3	1	3	0.1	1.3	0.0	0.2

Appendix B3.-North Slope sub-area sport fish harvests and catches by species, 1977-1997.

Year	Total	Lake Trout	Char	Grayling	Whitefish	Northern Pike	Burbot	Other Fish
Harvest								
1977	1,568	88	241	1,239	0	0	0	0
1978	868	9	181	678	0	0	0	0
1979	2,010	264	364	1,382	0	0	0	0
1980	2,971	379	827	1,765	0	0	0	0
1981	4,546	454	1,188	2,904	0	0	0	0
1982	6,771	629	2,065	4,077	0	0	0	0
1983	6,425	367	2,966	2,884	125	0	83	0
1984	5,896	481	1,507	2,441	13	0	0	1,454
1985	10,615	1,707	3,489	5,382	0	37	0	0
1986	9,386	415	983	4,099	3,776	19	94	0
1987	4,957	274	2,676	1,932	75	0	0	0
1988	2,092	73	1,018	983	18	0	0	0
1989	3,883	482	1,031	2,113	109	0	148	0
1990	1,482	168	489	791	17	0	17	0
1991	4,676	176	1,199	3,301	0	0	0	0
1992	2,403	379	836	1,145	18	0	25	0
1993	2,909	106	1,092	1,632	0	58	21	0
1994	1,880	73	589	807	58	0	353	0
1995	2,004	38	896	983	18	0	69	0
1996	1,680	18	887	753	0	0	0	22
1997	1,852	40	741	1,071	0	0	0	0
Averages								
1977-86	5,106	479	1,381	2,685	391	6	18	145
%		9	27	53	8	0	0	3
1987-97	2,711	166	1,041	1,410	28	5	58	2
%		6	38	52	1	0	2	0
1993-97	2,065	55	841	1,049	15	12	89	4
%		3	41	51	1	1	4	0
Catch								
1990	11,935	1,728	3,744	5,842	302	17	17	285
1991	12,852	932	2,670	9,200	50	0	0	0
1992	11,498	887	3,850	6,608	120	0	33	0
1993	13,905	266	3,946	9,345	192	135	21	0
1994	12,831	327	3,178	8,552	107	54	613	0
1995	9,113	370	3,229	5,427	18	0	69	0
1996	11,918	781	4,811	6,286	0	0	18	22
1997	16,429	110	2,881	13,163	254	0	21	0
Averages								
1990-97	12,560	675	3,539	8,053	130	26	99	38
%		5	28	64	1	0.2	1	0.3
1993-97	12,839	371	3,609	8,555	114	38	148	4
%		3	28	67	1	0.3	1	0.0

APPENDIX C

CHINOOK MANAGEMENT CHRONOLOGY IN THE KUSKOKWIM RIVER

Pre 1980

- Commercial fishery managed with goal of producing a harvest guideline. 2, 6 hour periods/ week.
- Sport bag limit 15 per day no size limit

1983

- Commercial fishery managed for escapement objective. Observed lowest recorded escapement index. Quality of escapement poor with sex ratio of 5 males to 1 female.

1985

- commercial fishery restricted to 6 inch gear to protect large spawning size chinook
- Sport fishery bag limit reduced to 5 chinook per day no size limit

1987

- First management plan adopted. Discontinued directed commercial fishery on chinook salmon in the Kuskokwim River . Allowed 14,000 incidental commercial catch of chinook in river.. Directed chinook fishery continues in Kuskokwim Bay in the Quinhagak District (District W-4)

1988

- Second management plan adopted. Formally eliminates commercial chinook fishery, allows 35,000 incidental commercial catch, creates Kuskokwin Working Group.
- Sport fishery bag limit reduced to 1 chinook per day no size limit

1990

- Modified management plan allows 51,000 incidental commercial catch because incidental catch composed primarily of smaller males.

1994

- Sport fishery bag limit increased to 3 per day only 2 may be 28 inches or longer.

1997

- Sport fishery season restricted to May 1 through July 25 for Kuskokwim River drainage downstream from and including the Holitna River drainage.

Recent average commercial, subsistence and sport harvests of chinook salmon in the Kuskokwim Area.

Commercial	1993-97	14,730	31
Subsistence	1993-97	90,156	68
Sport	1993-97	1,068	1

APPENDIX D

Appendix D.-Aerial estimates of Arctic char from the Ivishak, Anaktuvuk, and Kongakut rivers of the North Slope.

Year	Date	Ivishak River	Anaktuvuk River	Kongakut River	Survey Method	Survey Rating	Data Source
1971	22-Sep	24,470	-	-	H	Good	Yoshihara 1973
1972	24-Sep	11,937	-	-	H	Good	Yoshihara 1972
1973	11-Sep	8,992	-	-	H	Excellent	Furniss 1975
1974	10-Sep	11,000	-	-	H	Not Rated	Furniss 1975
1975	22-Sep	8,306	-	-	H	Not Rated	Bendock ADFG files
1976	22-Sep	8,570	-	-	H	Fair	Bendock ADFG files
1977	No survey	-	-	-			
1978	No survey	-	-	-			
1979	22-Sep	24,403	15,717	-	S	Excellent	Bendock 1980
1980	No survey	-	-	-			
1981	22-Sep	24,873	10,536	-	S	Excellent	Bendock 1982
1982	22-Sep	36,432	6,222	-	S	Excellent	Bendock 1983
1983	22-Sep	27,820	8,743	-	S	Excellent	Bendock and Burr 1984
1984	22-Sep	24,818	5,462	-	S	Excellent	Bendock and Burr1985
1985	No survey	-	-	-			
1986	No survey	-	-	8,900	?	?	Millard USFWS files
1987	No survey	-	-	-			
1988	No survey	-	-	-			
1989	22-Sep	12,650	-	6,355	H	Good	DeCicco ADFG files
1990	No survey	-	-	-			
1991	No survey	-	-	-			
1992	No survey	-	-	-			
1993	3-Sep	3,057	-	-	H	Good	Millard USFWS files
1994	No survey	-	-	-			
1995	27-Sep	27,036	-	14,080	H	Good	Burr ADFG files

H-helicopter, S-fixed-wing aircraft (Supercub).