

Fishery Management Report No. 09-07

**Fishery Management Report for Sport Fisheries in the
Kuskokwim Management Area, 2006**

by

John Chythlook

February 2009

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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

Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL			mid-eye to fork	MEF
gram	g	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye to tail fork	METF
hectare	ha			standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.		
liter	L		@	Mathematics, statistics	
meter	m			<i>all standard mathematical signs, symbols and abbreviations</i>	
milliliter	mL	at			
millimeter	mm	compass directions:			
		east	E	alternate hypothesis	H _A
Weights and measures (English)		north	N	base of natural logarithm	<i>e</i>
cubic feet per second	ft ³ /s	south	S	catch per unit effort	CPUE
foot	ft	west	W	coefficient of variation	CV
gallon	gal	copyright	©	common test statistics	(F, t, χ^2 , etc.)
inch	in	corporate suffixes:		confidence interval	CI
mile	mi	Company	Co.	correlation coefficient	
nautical mile	nmi	Corporation	Corp.	(multiple)	R
ounce	oz	Incorporated	Inc.	correlation coefficient	
pound	lb	Limited	Ltd.	(simple)	r
quart	qt	District of Columbia	D.C.	covariance	cov
yard	yd	et alii (and others)	et al.	degree (angular)	°
		et cetera (and so forth)	etc.	degrees of freedom	df
Time and temperature		exempli gratia		expected value	<i>E</i>
day	d	(for example)	e.g.	greater than	>
degrees Celsius	°C	Federal Information Code	FIC	greater than or equal to	≥
degrees Fahrenheit	°F	id est (that is)	i.e.	harvest per unit effort	HPUE
degrees kelvin	K	latitude or longitude	lat. or long.	less than	<
hour	h	monetary symbols		less than or equal to	≤
minute	min	(U.S.)	\$, ¢	logarithm (natural)	ln
second	s	months (tables and figures): first three letters	Jan, ..., Dec	logarithm (base 10)	log
				logarithm (specify base)	log ₂ , etc.
Physics and chemistry				minute (angular)	'
all atomic symbols		registered trademark	®	not significant	NS
alternating current	AC	trademark	™	null hypothesis	H ₀
ampere	A	United States (adjective)	U.S.	percent	%
calorie	cal	United States of America (noun)	USA	probability	P
direct current	DC	U.S.C.	United States Code	probability of a type I error (rejection of the null hypothesis when true)	α
hertz	Hz			probability of a type II error (acceptance of the null hypothesis when false)	β
horsepower	hp	U.S. state	use two-letter abbreviations (e.g., AK, WA)	second (angular)	"
hydrogen ion activity (negative log of)	pH			standard deviation	SD
parts per million	ppm			standard error	SE
parts per thousand	ppt, ‰			variance	
volts	V			population	Var
watts	W			sample	var

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by
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The Fishery Management Reports series was established in 1989 by the Division of Sport Fish for the publication of an overview of management activities and goals in a specific geographic area, and became a joint divisional series in 2004 with the Division of Commercial Fisheries. Fishery Management Reports are intended for fishery and other technical professionals, as well as lay persons. Fishery Management Reports are available through the Alaska State Library and on the Internet: <http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm>. This publication has undergone regional peer review.

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PREFACE

This report provides information for the Kuskokwim-Goodnews Area and is one in a series of reports annually updating fisheries management information within Region III. The report is provided for the state Board of Fisheries, Fish and Game Advisory Committees, the general public, and other interested parties. It presents fisheries assessment information and the management strategies that are developed from that information. In addition, this report includes a description of the fisheries regulatory process, the geographic, administrative, and regulatory boundaries, funding sources, and other information concerning Sport Fish Division management programs within the area.

The goals of the Sport Fish Division of the Alaska Department of Fish and Game are to protect and improve the state's recreational fisheries resources by managing for sustainable yield of wild stocks of sport fish, providing diverse recreational fishing opportunities, and optimizing social and economic benefits from recreational fisheries. In order to implement these goals the division has in place a fisheries management process.

A regional review is conducted annually during which the status of important area fisheries is considered and research needs are identified. Fisheries stock assessment research projects are developed, scheduled, and implemented to meet information needs identified by fisheries managers. Projects are planned within a formal operational planning process. Biological information gathered from these research projects is combined with effort information and input from user groups to assess the need for and development of fisheries management plans, and to propose regulatory strategies.

Sport Fish Division management and research activities are funded by State of Alaska Fish and Game (ADF&G) and federal aid in Fisheries Restoration funds. ADF&G funds are derived from the sale of state fishing licenses. Federal aid funds are derived from federal taxes on fishing tackle and equipment established by the Federal Aid in Sport Fish Restoration Act (also referred to the Dingell-Johnson Act or D-J Act). The D-J funds are provided to the states at a match of up to three-to-one with the ADF&G funds. Additional funding specified for providing, protecting, and managing access to fish and game is provided through a tax on boat gas and equipment established by the Wallop-Breaux (W-B) Act. Other peripheral funding sources may include contracts with various government agencies and the private sector.

ABSTRACT

This area management report provides information regarding the Kuskokwim-Goodnews Area and its fisheries for 2006, with preliminary information from the 2007 season. This report is organized into two primary sections: a management area overview including a description of the management area and a summary of effort, harvest and catch for the area; and a section on the significant area fisheries including specific harvest and catch by species and drainage.

Key words: Area Management Report, Kuskokwim-Goodnews Area, Alaska Board of Fisheries, Chinook salmon, coho salmon, chum salmon, sockeye salmon, rainbow trout, Dolly Varden/Arctic char, Arctic grayling, northern pike, Sheefish, lake trout, burbot.

INTRODUCTION

The Alaska Board of Fisheries (BOF) divides the state into eighteen regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47–70. Sport Fish Division of the Alaska Department of Fish and Game (ADF&G) divides the state into three administrative Regions with boundaries roughly corresponding to groups of the BOF regulatory areas. Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River drainage, Cook Inlet – Resurrection Bay Saltwater, Anchorage Bowl, Knik Arm, Susitna River drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes Upper Copper River and Upper Susitna River area and the Arctic-Yukon-Kuskokwim Region (including the North Slope, Northwestern, Yukon River, Tanana River, Kuskokwim-Goodnews regulatory areas).

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 1,146,000 km² (442,500 mi²) of land, some of the state's largest river systems (the Yukon, the Kuskokwim, the Colville, Noatak, Upper Copper and Upper Susitna River drainages), thousands of lakes and thousands of miles of coastline and streams. Regional coastline boundaries extend from Cape Newenham in the southwest, around all of western, northwestern and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River Valley. Fairbanks (population about 30,000) is the largest community.

For administrative purposes Sport Fish Division has divided Region III into six fisheries management areas (Figure 1). They are:

The Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);

The Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);

The Upper Copper/Upper Susitna Management Area (the Copper River drainage upstream of Canyon Creek and Haley Creek, and the Susitna River drainage above the Oshetna River);

The Upper Tanana River Management Area (the Tanana River drainage upstream from Banner Creek and the Little Delta River);

The Lower Tanana River Management Area (the Tanana River drainage downstream from Banner Creek and the Little Delta River); and,

The Kuskokwim Management Area (the entire Kuskokwim River drainage and Kuskokwim Bay drainages).

Area management biologists for the six areas are located in Nome/Fairbanks, Fairbanks, Glennallen, Delta Junction, Fairbanks, and Bethel/Fairbanks, respectively.

THE ALASKA BOARD OF FISHERIES

The Alaska Board of Fish (BOF) is a seven-member board that sets fishery regulations and harvest levels, allocates fishery resources, and approves or mandates fishery conservation plans for the State of Alaska. Board members are appointed by the governor for three-year terms and must be confirmed by the legislature.

Statewide fisheries issues may be considered at any BOF meeting. Under the current operating schedule, the BOF considers fishery issues for regulatory areas or groups of regulatory areas on a 3-year cycle. Proposals to create new or modify existing regulations and management plans are submitted by ADF&G and the public (any individual can submit a proposal to the BOF) for evaluation by the BOF. During its deliberations the BOF receives input and testimony through oral and written reports from ADF&G staff, members of the general public, representatives of local fish and game advisory committees, and special interest groups such as fishermen's associations and clubs. The public provides their input concerning regulation changes and allocation through submission of written proposals and testifying directly to the BOF, by participating in local fish and game advisory committee meetings, or by becoming members of local fish and game advisory committees.

ADVISORY COMMITTEES

Local Fish and Game Advisory Committees have been established throughout the state to assist the Boards of Fish and Game in assessing fisheries and wildlife issues and proposed regulation changes. Advisory committee members are nominated from the local public and voted on by all present during an advisory committee meeting. Most active committees in urban areas meet in the fall and winter on a monthly basis. Rural committees generally have only one fall and one spring meeting due to funding constraints. Advisory meetings allow opportunity for direct public interaction with department staff attending the meetings that answer questions and provide clarification concerning proposed regulatory changes regarding resource issues of local and statewide concerns. The Boards Support Section within the Division of Administration provides administrative and logistical support for the BOF and Fish and Game Advisory Committees. During 2006, the department had direct support responsibilities for 81 advisory committees in the state.

Within the Kuskokwim-Goodnews Management Area there are five advisory committees, the Lower Kuskokwim, Central Bering Sea, Central Kuskokwim, Stony-Holitna, and McGrath committees. In addition, Lower Yukon and Togiak advisory committees often comment on proposals concerning Kuskokwim-Goodnews fisheries.

RECENT BOARD OF FISHERIES ACTIONS

The BOF meets annually, but deliberates on each individual regulatory area on a 3-year cycle, most recently for the Kuskokwim Management Area in February 2007. Most of the actions that involved the Kuskokwim region were directed toward commercial fisheries. However, a significant action that is important to the sport fisheries is the repeal of the stock of concern designations for chum and king salmon. This action left the ability of commercial fisheries managers to use the ‘windows’ system to regulate salmon escapements on the Kuskokwim River if necessary. Also, in an action that is more administrative than will likely be put into practice, regulations were put into effect that would enable a directed king salmon commercial fishery, if conditions warrant.

The only action that was directed specifically toward a sport fishery on the Kuskokwim River drainage was concerning the Aniak River. In order to align the regulations governing subsistence rod and reel fishing and sport fish regulations, chum salmon were added to the daily aggregate bag and possession limit for salmon. This action was directly related to the repeal of the Stock of Concern designation for chum salmon in the Kuskokwim drainage.

From 2001 to 2003, the BOF adopted an aggregate (group) bag limit for the Aniak River subsistence rod and reel and sport fisheries. This action was taken to provide continuity between subsistence and sport fishing regulations. Subsistence anglers (any Alaskan resident) were restricted during the period of June 1 through August 31 to an aggregate bag limit of six fish, of which no more than three could be salmon and three resident fish species upstream of Doestock Creek. Additionally, subsistence anglers could not retain rainbow trout upstream of Doestock Creek between June 1 through August 31. In the sport fishery, rainbow trout could not be retained throughout the drainage at any time. All other resident fish species had a daily bag and possession limit of one; however, the aggregate bag limit only allowed three fish a day in the Aniak River. This restrictive nature of the Aniak sport-fishing regulations were based on a precautionary approach driven by local social concerns. Additionally, the waters upstream of Doestock Creek were restricted to unbaited, single-hook, artificial lures year-round following the catch-and-release implementation of the Southwest Rainbow Trout Management Plan in the 1990s.

In 2004, the BOF reinstated the sport bag and possession limits to those prior to 2001. The BOF acknowledged the high sport effort the Aniak River received, yet the harvest level remained low and there were no conservation concerns. At the 2007 meeting, the BOF aligned the subsistence rod and reel bag limits with the sport limits.

ADF&G EMERGENCY ORDER AUTHORITY

ADF&G has emergency order (EO) authority (5 AAC 75.003, 2006) to modify time, area, and bag/possession limit regulations. Emergency orders are implemented to deal with conservation issues that are not adequately controlled by existing regulations. Once implemented, an EO deals with the situation until it is resolved or the BOF can formally take up the issue. Emergency orders are also used as a tool for “in-season” management of fisheries. In-season management is usually in accordance with a fisheries management plan approved by the BOF. There were no emergency orders issued under this authority for the Kuskokwim Area during 2006–2007.

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for rural residents on lands and waters for which the federal government asserts jurisdiction. The state of Alaska also has established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258), but cannot discriminate between residents (Alaska State Constitution Article VIII, sections 3 and 15). Since the state did not amend the Alaska Constitution to conform to federal regulations, the federal government has asserted authority to ensure a priority subsistence use of fish and game for rural residents on federal lands and certain adjacent waters. On October 1, 1999 the federal government asserted management responsibilities for subsistence fisheries on federal public lands (includes non-navigable waters on public lands). Following the “Katie John” decision by the 9th Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which the federal agencies assert reserved water rights. Under current practice, the federal land management agencies assert management to protect the priority subsistence use by qualified rural residents in non-navigable waters within federal public lands (includes BLM lands) and in navigable waters adjacent to or within federal conservation units (generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land.

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

Within the Kuskokwim-Goodnews Area the subsistence fisheries under federal management include those in the Yukon Delta National Wildlife Refuge and the Togiak National Wildlife Refuge. The Kuskokwim-Goodnews Area fisheries fall mainly under the purview of the Yukon-Kuskokwim Delta RAC and peripherally the Western Interior RAC and Bristol Bay RAC. The most recent meeting of the Y-K Delta RAC was held in September 2007 in Marshall. At this meeting, no federal fisheries proposals were submitted for review.

REGION III SPORT FISH DIVISION RESEARCH AND MANAGEMENT STAFFING

The Region III Sport Fish Division staff biologists are organized into a research group and a management group. The management group consists of a management supervisor, an area biologist for each of the six management areas, one or more assistant area management biologists, and two stocked water biologists. The area biologists evaluate fisheries and propose and implement management strategies through plans and regulation in order to meet divisional goals. A critical part of these positions is interaction with the BOF, advisory committees, and the general public. The stocked waters biologists plan and implement the regional stocking program for recreational fisheries. The regional management biologist assigned to the Region III headquarters office in Fairbanks also administers the regional fishing and boating access program.

The research group consists of a research supervisor, a salmon research supervisor, a resident species supervisor, research biologists, and various field technicians. The research biologists plan and implement fisheries research projects in order to provide information needed by the management group to meet divisional goals. The duties of the management and research biologists augment one another.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001a-d, Walker et al. 2003, Jennings et al. 2004, 2006a-b, 2007, *in prep* a,b). The survey is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific catch-per-unit-effort (CPUE) information can seldom be derived from the report. Two types of questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or non-resident). Information gathered from the survey includes participation (number of anglers, trips, and days fished), number of fish caught and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaskan waters as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. The survey results for each year are not available until the following year; hence the results for 2006 were not available until fall 2007. Additionally, creel surveys have been selectively used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or in-season management.

The utility of statewide survey estimates depends on the number of responses received for a given site (Mills and Howe 1992). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation. Therefore the following guidelines were implemented for evaluating survey data:

1. estimates based on fewer than 12 responses should not be used other than to document that sport fishing occurred;
2. estimates based on 12 to 29 responses can be useful in indicating relative orders of magnitude and for assessing long-term trends; and,
3. estimates based on 30 or more responses are generally representative of levels of fishing effort, catch, and harvest.

SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The Kuskokwim-Goodnews Area includes those drainages beginning from the headwaters of the Kuskokwim River and all drainages in Kuskokwim Bay (Figure 2). Additionally, the Kuskokwim-Goodnews Area includes all drainages that flow into the Bering Sea from Cape Newenham to the south and including the Ninglick River drainage to the north; Nunivak, St. Matthew, and adjacent islands are also included within the area as well.

The Kuskokwim-Goodnews Area is partitioned into three sections; the Lower Kuskokwim River, Upper Kuskokwim River, and Kuskokwim Bay (Figure 2).

The Kuskokwim-Goodnews Management Area includes substantial parts of two National Wildlife Refuges, the Yukon-Kuskokwim Delta Refuge and the Togiak Refuge. Nearly half of the Yukon-Kuskokwim Delta Refuge is within the Kuskokwim Management Area, as are several thousand acres of the Togiak Refuge in the headwaters of Kuskokwim Bay streams.

FISHERY RESOURCES

Sport fisheries began to develop in the Kuskokwim Management Area during the mid-1980s. It was during this time period that sport fisheries in this area were captured in the statewide harvest survey (SWHS). Largely, sport fisheries of the Kuskokwim area were small, isolated, and were receiving little effort and hence small catch and harvest. As sport fisheries developed, the SWHS started to partition the prominent area fisheries by stream/river in 1983 (Tables 1-3).

Angling effort in the Kuskokwim Management Area is third in ranking of the angling effort in the AYK region, second to the Upper Copper/Upper Susitna and Tanana Management Areas. The amount of fishing effort in the area is directly related to the remoteness of the area and difficulty and expense in getting there.

Angling effort in the Lower Kuskokwim River and Kuskokwim Bay reached a high of 26,400 angler days in 1997, and has fluctuated between 17,000 and 22,000 in recent years, suggesting a fairly stable amount of fishing effort in this area. Even with the increased publicity the area has received in national fishing and hunting magazines, as well as local press, effort has remained stable. The static effort may be related to sustained high fuel and transportation costs to and within the region. There are three sport fisheries that dominate the area; they are the Kanektok, Aniak, and Goodnews rivers. All three of these streams provide salmon fisheries for all five Pacific salmon, as well as rainbow trout, in a remote Alaska setting. Other rivers in the Lower Kuskokwim River area that receive very small to moderate fishing pressure are the Kisaralik and Kwethluk rivers (Tables 2 and 3). Most other rivers in the area do not receive enough fishing effort to show up in the SWHS. In the upper portion of the Kuskokwim River, the Holitna River drainage is spoken of as a “breadbasket” for its production of salmon, but there isn’t much effort expended in angler days in spite of its large size. The majority of the Upper Kuskokwim River drainage sees very little effort (Table 4).

The subsistence fisheries for salmon have a long history on the Kuskokwim River, with harvests documented throughout the river dating as far back as 1922 (Burkey et al. 2000). The subsistence fishery for king salmon is the most prized, and regularly reaches harvests of over 80,000 for the entire Kuskokwim River drainage based on ADF&G Subsistence Division's 10 and 15 year averages (Simon et. al. 2004).

The commercial fisheries in the Kuskokwim-Goodnews drainages are relatively small and center on the lower part of the Kuskokwim River (District 1) and in Kuskokwim Bay at the Kanektok and Goodnews Rivers (Districts 4 and 5, respectively). They are important to the local economies, but may be somewhat irregular in prosecution due to factors including market issues, exceptionally high chum salmon catches, and run strength (Whitmore 2008).

The sport fisheries in the Kuskokwim-Goodnews Area are small by comparison to other sport fisheries in the state with better access (Tables 1 & 2). The majority of the effort occurs in the Kuskokwim Bay area, focusing mainly on the Kanektok River. Fishing pressure on the Kanektok averages about 10,000 angler days annually (Table 3). Rainbow trout are the most desired species for anglers on the Kanektok River, though fishing for other resident species such as grayling and Dolly Varden occurs also, as well as for salmon, especially kings and coho. Important rainbow trout sport fisheries also occur in the Lower Kuskokwim rivers: the Kisaralik/Kasigluk, Kwethluk, and Aniak rivers. Fishing for the five Pacific salmon species occurs throughout much of the Kuskokwim and Kuskokwim Bay drainages. The rivers that drain into the central and Upper Kuskokwim River such as the Holitna attract a moderate number of sport anglers annually (Table 4).

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the Kuskokwim-Goodnews Management Area are found in 5 AAC 70.017 through 5 AAC 70.035 (sport fishing), in 5 AAC 77.200 through 5 AAC 77.240 (personal use), in 5 AAC 01.250 through 5 AAC 01.295 (subsistence fishing) and in 5 AAC 07.001 through 5 AAC 07.650 (commercial fishing and management plans).

Currently, there are three management plans specific to sport fisheries in the Kuskokwim: the Southwest Rainbow Trout Plan, the Wild Arctic Grayling Management Plan (5 AAC 70.055) and the AYK Lake Trout Management Plan (5 AAC 70.040). These plans address time, area, and method and means of harvesting salmon and resident fish species in designated waters. The objectives are to distribute the opportunity to harvest a small proportion of the sustainable surplus over the fishing season without unnecessary disruptions to the sport fishery.

In the past, management plans have been designed to give managers guidance over inseason management, frequently addressing salmon management. Salmon management in the Kuskokwim is governed by subsistence regulations and several management plans directed at controlling commercial fisheries harvests. Subsequently, managers from Commercial Fisheries Division take a lead role in the management of salmon in this area of the state. Most of the subsistence and commercial fishing regulations are interconnected to provide opportunity to harvest salmon surpluses on the Yukon and Kuskokwim rivers.

SALMON MANAGEMENT PLANS

Subsistence fishing seasons and periods are the guiding regulations in the harvest of salmon in the Kuskokwim River (5 AAC 01.260, 2004). There are two salmon management plans that

guide subsistence, commercial, and sport fishing management in the Kuskokwim Management Area, including streams in the Kuskokwim Bay. These include the:

1. Kuskokwim River Salmon Rebuilding Management Plan (5 AAC 07.365, 2004); and,
2. District 4 (Quinhagak) Salmon Management Plan (5 AAC 07.367, 2004).

During the 2007 BOF meeting, the stock of concern designation for Kuskokwim River king salmon and Kuskokwim River chum salmon was discontinued, both of which were first designated as stocks of concern during the 2001 BOF meeting. The 'windows' system remained in regulation, however, with the understanding that 'windows' would not be used if the chum and king salmon returns remain strong during any given year.

The Sustainable Salmon Management Policy applies to the king and chum salmon management plans of the Yukon and Kuskokwim rivers. Comprehensive rebuilding measures were instituted in 2001 by placing windows of salmon passage in migratory routes in freshwater and marine environments. Windows included: restrictions to the Area M fishery, moving the northern commercial fishing boundary of W-4 (Quinhagak) three miles south (Oyak Creek), closing the Kuskokwim commercial fishery during the months of June and July, adjusting the subsistence fishing schedule to four consecutive fishing days in the Kuskokwim and basing sport fishery restrictions on in-season abundance, except for the Aniak River. Many of the existing and a few new restrictions in the Aniak sport fishery were included within the Kuskokwim rebuilding plan, including the continuation of the annual king salmon season May 1-July 25 with a daily limit of 2 king salmon 20 inches or greater and an annual limit of 2 king salmon 20 inches or greater. On the Aniak River, a combined bag and possession limit of three other salmon species (pink, sockeye, chum and coho) per day remains in effect. The retention of chum salmon in the daily aggregate limit was reinstated in the Aniak River by BOF action in 2007.

Emergency Orders were issued in 2001, 2002, and 2003 to reduce the bag and possession limit for king and chum salmon in the Kuskokwim River drainage. In 2002, these measures were also forced by a closure of the Kuskokwim River to sport fishing by the Federal Subsistence Board. Such measures did not prove necessary during the subsequent 2004-2006 seasons, though there was a precautionary EO in place in 2004 to reduce king bag and possession limits that was rescinded early in the season.

RESIDENT FISH MANAGEMENT PLANS

As recently as the 1990s, sport fishing bag limits were generous and were used as a surrogate for subsistence uses in the Kuskokwim drainage. With the advent of rod and reel being included as a legal method for subsistence uses in the entire Kuskokwim drainage (July 2001) and Lower Yukon (March 2000), essentially sport fish regulations apply only to non-resident anglers. Management of resident fish species in the Kuskokwim is under subsistence and sport fishing regulations. The subsistence regulations of the Kuskokwim are an exception to resident species management throughout the state of Alaska. This and the Lower Yukon are the only areas of the state where a resident of Alaska can harvest unlimited quantities of resident fish (except rainbow trout) under subsistence regulations.

Southwest Alaska Rainbow Trout Management Plan

During the February 1990 BOF meeting, the Board adopted regulations implementing criteria for establishing special management areas for trout (ADF&G 1990). Special management areas

were created to provide a diversity of sport fishing opportunity, such as catch-and-release, fly-fishing only or trophy designation.

This management plan has three primary aspects.

1. Native rainbow trout populations will be managed to maintain historic size and age composition and at stock levels sufficient such that enhancement (or stocking) is not needed to supplement wild populations.
2. A diversity of sport fishing opportunities for wild trout should be provided through establishment of special management areas by regulation. Selection of areas for special management will be based on criteria to be adopted by the BOF. Selection criteria is inclusive of the following: stock status, history of special management, proximity to local community, legal access, overlap with freshwater net fisheries, abundance and size of rainbow trout, water characteristics, clear geographical boundaries, importance of the rainbow trout fishery to sport fishing industry, geographical distribution of special management.
3. Management strategies should be consistent with prudent economic development of the State's recreational sport fishing industry and at the same time acknowledge the intrinsic value of these fishery resources to the people of Alaska.

Implementation of this plan:

- Expanded the Wild Trout Zone from the Iliamna drainage to include the drainages of Bristol Bay, Kuskokwim Bay and Lower Kuskokwim River including the Aniak River drainage.
- Established eight catch-and-release areas.
- Established six fly-fishing catch-and-release only areas.
- Established eleven unbaited, single-hook, artificial lure only areas to protect rainbow trout stocks in Southwest Alaska.

In March 2003, the BOF adopted a statewide *Policy for the Management of Sustainable Wild Trout Fisheries* (5 AAC 75.222) was adopted. This policy provides guidelines to the board and department for developing regulations and managing wild trout populations. The department and BOF will continue to review rainbow trout regulations that are not under special management designation.

Land Use Management Plans

The Togiak and Yukon-Kuskokwim National Wildlife refuges produce Fisheries Management Plans (FMPs) within the Kuskokwim-Goodnews Area. These plans generally acknowledge the state's authority for the management of sport fisheries and have little direct effect on the day-to-day management of the area's fisheries. Department staff have worked with the U.S. Fish and Wildlife Service (USFWS) refuge staff to develop these plans. These plans are essentially a list of fishery-related issues and concerns and projects that address these concerns. Each refuge plan has a 5-year duration, after which a review process begins. In 1999, the Togiak FMP was adopted and a comprehensive conservation planning phase was implemented. The Togiak Comprehensive Conservation Plan (CCP) has been under development and public review was initiated in December 2001. This plan still remains in the review process. There are significant

numbers of suggestions within this plan that address sport-fishing issues in Kuskokwim Bay. The state has responded to several sport fishing issues within the Togiak CCP, particularly the issue of quality of sport fishing opportunity and quality of subsistence opportunities. The Yukon-Kuskokwim Delta Refuge FMP was adopted in 1992 and has been gradually implemented.

A Public Use Management Plans (PUMP) has been adopted for the Togiak Refuge and allows for certain activities on refuge lands. Commercial sport fishing services are a significant portion of the Togiak Refuge PUMP. Much of the sport fishing effort within the Togiak Refuge is guided; therefore the plan affects guided access and activities that affect opportunity in the sport fisheries. In general, the PUMP established levels of commercial use under land lease requirements on a river-by-river basis. Unguided uses are presently unconstrained in the Togiak PUMP. The Togiak PUMP is complex, requiring operators to submit prospectus applications and bid for the privilege to lease refuge lands for the purpose of providing angler services.

The Togiak PUMP was adopted in 1991. Since adoption, four minor amendments have been made. In 1995, the Togiak Refuge began review and revision of the plan when the amount of guided use equaled visitor use. Currently, the plans include a matrix of options that may potentially govern use patterns on rivers that flow through the refuge (Appendix A1). The Department has opposed many of the options listed in the matrix, and continues to support efforts to maintain access for unguided visitors to these rivers without potentially unnecessary regulation. The department assisted refuge staff during the 2005 review process of the Togiak CCP, and has continued to offer comments toward the implementation of this plan.

MAJOR ISSUES

1. 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 popular fishing destinations in Bristol Bay and Southcentral Alaska become increasingly crowded, anglers and guides are likely to continue 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 minimal information. This is likely to be the biggest challenge in the management of sport fisheries in the Kuskokwim Management Area.
2. Rod and Reel Subsistence. In 2000, the BOF included rod and reel gear as a legal subsistence fishing method for harvest during the open water season in the Association of Village Council Presidents (AVCP) area of the lower Yukon and Kuskokwim rivers. In 2001, rod and reel subsistence fishing was extended upstream in the Kuskokwim by emergency regulation in response to a petition to the BOF from Nikolai Native Village and the Western Interior Regional Advisory Council. Until these actions were taken, rod and reel for subsistence fishing was permitted only through the ice under state regulations. Harvest of fish with rod and reel during open water periods in the remainder of the state is regulated under sport fishing regulations. 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. It is likely that rural resident use patterns have incorporated rod and reel in past subsistence harvests, and legalization of this gear will not greatly affect local use patterns. The greatest concerns relate to changes in urban resident behavior in regard to license sales, visitation to rural fisheries, and harvests of fish populations, since all Alaska residents qualify for subsistence.

3. Federal Fishery Management for Subsistence in Alaska's navigable waters. In October 1999, Federal fishery managers assumed responsibility for ensuring a rural subsistence priority on navigable waters adjacent to or within the boundaries of Federal Conservation units. There is widespread concern that one result of this action will be reduced opportunity for sport fishing throughout the state. Because of the large amount of Federal public land, and the high proportion of subsistence users within the Kuskokwim Management Area, this loss of opportunity is a concern for sport fishermen in the area. Recent proposals to the Federal Subsistence Board to exclude recreational anglers from popular fisheries have required substantial efforts by department staff to maintain current opportunities.
4. Jurisdictional issues involving navigable water bodies. Jurisdiction over navigable water bodies that run through Federal Conservation Areas are in dispute between State and Federal managers. For example, land managers of the Togiak National Wildlife Refuge are investigating the implementation of several options put forward in the Togiak CCP and PUMP that restrict access to individuals seeking to gain access to sport fisheries in waters in which jurisdiction is contested, namely on the Goodnews, Kanektok, and Togiak Rivers (Appendix A). In a similar issue, the land status surrounding the Arolik River continues to be in dispute between the federal and state governments. The Bureau of Land Management (BLM) determined that portions of the Arolik River were non-navigable and under the Alaska Native Claims Settlement Act (ANCSA) conveyed shore-lands to Qanirtuuq Inc. as part of their entitlement under the Act. However, the State of Alaska received title to inland navigable water bodies as provided in the Statehood Act of 1958 and the U.S. Submerged Lands Act of 1953. Therefore the State of Alaska asserts that those shore-lands were not in federal ownership and were not BLM's to convey.

ACCESS PROGRAMS

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

To date relatively few access projects have been proposed for the rural Kuskokwim area. An upgrade of the boat launching site in the Kuskokwim River community of McGrath is currently under review. Very recent discussions have mentioned the possibility of access projects involving boating facilities in Bethel or Aniak. Presently, there are no major access issues for sport fishing in the Kuskokwim, largely because of the remote character of the entire region.

INFORMATION AND EDUCATION

Information regarding regulations, publications, stocking and fishing reports, news releases and emergency orders for the Kuskokwim-Goodnews Area can be found at the Department of Fish and Game, Division of Sport Fish website (www.sf.adfg.state.ak.us/statewide/SF_home.cfm). The Togiak National Wildlife Refuge and the Yukon Delta National Wildlife Refuge are the two federal land units within the area and a portion of the major rivers in the area are within these lands. A listing of the addresses and contact numbers for these information sources can be found in Appendix A.

There are three regional information and education (I&E) staff located in the Fairbanks office. An Information Officer II and a seasonal Fisheries Technician III respond to questions from the public at the office and via phone and e-mail. In addition, I&E staff distribute and update fishery brochures, fishing regulations, the regional webpage, coordinate the Fairbanks Outdoor Show booth and Kid's Fish & Game Fun Day, and the Becoming an Outdoorswoman (BOW) program. An Education Associate II coordinates the sport fishing component of the Alaska Conservation Camp and works with schools in various communities throughout the region to provide a curriculum in sport fishing and aquatic education.

SPORT FISHING EFFORT, HARVEST, AND CATCH

Sport fishing effort and harvest in the Kuskokwim-Goodnews area remains low for most tributary rivers, and indeed for the entire region (Tables 1-4). Sport fishing effort from 2001 to 2005 has averaged over 22,000 angler-days, the majority in the Kuskokwim Bay tributaries (Tables 1 and 3). The river that receives the most effort in angler days is the Kanektok, which in the last 10 years has received roughly a third of the effort expended for the Lower Kuskokwim (Table 3). The Kanektok River undoubtedly receives this attention due to the rainbow trout fishery, which is renowned through coverage in national fishing magazines and publications.

The majority of the sport fishing effort occurs in three areas: Kuskokwim Bay tributaries (including the Kanektok, Goodnews, and Arolik Rivers), the Aniak River, and the Lower Kuskokwim tributaries near Bethel (Kwethluk and Kisaralik Rivers; Table 3). There is some sport fishing effort in the Holitna river, but considering the size of this drainage, the effort remains exceptionally low (Table 4).

Fishing effort in the Kuskokwim-Goodnews Area has remained stable overall, in 2006; the effort was 99% of the five year average (Table 1). It was anticipated that there would be a drop in travel to the area due to travel restrictions that followed September 11, 2001, but effort remained relatively stable comparable to that prior to 2001 (Tables 3 and 4). There is considerable speculation that this stability in effort expended may be relatively short-lived, however, as anecdotally many individuals and guides throughout the region expressed concern over the high energy costs.

Coho salmon is the primary sport fish species that is harvested in the Kuskokwim Management Area (Table 2). This is also the case in the upper Kuskokwim and Holitna river drainages (Table 4). Arctic grayling surpasses coho salmon in numbers of fish caught in the Upper Kuskokwim River, but sockeye salmon are the primary sport fish species caught in the Holitna River (Table 5).

SECTION II: FISHERIES

SALMON FISHERIES

Chinook (King) Salmon

Background and Historical Perspective

Chinook (king) salmon are present in most streams throughout the Kuskokwim Management Area. King salmon are predominately caught and harvested in tributaries of Kuskokwim Bay and tributaries of the Lower Kuskokwim River. The largest sport fisheries for king salmon are located in the Kanektok and Aniak rivers. These two sport fisheries average approximately 6,700 and 2,400 angler days of effort, respectively, (Table 3) for all fish species. Very few king salmon are caught and harvested in the sport fisheries in the Upper Kuskokwim tributaries including the Holitna River.

The Kuskokwim River and tributaries contain large runs of king salmon, but many streams are broad and turbid, thus directing the sport fishing to clearwater tributaries. These salmon fisheries attract a very small number of anglers to western Alaska each year.

Sport harvest and catch of king salmon are estimated through the SWHS. These estimates of harvest and catch are summarized in previous Fishery Management Reports (FMR; Lafferty 2001 and 2003, Chythlook 2006). Additional Kuskokwim area commercial and subsistence harvest information for 2003-2005 can be found in Whitmore et al. (2005). Sport Fish Division has monitored both the Kanektok and Aniak river sport fisheries with additional in-season harvest surveys and stock assessment projects in the past (Minard 1987, Minard and Brookover 1988; Dunaway and Bingham 1992, Dunaway and Fleischman 1995, Dunaway 1997; Lafferty and Bingham 2002). Additionally, the USFWS, Togiak Refuge, has collected age and size data from king salmon spawning in the Kanektok since 1994 (Lisac and MacDonald 1995, MacDonald 1996).

Sport harvests of king salmon are minor in comparison to the commercial and subsistence harvests of the area (Tables 7, 8 and 9). However, there is angler desire to participate in the king salmon fisheries of the Kuskokwim area. The average angler stay in western Alaska for fishing is at least six days. The Kuskokwim Bay sport fisheries average about 10,000 angler-days per season, which is about half the total effort for season: the total average angler days for the Kuskokwim River and Kuskokwim Bay averages near 20,000 angler-days (Table 3).

Historically, these 3,000 anglers were harvesting just over 1,000 king salmon from a total catch of nearly 11,000 king salmon during 1983 to 2006 (Tables 10 and 11). Harvests during the last 5 years have remained similar. In 2005, catches in the Kuskokwim Bay area exceeded 21,000 king salmon, nearly all of which were released. It is doubtful that hooking mortality is a significant factor, as all of the salmon studies associated with delayed mortality of salmon when caught with hook and line gear in Alaska are conducted in areas adjacent to marine waters (Stuby 2002). Most of the anglers participating in the Kuskokwim area king salmon fisheries are via float trips in tributary headwaters, a significant distance from estuarine waters. Furthermore most of the popular sport fisheries have significant river segments under unbaited, single-hook, artificial lure

requirements to protect rainbow trout under special management. Accepting that delayed hooking mortality is minor, 10% or less (Bendock and Alexandersdottir 1992), the overall fishing mortality (harvest + delayed mortality) can account for an additional 1,000 king salmon from the area sport fisheries, bringing the total removal by the sport fishery to around 2,500 king salmon under the current regulations. The Kuskokwim Area sport harvest of king salmon is small when compared to harvests of king salmon in the Nushagak River and other areas on the road system or with better access such as the Southcentral region and Kenai River.

The harvest of king salmon in the Kuskokwim River drainage sport fisheries has remained low (around 1,000 in recent years) (Table 9). This is likely due in part to care taken to not retain sport caught king salmon in the Kuskokwim due to perceptions regarding the sport fishery and the recent stock of concern designation placed on king salmon stocks. Catches of king salmon in the sport fishery follow a general trend, for each fish harvested, 10 are caught and released in this area.

Recent Fishery Performance

In 2006, the subsistence schedule was again implemented on June 4 in the Lower Kuskokwim, in accordance with the Kuskokwim Salmon Rebuilding Plan. Sport and subsistence catches indicated good numbers of king salmon returning to the Kuskokwim area. The schedule was discontinued on the 18th of June when it became apparent that the run strength was appropriate to discontinue the “windows” schedule (Linderman *pers. comm.*).

As is usually the case, the brunt of the king salmon sport fishery was prosecuted in the Lower Kuskokwim and Kuskokwim Bay, though there is always a minimal catch and harvest in the Upper Kuskokwim River, which includes the Holitna River drainage (Tables 4 and 5).

Sport fishing reports from the Kuskokwim Bay fisheries were good throughout the Kuskokwim Bay and Lower Kuskokwim tributaries, and remained so until the king salmon closure on July 25. Sport guiding operators and individual sport fishers qualified fishing as good, but not as good as summer 2005. Sport fishers in the Holitna drainage took very few king salmon, with very little corresponding catch (Tables 4 and 5).

Commercial fisheries Division characterized the king salmon escapements in the Kuskokwim River as above average, with the exception of the Tatlawiksuk River, which was near average. Kogruklu River king salmon escapement (a tributary of the Holitna and often used as a gauge of the strength of a salmon run) exceeded the escapement goal range, and aerial survey goals were exceeded or within range (J. Linderman, *pers. comm.*).

Fishery Objectives and Management

The department has focused on assessing salmon escapements and harvest monitoring through several programs in the Kuskokwim area. Commercial harvest monitoring is conducted through fish tickets and surveys are utilized to estimate harvests from the subsistence and sport fisheries. Salmon escapement is monitored through aerial surveys, sonar, test fishing, and weirs in the Kuskokwim River. The primary king salmon escapement programs in the Kuskokwim are aerial surveys, and the Kogruklu River weir. There have been recent weir additions to further the department understanding of Kuskokwim escapements, as well as mark recapture studies (Whitmore et. al, 2008).

Most of the Kuskokwim River king salmon escapement objectives are based on aerial survey information. Often these aerial surveys are sporadic because of aircraft availability or weather

conditions and this method of evaluating escapement has been unsatisfactory in understanding Kuskokwim River drainage king salmon production. Therefore, the department has invested in weir operations in locations where feasible. Generally the location of these weirs is not based on the proportion of the total run using a tributary but on the suitability of the site for weir maintenance. Many of the larger tributaries and probably the larger stocks of king salmon, such as the Aniak and Holitna rivers have no complete assessment other than sporadic aerial surveys of king salmon or a singular tributary weir on the Kogrukluk River (Holitna tributary). The test fishing in the Lower Kuskokwim, near Bethel, only provides indices of daily passage and not a measure of escapement.

Current Issues and Fishery Outlook

Kuskokwim River and Tributaries

The department's ability to forecast king salmon returns is limited, but recent year returns indicate that above average run strength should continue in 2008. The subsistence and sport fisheries in 2007 were similar to recent years, though many subsistence users characterized this fishery as poor to average (Linderman *pers. comm.*). These reports of poor conditions by both the sport and subsistence fisheries likely had to do with extremely low water conditions, with much higher than usual clarity. It is expected that the water conditions had a lot to do with the late run timing, which Commercial Fisheries managers, sport fishers, and subsistence fishers all characterized as nearly a week late. Commercial Fisheries Division called the 2007 escapements as average to above average at all escapement projects with the exception of the Tuluksak River which was characterized as below average.

Kuskokwim Bay Tributaries

The 2007 king salmon escapement into the Goodnews River was above average (Appendix A). The Commercial Fisheries Division has been operating an escapement weir since 2002 on the Kanektok River to enumerate salmon escapement. The weir is located more than 40 miles upstream and therefore counts only salmon that pass the weir during their spawning migration. The escapement in the lower 40 miles of the Kanektok River is estimated with aerial surveys. Due to weather, there were incomplete king and sockeye salmon surveys in 2007, but based on the weir counts, escapement can probably be characterized as average to above average. The possibilities of a future telemetry project to assess the spawning contribution downstream of the weir have been discussed, and will continue to be reviewed.

Recent Board of Fisheries Actions

In January 2007 the Board of Fisheries considered and approved an action allowing 8" or greater gillnet mesh size as an allowable gear type in Kuskokwim River Fisheries by emergency order (EO) only. Other than that, the Board has not considered any actions regarding king salmon in the Kuskokwim River and Kuskokwim Bay during the past two board meetings that have covered the area.

A directed commercial fishery for king salmon in the Kuskokwim has not been deemed likely due to current subsistence demands and public concern over it, yet with current levels of returning king salmon, pressure from commercial fishermen to open a directed commercial fishery has been mounting. A proposal addressed toward a directed king fishery was considered by the BOF at the 2007 AYK meeting and passed, however, the prosecution of this fishery may be extremely limited by lack of overall public support.

Current or Recommended and Management Activities

In recent years, weirs have been used to enumerate escapements on the Kwethluk, Tuluksak, George, Kogrukluuk, Tatlawiksuk, and Takotna rivers (Whitmore et. al. 2008). A new weir was added to the Salmon Fork of the Aniak River for the 2006 and 2007 seasons, but may not continue past that, pending availability of funding. Kuskokwim salmon escapement or weir projects in recent years are improving the department's ability to count escapement and are integral parts to complying with the sustainable salmon policy and the development of escapement objectives. In addition, from 2001 to 2004 a mark-recapture study was conducted on the Holitna River to estimate abundance of king salmon in that system (Wuttig and Evenson 2002; Chythlook and Evenson 2003; Stroka and Brase 2004; Stroka and Reed 2005). Because of the success of this project in 2001, it was continued in 2002 and 2003. Additionally, in 2002, a mainstem mark-recapture project was implemented by Commercial Fisheries Division to assess king, chum and coho salmon abundance upstream of Kalskag. Sport Fish Division has supported an ongoing king salmon radiotelemetry project that occurred on the mainstem Kuskokwim from 2002 through 2006 (Stuby 2007). Commercial Fisheries Division continued this project in 2007. Aerial surveys conducted by CFD remain an important component of king salmon assessment in the Kuskokwim area (Table 6).

Coho Salmon

Background and Historic Perspective

Coho salmon are present in the majority of area streams and are caught and harvested in tributaries of the Kuskokwim Bay and tributaries of the Lower Kuskokwim River. There is a large commercial harvest of coho salmon in the Kuskokwim River. In the last 20 years the commercial harvest has ranged from 23,593 in 1999 to 937,300 coho salmon in 1996 (Table 12). The historic commercial harvest has averaged approximately 450,000 coho salmon in the Kuskokwim River (Whitmore et. al. 2008). The Kuskokwim River itself is characterized by broad channels and turbid water thereby reducing the sport fishing largely to clear water tributaries of the Kuskokwim River and Kuskokwim Bay. The largest coho salmon sport fisheries are located in the Kanektok and Aniak rivers (Tables 15 and 16). These two sport fisheries average approximately 6,700 and 2,500 angler-days of effort, respectively, for all fish species (Tables 3 and 4).

Sport harvests and catch of coho salmon are estimated through the SWHS. Commercial and subsistence harvests are managed by the Commercial Fisheries Division located in Bethel (Burkey et al. 1997-2001, Ward et al. *in prep*, Whitmore et al. 2005). The Kanektok River has the most complete commercial, subsistence, sport harvest and escapement information on coho salmon in the area (Table 13). Sport Fish Division has monitored both the Kanektok and Aniak with additional in-season harvest surveys and stock assessment projects in the past (Minard 1987, Minard and Brookover 1988; Dunaway and Bingham 1992, Dunaway and Fleischman 1995, Dunaway 1997 and Lafferty and Bingham 2002). Additionally, the U.S. Fish and Wildlife Service from the Togiak Refuge has collected age and size data from coho salmon spawning in the Kanektok since 1994 (Lisac and MacDonald 1995, MacDonald 1996).

Prior to 1987 the daily bag limits for coho salmon were very liberal, allowing 15 fish per day, 30 fish in possession. In 1987, the Board recognized the significance of the harvest potential of the Kanektok sport fishery and reduced bag and possession limits to 5 fish daily. These bag limits remained the standard for most of the area, except recent changes in the Aniak River. The liberal

bag and possession limits were adopted to accommodate subsistence fishers who were using rod and reel for subsistence purposes, but were required to purchase a sport fishing license. Repeatedly, harvest surveys conducted on the Kanektok River indicate that sport anglers rarely (7%-15%) had taken a full bag limit of coho salmon and most of the anglers (61%-66%) elected to take no fish, even though 95% of them had caught and released a fish (Dunaway and Bingham 1992, Dunaway and Fleischman 1995).

Recent Fishery Performance

Sport harvests of coho salmon are very small in comparison to the commercial and subsistence harvests in the area (Tables 12, 13 and 14). However, angler desire to participate in the coho fisheries is great. From 2001 to 2005 approximately 3,000 coho salmon were harvested, while approximately 37,000 coho salmon were released (Tables 15 and 16). Delayed mortality has been a concern in some coho fisheries within the state; however, these coho fisheries are near estuarine waters. Most of the anglers participating in the Kuskokwim area are on float trips in tributary headwaters, and furthermore these headwaters have special management regulations to protect rainbow trout, with unbaited single-hook, artificial lures. Accepting that delayed hooking mortality is minor 15% or less (Stuby 2002), the overall harvest of coho salmon contributed to the area sport fisheries is approximately 9,000 coho salmon. Area sport harvests of coho salmon are insignificant to the commercial and subsistence harvests.

In 2006, coho salmon began entering the lower Kuskokwim River in mid-July, with the bulk of the run arriving late according to most reports. Coho salmon escapements were characterized as average to below average during the 2006 season. All user groups, including sport, commercial, and subsistence users reported lower than average size and weights. Commercial Fisheries Division staff observed that the coho averaged about a pound lighter than previous years, based on commercial fish ticket information. Coho salmon escapements were monitored through enumeration at weirs on six tributaries of the Kuskokwim River, and at a mark-recapture tagging station operated near Kalskag. Commercial fisheries managers characterized the 2006 coho salmon escapements as average to below average at most locations, except at the Kalskag station and Takotna, which were characterized as above average (Whitmore et. al 2008).

Sport fish catch rates remained stable throughout Kuskokwim Bay and the Lower Kuskokwim, though anglers reported poor catch rates early in the season along with the low average weight of coho landed (Tables 15 and 16). Sport harvest for the entire management area at the end of the season was well above average, (Table 12), though still a fraction of the total harvest including subsistence and commercial uses.

Sport fishing for coho salmon improved late in the season at many tributary confluences in the lower Kuskokwim. By mid-August, fishing opportunities were being reported as average in the lower reaches of Kuskokwim tributaries. Coho abundance at escapement weirs tracked near average. Most escapement weirs counted average numbers of coho salmon during the remainder of their operations in 2006.

Sport fish harvest of coho in the Holitna drainage was well below average (Table 4 and 5). Anecdotal reports suggest that late run timing may have contributed to this, due to some guided operators shutting down operations before the bulk of the fish bound for the Holitna arrived. Sport fishing opportunities were characterized as low to average during the months of August and September in 2006.

Fishery Objectives and Management

The department has focused on assessing salmon escapements and harvests through several programs in the Kuskokwim area. Harvest monitoring is conducted through fish tickets and surveys designed to estimate harvests from subsistence and sport fisheries. Salmon escapement is monitored through aerial surveys, sonar, test fishing and weirs in the Kuskokwim drainage. The primary coho salmon escapement programs in the Kuskokwim are aerial surveys, and the Kogrukluq weir. The Bethel test fishery only provides indices of daily passage. Recent weir projects in the Kwethluk, Tuluksak, George, Kogrukluq, Tatlawiksuk, and Takotna and the Salmon River have been added to escapement assessment of the area. There is consideration for more weir operations in the future. Mark-recapture methods were used on the mainstem of the Kuskokwim River utilizing fish wheels to capture and estimate coho salmon populations upstream of Kalskag from 2004 to 2006 (Pawluk et. al. 2006).

There are only a few escapement objectives for coho salmon in this area, and weather conditions seldom allow reliable aerial surveys to be flown to index coho salmon escapements. However, salmon escapement or weir projects in recent years are improving the department's ability to enumerate coho escapement (Molyneaux and Brannian 2006) and begin the process to develop escapement objectives in accordance with the department's Escapement Goal Policy.

Current Issues and Fishery Outlook

Kuskokwim River

Recent trends in coho salmon production have provided surpluses for commercial and sport fisheries during the past 10 years. Coho salmon returns to the area have fluctuated during the last 5 years, with especially large returns in 2003 and 2004. Coho salmon return to the Kuskokwim area primarily at 4 years of age; the 2004 brood will be the main parent year for the 2008 return. If these coho escapements are any indication of coho returns to the Kuskokwim area, then the department could expect a better than average return to the area. This statement should be taken with caution, however, given that recent high seas data indicate that juvenile coho recruitment may be poor (Milani 2007). Combined with the small average for Kuskokwim coho size seen in 2006, this may be an indicator that the run strength for coho salmon may decrease, though average weights for coho were on par in 2007 (Linderman pers. comm.). This information will of course only be available as the various fisheries are prosecuted, as run strength is assessed by commercial fishery performance, test fishing and escapement assessment.

Recent Board of Fisheries Actions

Concerns from the Central Kuskokwim Advisory Committee prompted the BOF to create the Aniak River Salmon Management Plan out of the regular 3-year cycle during the March 2000 meeting. This temporary plan was a series of species-specific regulations restricting bag/possession limits and implementing catch-and-release for chum and coho salmon with a sunset clause. During the period of May 1 through August 31 only one coho salmon may be harvested above the Buckstock River and chum salmon may not be possessed year-around in this section of the Aniak River. The Aniak Management Plan became the most restrictive remote fishery within the State of Alaska. The sunset clause attached to the Aniak Management Plans required the BOF to review this set of regulations during the January 2001 meeting. Members of the public and sport fishery industry indicated that these temporary regulations were far too restrictive, a compromise set of regulations were accepted based on an aggregate daily bag limit. Aggregate daily bag limits were consistent with the subsistence regulations of the Aniak River;

however, subsistence possession limits were more generous. Sport anglers were allowed up to three (3) coho salmon a day in the Aniak River, in all other locations of the Kuskokwim anglers were allowed a daily bag limit of five (5) coho salmon.

Current or Recommended Research and Management Activities

A study using radiotelemetry and mark-recapture methods based on the existing Kuskokwim weir projects will operate in 2008. This project will utilize the combined expertise that Sport Fish Division and Commercial Fisheries Division have gained through the recent king and sockeye salmon projects (Stuby 2005, Gilk et. al. *unpublished*). From a Sport Fish Division perspective, studies that compare catch-and-release mortality (Stuby 2002) to the Kuskokwim and Goodnews area sport fisheries may be useful. Such studies could answer questions brought about by the general public regarding catch-and-release mortality.

Chum Salmon

Background and Historic Perspective

Kuskokwim area chum salmon stocks are primarily harvested for subsistence and commercial uses. There has been a long history of subsistence use of chum salmon in the Kuskokwim River; chum salmon were documented as being used for subsistence in 1922 (Burkey et al. 2000). In the past, the subsistence fishery has had few restrictions and most of the harvest has been taken using gillnets, either drift or set net. Directed commercial fishing for chum salmon in the Kuskokwim River started in 1971. In 1983 escapement based-management began in the Kuskokwim River. This fishery continued and expanded with a record harvest of 1.4 million in 1988 (Table 17). Since then, harvests declined to less than 100,000 in the mid-1990s and more recently to less than 50,000 chum salmon. Commercial harvests of Kuskokwim have chum salmon generally declined from harvests that occurred in the 1980s, first due in part to low returns in the late 1990s, and now largely due to low market demand. During the recent record chum returns, chum have not been actively sought after. During the last few years, the chum harvest has been incidental to the harvest of coho salmon in the Kuskokwim River. The harvest of chum salmon is also incidental to the directed commercial fisheries for sockeye salmon in Kuskokwim Bay.

Recent Fishery Performance

Sport harvests of chum salmon are minimal in comparison to subsistence and commercial harvests (Table 17). There is active angler participation in the chum salmon fishery. Approximately 200 chum salmon were harvested and 12,000 chum salmon released annually from 2001 to 2005 (Tables 4, 5, 18, 19). It is assumed there is very little hooking mortality because many of the anglers are on float trips in tributary headwaters and these headwaters have special management regulations to protect rainbow trout (i.e., unbaited single-hook, artificial lures). Accepting that delayed hooking mortality is minor, less than 5%; the overall removal of chum salmon is less than 1,500 fish in sport fisheries of the Kuskokwim Area.

Fishery Objectives and Management

Chum salmon escapement goals were established in 1983 for several Kuskokwim River tributaries based on average observed escapements, since 1960. Escapement-based management assumes that providing adequate numbers of spawners will produce sustainable yields of salmon

and return salmon runs to historic levels. As the department's knowledge on stock specific production increases, refinements can be made to provide sustainable yields.

The department has focused on assessing salmon escapements and harvests through several programs in the Kuskokwim Area. Harvest monitoring is conducted through commercial fish tickets and surveys designed to estimate harvests from the subsistence and sport fisheries. Salmon escapement is monitored through aerial surveys, sonar, test fishing and weirs in the Kuskokwim River drainage. In the past, the primary method of assessing chum salmon escapement in the Kuskokwim area was by aerial survey. With the addition of several weirs to the area and the existing Aniak Sonar and Bethel test fishery, aerial surveys have been phased out as an index method.

In 2006, the subsistence schedule was implemented on June 4 in the Lower Kuskokwim River downstream of Bogus Creek, in accordance with the Kuskokwim River Salmon Rebuilding Management Plan. The schedule continued after June 11 downstream of Chuathbaluk, and was discontinued on June 18 when it was scheduled to go into effect for the rest of the Kuskokwim River.

Importantly, in 2005 and subsequently in 2006, the Aniak sonar project and Kogruklu River weir on the Holitna system exceeded the upper end of their escapement goals (Whitmore et. al 2005). With sustained low prices offered dockside to commercial fishermen for chums, combined with very large runs in recent years, chum salmon have recovered from the exceptionally low escapement observed in 1999 and 2000.

Current Issues and Fishery Outlook

Recent trends in chum salmon production have provided large surpluses for commercial and sport fisheries in the past 3 years. The chum salmon harvests in the commercial fisheries in Kuskokwim Bay are incidental to directed fisheries at king, sockeye and coho salmon. In the Kuskokwim River proper, ostensibly a chum fishery, large catches of chum in relation to the more commercially valuable species will often shut down the commercial fishery due to lack of processing capacity.

Considering the large numbers of chum returning in 2005 through 2007, the outlook for chum salmon in the Kuskokwim area is above average. The BOF removed these stocks from stock of yield concern status at the 2007 meeting.

Recent Board of Fisheries Actions

In March of 2000, the BOF created two Aniak River management plans, one for salmon and one for resident fish. The Aniak Salmon Management Plan was a series of species-specific regulations restricting bag/possession limits and implementing catch-and-release for chum and coho salmon. Chum salmon could not be possessed year-round. During the period of May 1 through August 31 only one coho salmon could be harvested above the Buckstock River. However, the mechanics of implementing this management plan became complex because emergency regulations are only valid for 180 days and the change in bag/possession limits was greater than 180-day limit. With concurrence from the BOF, a permanent regulation was created with a sunset clause. This sunset clause required the BOF to address this regulation at every AYK BOF meeting with or without a proposal addressing this regulation. The regulation became effective on May 9 and expired on December 31, 2000.

During the BOF meeting in 2001, members of the public and sport fishing industry indicated that these temporary regulations were far too restrictive; a compromise set of regulations were accepted based on an aggregate daily bag limit. Aggregate daily bag limits were consistent with the subsistence regulations of the Aniak River; however, subsistence possession limits were more generous. The sport fishery for chum salmon in the Aniak River remained no-retention, allowing catch-and-release fishing. The chum salmon retention clause was removed from Aniak sport fish regulations at the 2007 BOF meeting

Current or Recommended Research and Management Activities

There haven't been many recent research needs identified, as the general health of the chum salmon runs throughout the Kuskokwim-Goodnews Area has been quite good. Commercial Fisheries Division has been archiving chum salmon samples from throughout the Kuskokwim for future genetics work.

Sockeye Salmon

Background and Historic Perspective

Sockeye salmon are present in the Kuskokwim River drainage, but are more plentiful in Kuskokwim Bay tributaries. The sockeye salmon stocks of the Kanektok and Goodnews rivers are the largest in the Kuskokwim area. Sockeye stocks of the Kuskokwim River are relatively small and located sporadically throughout the drainage, with the largest occurring in the Holitna drainage (S. Gilk, pers. comm.). Most anglers venturing to western Alaska are interested in king and rainbow trout opportunities; however, sockeye and coho salmon opportunities have been becoming increasingly important to recreational anglers. Anglers seeking sockeye fishing opportunities in the Kanektok and Goodnews rivers focus their efforts during the month of July prior to the king spawning season closure of July 25. Sport harvests and effort are estimated through the SWHS while commercial and subsistence harvests are managed by the Commercial Fisheries Division located in Bethel and are reported in their Annual Management Report series Ward et al. (*In prep*) and Whitmore et al. (2005).

As with the other Pacific salmon, sport harvests are small and minor in comparison to the commercial and subsistence harvest of the area (Table 20). Commercial fisheries of Kuskokwim Bay target sockeye salmon during late June through mid-July. The average sockeye harvest in the commercial fisheries is greater than 60,000 and 40,000 fish, respectively for the Quinhagak and Goodnews districts (Whitmore et. al 2008). Sockeye salmon commercial harvests have been exceptional in Kuskokwim Bay in 2006, with about 100,000 taken in the commercial fishery in the Quinhagak district and about 30,000 taken in the Goodnews district.

Recent Fishery Performance

With the strong returns recently, sport fishers in the Kuskokwim Bay streams have responded by catching quite a few more sockeye, with a record catch of over 14,000 in 2006. Recreational sockeye catches in the Kanektok and Goodnews rivers in recent years have been a few thousand. Harvests in Kuskokwim Bay rivers haven't increased as much as the catch has, with most fishers practicing catch-and-release. In general, for the Goodnews and Kanektok Rivers, one sockeye is harvested per 10 caught (Table 21). Sockeye catches and harvests in the sport fisheries of Kuskokwim Bay tributaries are negligible in comparison to the commercial and subsistence harvests of sockeye salmon. A very small sport fishery for sockeye salmon exists on Lower Kuskokwim streams such as the Aniak, Kisaralik, and Kwethluk, but historically the catches

have averaged 500, with 2006 being a standout year at 1,400 (Table 22). As with the Kuskokwim Bay rivers, the harvest remains low (Table 22).

Fishery Objectives and Management

Sockeye management of Kuskokwim Bay is outlined under the District 4 Salmon Management Plan (5 AAC 07.367, 2004), sockeye management in Goodnews Bay, District 5 follows a similar regulation pattern, although there is no formal management plan (Ward et al. *in prep*; Whitmore et al. 2005). Escapement based management has been challenging in Kuskokwim Bay. In the past, escapements have been evaluated by aerial surveys; however, multiple salmon species and frequent poor survey conditions have made documenting salmon escapements difficult. Finding different methods of assessing salmon escapements has not been an easy task, within the Kanektok, towers and sonar have been attempted, but water conditions, technical support staff and budgetary constraints have limited salmon enumeration effectiveness. A weir using resistance board design has been successful; unfortunately, the weir site is 42 miles upstream from the mouth and the commercial fishery. This weir site appears to be functional, but additional assessment may need to be done to evaluate the escapement spawning downstream of the weir. The Goodnews River weir is located 15 miles upstream of the mouth and commercial fishery on the Middle Fork and represents an index of salmon escapement into the entire drainage, however, aerial surveys are still used to estimate salmon escapement in other tributaries in the Goodnews drainage. Additional salmon assessment has been conducted to evaluate the contribution of salmon escapement in the mainstem of the Goodnews River in relation to index counts from the weir (Menard 1998 and 1999; Estensen 2003). Salmon escapement objectives for the Goodnews River were established in 1992 (Buklis 1993) at 25,000 sockeye salmon by either tower or weir counts in the Middle Fork of the Goodnews River, along with aerial survey indices of the main fork and lakes with an escapement objective of 15,000 sockeye salmon. The Kanektok River aerial escapement objective for sockeye salmon is 15,000 fish. Successful aerial surveys counting salmon escapement in the Kanektok and Goodnews Rivers have been dismal historically, very few surveys were conducted during peak spawning, and this has made escapement-based management problematic. However, commercial fisheries management has followed a simple fishing schedule based on fishery performance in relation to the historic mean CPUE of the commercial fishery and this has worked to provide sustained yields.

Current Issues and Fishery Outlook

Though the sockeye showed up late according to subsistence, sport, and commercial users, the 2006 season showed a strong return of sockeye to the Kuskokwim and Kuskokwim Bay. This was in addition to the previous strong years in 2004 and 2005. The 2007 year showed record returns on the Kanektok, with over 300,000 sockeye. In addition, the Goodnews escapement goal for sockeye was exceeded. For the Kuskokwim River, 2007 sockeye escapement enumeration remained above average, though not at the record numbers observed in 2005 and 2006. With four strong near-record years of returns in the Kuskokwim Bay and Kuskokwim drainage streams, all indications are that the sockeye returns for 2008 will likely remain above average, though it is difficult to predict whether this will continue.

Recent Board of Fisheries Actions

No recent Board actions have occurred for sockeye salmon. Although sockeye salmon catches have increased in the mainstem Kuskokwim River in recent years, much of the sockeye salmon

fishery occurs in the Kuskokwim Bay. Kuskokwim Bay fisheries are subject to the District 4 Salmon Management Plan, as prescribed by the Board of Fisheries. This Management plan sets guideline dates for the opening of the commercial salmon fishery before June 16. The Management Plan also describes basic rules regarding king salmon percentages allowed relative to sockeye salmon before the fishery is allowed to remain open.

Current or Recommended Research and Management Activities

Current research on sockeye salmon radiotelemetry and sampling for genetics has been undertaken by Commercial Fisheries Division (Gilk et. al. *unpublished*). Approximately half of the sockeye salmon in the Kuskokwim River have origins in the Holitna drainage, according to the Gilk study, followed by the Aniak River and distantly by other smaller drainages.

RESIDENT SPECIES FISHERIES

Rainbow Trout

Background and Historic Perspective

Combining salmon and rainbow trout fishing is probably one of the major attractions to worldwide anglers to the Kuskokwim area. Area rainbow trout stocks are extremely important to the people of the state and to the recreational and tourism based services that contribute to the state's economy.

Rainbow trout of the Kuskokwim-Goodnews Management Area are found only in the Lower Kuskokwim River tributaries and tributaries of Kuskokwim Bay. These stocks of rainbow trout are at the northern range of their geographic distribution. Many of these rainbow trout stocks in the Kuskokwim area are small, slow growing, mature at older age and are not particularly abundant. With any population on the edge of its distribution, it is more sensitive to changes in climatic changes and food availability. The Southwest Alaska Rainbow Trout Management Plan (ADF&G 1990) recognizes these factors and provides policy for conservative management and maintenance of rainbow trout stocks in the Lower Kuskokwim River and Kuskokwim Bay.

Rainbow trout stocks of the Kanektok River are considered "world class" with notoriety for high catch rates, the peak catch of 27,000 rainbow trout occurred in 1997. The most current 5-year average shows approximately 8,000 a year with virtually no harvest being reported during that period (Table 23). Rainbow trout catch rates from the Kanektok River rival those of the premier rainbow trout stocks of Alagnak and Copper rivers of Bristol Bay and the trophy rainbow trout area on the Kenai River, between Kenai and Skilak lakes. The Kanektok River is the largest rainbow trout fishery in the Kuskokwim Bay and Lower Kuskokwim River. Recently, angling effort in the Kanektok has fluctuated a little (Table 3), with angling effort in the past 5 years ranging from approximately 6,000 to 9,000 angler days. Overall, the rainbow trout catch in Kuskokwim Bay drainages has remained steady in the last 5 years, ranging from 11,000 to 16,000 with a slight spike in 2006. The sport fishing industry continues to report good catches and rainbow trout across all size categories.

Sport fishing effort, catch, and harvest are estimated by the SWHS. In the past, subsistence harvest surveys have focused on salmon in the LYLK, but in 2000 the Subsistence Division began to estimate resident fish harvests, including rainbow trout on a community basis. Commercial Fisheries Division manages all of the subsistence fisheries.

Recent Fishery Performance

Angler effort in all sport fisheries of the Kanektok River has seen a rapid increase from 1,500 angler-days in 1983 to over 12,000 angler-days in 1988 (Table 3). Since 1988, the effort has fluctuated from 3,000 to 9,000 angler-days and most likely reflects the availability of guiding services. In recent years, angler effort has fluctuated somewhat, with approximately 7,800 angler days in the Kanektok, and about 2,800 in the Goodnews River in 2006. Angler effort in the Aniak River sport fisheries was greater than 5,500 during a peak in 1998 but has since fluctuated between 2,000 and 4,000 angler-days. Angler effort in the Aniak is directed primarily towards king and coho salmon but rainbow trout are an important attraction. Total area-wide rainbow trout sport harvests have rarely exceeded 1,500 fish as seen in 1988, and the recent 5-year average is less than 300 rainbow trout (Tables 23 and 24).

In 2006, conditions beginning in late May were cold and generally wet. In many places conditions were not especially favorable for rainbow trout catch early in the summer, as the water was high and turbid, according to verbal reports from guides and individuals. Catches improved through the summer in both Kuskokwim River and Kuskokwim Bay drainages and were later reported to be above average at most Kuskokwim Bay/Kuskokwim River locations. This is reflected in high catch rates reported by the Statewide Harvest Survey, which approached three times the most recent 5-year average in the Lower Kuskokwim drainages at above 15,000 caught (Table 24), and about twice the most recent 5 year average for the Kuskokwim Bay drainages, with over 20,000 caught (Table 23). This however, is not an increase over historic catches that occurred in the late 1990s (Tables 23 and 24). Though catch rates were above average, nearly all sport-caught rainbow trout caught in the entire Kuskokwim-Goodnews area were released. Beginning in early August, conditions deteriorated somewhat due to rain with high, turbid water and catches were reported to be below average in most locations.

Fishery Objectives and Management

During the mid-1980s bag limits were adopted in the Kuskokwim area to eliminate excessive harvests. Bag limits at this time were very liberal providing opportunity for local people to meet their subsistence needs. During the February 1990 BOF meeting, the Board adopted regulations implementing a comprehensive management plan for rainbow trout in Southwest Alaska (ADF&G 1990). The plan provides guidance in the form of policy that gives the Board and the public clear understanding of the underlying principles by which rainbow stocks are to be managed and provides guidance to the board in developing future regulations. In conjunction with the adoption of this plan the Aniak River drainage (Figure 3) was designated a catch-and-release special management area above its confluence with the Doestock River with unbaited, single-hook, artificial lure restrictions.

During 1997, upper sections of the Kisaralik, Kwethluk, and entire length of the Kasigluk rivers were recognized as special rainbow trout waters following the Southwest Alaska Rainbow Trout Management Plan (ADF&G 1990) allowing the use of only unbaited, single-hook, artificial lures.

Current Issues and Fishery Outlook

The rainbow trout stocks of the Kuskokwim area provide high catch rates and low harvest rates; strong indicators of healthy fish populations. Local anglers and the guiding industry continue to provide positive comments on the rainbow trout stocks. Some concerns have been raised about

rainbow trout stocks on the Aniak River. The outlook for rainbow trout stocks in the Kuskokwim area is generally good. Rainbow trout greater than 25 inches are occasionally caught. In the short term the impacts of the rod and reel subsistence fishing appear to be minor, but resident fish populations rebuild slowly, particularly on their distribution boundary.

In March 2003 the BOF adopted the *Statewide management standards for wild trout* (5 AAC 75.220, 2003) that merge with existing regulations for rainbow trout stocks not under special management. Within the Kuskokwim Management Area this includes the Kasigluk, Arolik, Kisaralik and Kwethluk rivers which are not under special management regulations under the Southwest Rainbow Trout Management Plan. There are currently no major biological concerns for rainbow trout fisheries in the Kuskokwim and Kuskokwim Bay. With close attention to sport and subsistence harvests to ensure the health of local stocks, area stocks should continue to provide good angling opportunities for the 2008 season and beyond.

Recent Board of Fisheries Actions

During the 2000 March BOF meeting, a subsistence rod and reel provision was adopted in the AVCP region of the Yukon-Kuskokwim Delta area. A result of this rod and reel subsistence provision was that all sport fishing regulations in the AVCP region apply only to nonresident anglers. All Alaskan residents are considered subsistence users under state statutes and there were no bag or possession limits for subsistence users utilizing rod and reel, except for rainbow trout. Local residents of the village of Aniak were concerned with this change and sought additional protection in the Aniak River. A temporary Aniak River Subsistence Management Plan was created and the regulations mirrored the sport fishing regulations. The first subsistence catch-and-release fishery was created in the Aniak River.

During the January 2001 BOF meeting additional regulations were adopted to protect Lower Kuskokwim River rainbow trout in the sport fishery. Catch-and-release regulations are currently in effect for the entire Aniak River drainage rainbow trout sport fishery, gear restrictions remain in effect upstream of Doestock Creek. The rainbow trout regulations for the Lower Kuskokwim River tributaries of the Kasigluk and Kwethluk rivers were consistent. The bag and possession limit was reduced from two a day, with only one over 20 inches in length to one a day less than 14 inches in length, to protect mature spawning fish in the designated reaches of these streams. The downstream section below the Akiak Lodge site on the Kisaralik was also included in this management regime to provide consistent rainbow trout regulations for the area.

At the January 2004 meeting the BOF adopted regulations for the Arolik, Kasigluk, Lower Kisaralik, and Kwethluk which aligned the rainbow trout regulations in these four rivers with the *Statewide management standards for wild trout*. The bag and possession limit became two fish per day, only one 20 inches or greater in length and created an annual bag limit of two fish 20 inches or greater in length.

Current of Recommended Research and Management Activities

Several on-site creel surveys in the Kanektok and Aniak rivers have been done to verify catch, harvest and angler effort (Lafferty and Bingham 2002; Adams 1996; Dunaway 1997; Dunaway and Feischman 1995; Dunaway and Bingham 1992; Wagner 1991; Minard 1990; Minard and Brookover 1988; Minard 1987; Alt 1986). Emphases of these studies were on the sport fisheries that included rainbow trout fisheries as part of the study except the study by Wagner (1991). Wagner attempted to estimate rainbow trout using a mark-recapture experiment, although several

of the assumptions were invalid and a biased population estimate of 15,000 to 20,000 rainbow trout was obtained for a 32-kilometer study section. Expanding this information to a drainage wide estimate, the abundance of Kanektok rainbow trout was estimated to be in the range of 40,000 to 80,000 fish in 1986 and 1987.

Another tagging study of Kisaralik River rainbow trout in 1997 by the U.S. Fish and Wildlife Service estimated the rainbow trout population to be in excess of 16,000 rainbow trout in a 79-km study section (Harper et. al. 2005). The rainbow trout density estimates range from 200-rainbow trout/km in the Kisaralik River to 650-rainbow trout/km in the Kanektok River. Although these mark-recapture experiments were flawed because of the egress and migration of tagged fish within the study site, the density estimates are a rough approximation of density and provides confidence that existing catches by SWHS are sustainable. Area rainbow trout stocks continue to be conservatively managed.

Currently, a rainbow trout radiotelemetry project is scheduled for the Aniak drainage in fall of 2008. This project will follow the radiotagged fish the next two seasons in an attempt to gain insight into spawning areas and migratory habits. Depending on the results of the radiotelemetry study concerning fidelity of rainbow trout to specific areas in the Aniak drainage, there is potential to do a mark-recapture study following the completion of the radiotelemetry work.

In the near future, similar work may be conducted on the Kanektok and Goodnews Rivers. Preliminary meetings with interested parties (including Togiak National Wildlife Refuge, Kenai Fisheries Resource Office, and Alaska Department of Fish and Game Sport Fish Division staff) have indicated that cooperation for radiotelemetry work in the Kanektok drainage may happen as early as summer/fall 2009.

Dolly Varden/Arctic Char

Background and Historical Perspective

Dolly Varden/Arctic char (DV/AC) of the Kuskokwim River drainage are found throughout the area. The distribution of both Dolly Varden and Arctic char overlap in this area of Alaska, and it is potentially difficult to differentiate between the species. Populations of Dolly Varden are both anadromous and freshwater resident. Arctic char are primarily lake residents in this part of Alaska. The distributions and external characteristics of these species make identification a challenge. For management purposes this closely related species are treated as a composite.

Anglers focusing on DV/AC target mainly the clearwater tributaries and lakes of the area. Within the Kuskokwim Management Area, the largest catches of DV/AC occur in the tributaries of Kuskokwim Bay and the Aniak River. Many of the DV/AC are caught incidentally while anglers are fishing for salmon and rainbow trout. The regulations in place to protect rainbow trout also protect other resident fish species such as DV/AC. With catches generally exceeding 15,000 DV/AC, the Kanektok River is the largest fishery in the Kuskokwim Bay and Lower Kuskokwim River (Table 25). Goodnews and Aniak river DV/AC fisheries are the next largest sport fisheries in the area (Tables 25 and 26). These three fisheries are of primary interest to the angling public; angling services have increased in recent years as each of these streams gains increasing popularity. Local residents seek DV/AC when salmon are not available as a fresh source of fish. Stock sizes of DV/AC in the Kuskokwim area remain unknown.

Recent Fishery Performance

In 2006, conditions beginning in late May produced were cold and generally wet. In many places conditions were not especially favorable for DV/AC catch early in the summer, as the water was high and turbid, according to verbal reports from guides and individuals. Catches improved through the summer in both Kuskokwim River and Kuskokwim Bay drainages, and were later characterized as above average at most Kuskokwim Bay/ Kuskokwim River locations. This is reflected in high catch rates reported by the Statewide Harvest Survey, which were above average in the Kuskokwim Bay at over 45,000 caught, and Lower Kuskokwim at over 12,000 caught (Tables 25 and 26). Though catch rates were above average, nearly all sport-caught AC/DV caught in the entire Kuskokwim-Goodnews area were released. Beginning in early August, conditions deteriorated somewhat due to rain with high, turbid water and catches were reported to be below average in most locations.

Fishery Objectives and Management

Sport fishing effort, catch and harvest are estimated by the SWHS, estimates from the annual report are reviewed to ensure that sport harvests remain with sustainable yields. Sport fishing regulations are developed to match effort and harvest within sustainable bounds. Current regulations and harvests appear to be within sustainable levels for DV/AC of the Kuskokwim. High catches with low harvests are good indications of healthy fish stocks. Additionally, the low harvest rates are not an indicator of depressed fish stocks but of an underutilized resource. Declining sport harvests of DV/AC from the early 1980s to the 1990s can be attributed to the additional protection from the Southwest Alaska Rainbow Trout Management Plan and changing attitudes of anglers regarding the harvest of DV/AC (Tables 25 and 26).

Current Issues and Fishery Outlook

The DV/AC stocks of the Kuskokwim area are well protected in the area sport fisheries with the current regulations. Overall, high catches with low harvests are a strong indicator of healthy fish populations. The outlook for DV/AC and other resident fish species in the Kuskokwim area is currently good. The department has invested substantial effort in regulation development to protect resident fish species.

There are currently no major biological concerns for DV/AC fisheries in the Kuskokwim Management Area. Area stocks should continue to provide good angling opportunities for the 2007 season.

Recent Board of Fisheries Actions

The 2004 BOF meeting reinstated individual bag and possession limits for resident species in the Aniak over the aggregate bag and possession limits that were adopted in 2001. The current AC/DV limit in the Aniak is 3 fish, no size limit. The Kuskokwim Bay rivers (Kanektok, Arolik, and Goodnews) have the same limit for AC/DV, as does the entire Holitna drainage. Those Upper Kuskokwim drainages upstream of the Holitna are governed by the general regulation for AC/DV and lake trout which for flowing waters is a bag limit of 10 per day, only two 20 inches or greater and only 2 may be lake trout. In lakes, the aggregate bag and possession limit for DV/AC and lake trout is 2 fish, no size limit. The rest of the Kuskokwim drainages downstream of the Holitna River, with the exceptions already named, have a Dolly Varden/Arctic char bag limit of 5 fish, with only two 20" or longer.

Arctic Grayling

Background and Historical Perspective

Arctic grayling are probably the most widely distributed and abundant resident fish in the Kuskokwim Management Area. Grayling are found throughout many lakes, streams and clear water tributaries of the area. Non-resident anglers access most of the area via float trips on many of the clear water tributaries. Anglers typically catch grayling while targeting salmon and rainbow trout. Current sport fishing regulations for rainbow trout provide additional protection to other fish species with gear and hook restrictions in local tributaries. Recent grayling harvests in the Kuskokwim are about 500 fish (Tables 27 and 28). Recent sport catches are approximately 13,000 grayling. The Aniak River is the largest grayling fishery in the area, with the Kisaralik and Kanektok fisheries the next largest sport fisheries.

Recent Fishery Performance

In 2006, conditions beginning in late May produced were cold and generally wet. In many places conditions were not especially favorable for grayling catch early in the summer, as the water was high and turbid, according to verbal reports from guides and individuals. Catches improved through the summer in both Kuskokwim River and Kuskokwim Bay drainages, and were later reported to be average or below average at most Kuskokwim Bay/Kuskokwim River locations (Tables 27 and 28). For the entire Kuskokwim-Goodnews area, this was about 15,000 grayling caught, down from a combined 5-year average of over 18,000 caught. This is somewhat deceptive though, for the 2006 season, as fishing for other species such as rainbow trout and Arctic char/Dolly Varden was characterized by many individuals and guides as being exceptional. Grayling are often viewed as the species to target if the other, more desirable species are not available or easy to catch. Nearly all sport-caught grayling caught in the entire Kuskokwim-Goodnews area were released. Beginning in early August, conditions deteriorated somewhat due to rain with high, turbid water and catches were reported to be below average in most locations.

Fishery Objectives and Management

Sport fishing effort, catch and harvest are estimated by the SWHS, estimates from the annual report are reviewed to ensure that sport harvests remain within sustainable bounds. The focus of sport fishing regulations development is to enhance opportunity and maintain harvest within sustainable bounds. Current regulations and harvests appear to be within sustainable levels for Arctic grayling of the Kuskokwim. High catch rates with low harvests indicate healthy fish stocks. Additionally, the low harvest rates are not an indicator of depressed fish stocks but of an under utilized resource. The declining harvest rates of grayling from the early 1980s to the 1990s can be attributed to the additional protection of the regulation changes and changing attitudes of anglers regarding the harvest of grayling (Tables 27 and 28), as well as the development of more stringent regulations regarding catch-and-release of rainbow trout, especially in the Aniak River and Lower Kuskokwim Rivers. These systems now require unbaited single hook artificial lures, which lessens the catch (and harvest) of grayling as well as providing added protection for the rainbow trout for which the regulations were designed

Current Issues and Fishery Outlook

The grayling stocks of the Kuskokwim area are well protected with the current sport fishing regulations. A relatively high catch rate with low harvests is a strong indicator of healthy fish

populations. There are currently no major biological concerns for grayling fisheries in the Kuskokwim. Area stocks should continue to provide good angling opportunities for the 2008 season.

Recent Board of Fisheries Actions

During the 2001 January BOF meeting, both the subsistence and sport fishing bag and possession limits for resident fish in the Aniak River were enacted with the establishment of an aggregate bag limit. A six fish resident species limit was enacted for subsistence anglers during June, July and August. Sport anglers were restricted to an aggregate three (3) resident fish limit, but only allowing one fish of the following species: DV/AC, grayling, lake trout, sheefish, pike and burbot in any combination.

The 2004 BOF meeting reinstated individual bag limits for resident species in the Aniak River. The current Aniak grayling bag and possession limit is 2 fish, no size limit.

Northern Pike

Background and Historic Perspective

Most northern pike are harvested in lakes, streams and tributaries of the Kuskokwim River drainage. Very few pike (less than 50) are being recorded through the SWHS in the Kuskokwim Bay area. Some of the northern pike that are recorded by the SWHS may more accurately be described as subsistence-caught fish under the rod and reel subsistence fishery. The largest northern pike sport fishery occurs in the Aniak River; however, there are a number of sloughs and unnamed lakes that provide northern pike fishing opportunities in the area (Table 29). Local anglers seek northern pike when salmon are not available as a fresh source of fish, mostly during the winter months. Most of the local Bethel subsistence effort is focused during the winter at the mouth of the Johnson River. Localized depletion is evident from repeated comments of only small “hammer handle” northern pike in the subsistence harvest. Stock sizes of northern pike in the Kuskokwim remain unknown.

Recent Fishery Performance

Northern pike harvests are in a declining trend in the Lower Kuskokwim River. From 1996 to 2005, northern pike harvests averaged over 900 fish, while from 2001 to 2005, harvests averaged below 400 fish (Table 29). In 2006, only 66 northern pike were estimated to be harvested in the Lower Kuskokwim area. Catch of northern pike during these same periods remained constant at approximately 2,000 fish. In the Upper Kuskokwim, above Aniak, the catch and effort has increased slightly, mainly in the Holitna River. The 2001–2005 catch averages near 3000 for the Upper Kuskokwim, compared to the 1996–2005 average which is closer to 2000. Similarly, harvest has gone up, averaging near 400 in the 10 year period from 1996 to 2005, to near 700 in the 5 year period from 2001 to 2005 (Tables 4 and 5).

Fishery Objectives and Management

Sport fishing effort, catch and harvest are estimated by the SWHS, estimates from the annual report are reviewed to ensure that sport harvests remain within sustainable bounds. The focus of sport fishing regulations development is to enhance opportunity and maintain harvest within sustainable bounds. Current harvests appear to be within sustainable levels for northern pike of the Kuskokwim. High catches with low harvests indicate healthy fish stocks. Additionally, the low harvest rates are not an indicator of depressed fish stocks but of low levels of use (Table 29).

Annual sport harvests of northern pike have fluctuated in recent years, but harvests have remained very low (Table 29). The Kuskokwim River northern pike daily bag and possession limit is 10, with no size limit, except for the following: For those waters downstream of the Holitna to the mouth of the Kuskokwim River, the daily bag and possession limit is 5, with only one over 30 inches.

Current Issues and Fishery Outlook

There are no current biological concerns for the sport fisheries for northern pike in this area. There were no reported problems by anglers having difficulties locating northern pike during 2004 and 2005. Other area stocks should continue to provide good angling opportunities for the 2008 season.

Recent Board of Fisheries Actions

During the 2001 January BOF meeting, both the subsistence and sport fishing bag and possession limits for resident fish in the Aniak River were enacted with the establishment of an aggregate bag limit. A six resident fish species limit was enacted for subsistence anglers during June, July and August. Sport anglers were restricted to an aggregate three (3) resident fish limit, but only allowing one fish of the following species: DV/AC, grayling, lake trout, sheefish, northern pike and burbot in any combination.

The 2004 BOF meeting reinstated individual bag and possession limits in the Aniak River, which reverted to the 5 northern pike per day daily bag and possession limit, with only one over 30”.

Current or Recommended Research and Management Activities

An evaluation of the subsistence fishery at the mouth of the Johnson River should be conducted to investigate public comments regarding the small size of the northern pike harvested during the winter fishery.

Sheefish

Background and Historical Perspective

Most sheefish are harvested in streams and tributaries within the Kuskokwim. The largest sheefish sport fishery occurs in the Holitna River. This harvest and catch of sheefish by the sport fishery remains very low (Table 30). A few local anglers have recently begun prospecting for sheefish in the lower tributaries of the Kuskokwim. Local anglers seek sheefish in spring and fall when salmon are not available as a fresh source of fish. Stock sizes of sheefish in the Kuskokwim River drainage are unknown. Previous work suggests that there may be at least two stocks, one specific to spawning in the Upper Kuskokwim near Big River. These were observed in spawning condition in late fall (Alt 1987). Other Kuskokwim area projects have noted high concentrations of sheefish in various times in other areas of the Kuskokwim River (Stuby *pers. comm.*).

Recent Fishery Performance

There were no reported problems by anglers having difficulties locating sheefish during recent years in the Kuskokwim, except for poor fishing conditions attributed to high water or late breakup. Generally, local people in the lower river near Bethel tend to harvest sheefish during the king salmon fishery, while people in the upper river, especially near the Holitna and Aniak

Rivers, and the upriver areas near McGrath tend to catch sheefish mid-summer through to late fall, and occasionally through the ice during winter.

Fishery Objectives and Management

Sport fishing effort, catch and harvest are estimated by the SWHS. Estimates from the annual report are reviewed to ensure that sport harvests remain within sustainable yields. The focus of sport fishing regulations development is to enhance opportunity and maintain harvest within sustainable bounds. Current harvests appear to be within sustainable levels for sheefish of the Kuskokwim. High catches with low harvests indicate healthy fish stocks (Tables 4, 5 and 30). Additionally, the low harvests are not an indicator of depressed fish stocks but an under utilized resource.

Current Issues and Fishery Outlook

There are no current biological concerns for the sheefish fisheries in this area. Area stocks should continue to provide good angling opportunities for the 2008 season.

Recent Board of Fisheries Actions

There have been no recent BOF actions regarding the Kuskokwim sheefish fisheries.

Current or Recommended Research and Management Activities

A radiotelemetry project began in 2007, with the hopes of identifying spawning locations and gathering overwintering and genetic information. Though this project is well under way at this point, data is still pending.

Lake Trout

Background and Historical Perspective

Most lake trout are harvested in lakes of the headwater rivers and tributaries within the Kuskokwim. Many of these lakes are located in the Lower Kuskokwim and Kuskokwim Bay area. Anglers utilize lakes in the headwaters to begin float trips on adjacent streams and rivers. However there are a few local anglers with float or ski planes fishing on local lakes for lake trout throughout the year. Local residents commonly seek lake trout when salmon are not available as a fresh source of fish. Stock sizes of lake trout in the lakes of the Kuskokwim are unknown. Lake trout of the Kuskokwim are similar to other Alaskan lake trout stocks. They are long-lived, slow-growing, late-maturing fish that can be easily overexploited in a relatively short period of time. Many of the lakes that contain lake trout are high altitude alpine lakes that have a short open water period with a short growing period. Historical harvests of lake trout in other locations in the state of Alaska suggest that past sport fishing practices can rapidly deplete lake trout stocks in small lakes.

Recent Fishery Performance

There were no angler reports of problems of locating lake trout in 2006 in the Kuskokwim. Generally, lake trout catches have remained relatively low, with correspondingly low harvests. The Kuskokwim Bay catch rates averaged near 600 for the 1996–2005 period, with harvests averaging near 50 (Table 31). For the Lower Kuskokwim Rivers, similar catch and harvest rates were observed, with the 1996–2005 average harvest near 100, with average catch near 500 (Table 32).

Fishery Objectives and Management

Sport fishing effort, catch and harvest are estimated by the SWHS, estimates from the annual report are reviewed to ensure that sport harvests remain within sustainable yields. Sport fishing regulations are developed to match effort and harvest within sustainable bounds. Current regulations and harvests appear to be within sustainable levels for lake trout of the Kuskokwim. High catch rates with low harvest rates indicate healthy fish stocks. Occasionally there is some misidentification between Dolly Varden/Arctic char and lake trout. Some of the large harvests that arise in the SWHS report need further investigation from time to time to ensure proper identification for accurate reporting. Recent catch and harvest data suggest overall very low fishing pressure from the sport fishery.

Current Issues and Fishery Outlook

Exploitation of area lake trout stocks appears to be low due to low levels of angler effort resulting in low harvests (Table 32). It is difficult to distinguish lake trout from lake-resident Dolly Varden/Arctic char inhabiting the same lake from external characteristics and markings. Current low harvest rates combined with high catch rates suggest healthy fish populations. Lake trout studies conducted in Region III have shown that even low levels of harvest can over exploit small populations of lake trout.

The outlook for lake trout and other resident fish species in the Kuskokwim area is good. The department and the BOF have invested substantial effort in regulation development to protect resident fish species. Currently the Department has not identified a biological concern for lake trout fisheries in the Kuskokwim. Area stocks should continue to provide good angling opportunities for the 2008 season.

Recent Board of Fisheries Actions

During the January 2001 meeting the BOF established an aggregate bag limit for resident fish species for both subsistence and sport anglers in the Aniak River. A six resident fish species limit was enacted for subsistence anglers during June, July and August. Sport anglers were restricted to an aggregate three (3) resident fish limit, but only allowing one fish of the following species: DV/AC, grayling, lake trout, sheefish, pike and burbot in any combination.

This regulation was replaced with individual bag limits by the 2004 BOF meeting. The current bag and possession limit for lake trout is 2 per day, except for restrictions in the Aniak River.

Current or Recommended Research and Management Activities

At some point in the near future there should be monitoring activity on at least one of the headwater lakes in either Kuskokwim Bay or the lakes that drain into the Lower Kuskokwim River. A good candidate would be Aniak Lake or Pegati Lake, since they both receive a fair number of visitors, and similar lake trout utilization (Tables 31 and 32). These lake/river systems have a similar size and lake trout catch and harvest to the other Lower Kuskokwim or Kuskokwim Bay lakes. They may be able to serve as proxy for the health of the lake trout stocks in nearby air-accessible lakes.

Burbot

Background and Historic Perspective

Burbot are harvested mainly by subsistence fishermen in the rivers and tributaries within the Lower Kuskokwim River. Local residents commonly seek burbot when salmon are not available as a fresh source of fish. Stock size of burbot in the Kuskokwim River drainage is unknown but is believed to be fairly large. Local depletion has been known to occur in locations of intensive fishing, such as river mouths during the winter. Under current regulations which allow for “rod and reel subsistence” in the Kuskokwim drainage, most users are currently classified as subsistence harvesters rather than sport fishers, which is reflected in the decline in reported burbot harvests by the Statewide Harvest Survey (Table 33). Prior to the rod and reel subsistence era, the burbot harvest estimate swung drastically from low to high. This was likely due to a limited number of respondents to the Statewide Harvest Survey having high catch and harvest rates, which showed up whenever they got the survey. Later, the reasons for the decline from a harvest over 1,000 reported in 1990 to 0 reported in 2006 (Table 33) may be attributed to changing tastes: younger generations don’t like to eat them as much as the older generations did.

Recent Fishery Performance

There were no reported problems of anglers having difficulties locating burbot during recent seasons in the Kuskokwim. There were occasionally some larger harvests associated with burbot in the Lower Kuskokwim in the latter half of the 1990s (Table 33). These larger harvests may be associated with increased burbot harvest in the lower river near Bethel prior to the “rod and reel subsistence” regulations coming into effect. The “rod and reel subsistence” regulations seem to have relegated the harvests mostly to subsistence efforts, though some burbot harvests are observed on Alaska Department of Fish and Game Sport Fish Division’s Statewide Harvest Survey. Many of the respondents to Sport Fish Division’s Statewide Harvest Survey may have included local residents as well as non-local sport fishermen.

Fishery Objectives and Management

Sport fishing effort, catch and harvest are estimated by the SWHS; estimates from the annual report are reviewed to ensure that sport harvests remain with sustainable yields. Sport fishing regulations are developed to match effort and harvest within sustainable bounds. Current regulations and harvests appear to be within sustainable levels for burbot of the Kuskokwim. The current bag and possession limit is 15 burbot a day. The low harvests are not an indicator of depressed fish stocks but an under utilized resource (Table 33).

Current Issues and Fishery Outlook

Currently the department has not identified a biological concern for burbot stocks or fishery concerns in the Kuskokwim. Area burbot stocks should continue to provide similar angling opportunities for the 2008 season.

Recent Board of Fisheries Actions

During the January 2004 BOF Meeting, the removal of the aggregate bag limit for resident fish species for both subsistence and sport anglers occurred in the Aniak River. Sport fish regulations remain somewhat more restrictive for other species on the Aniak, but for burbot, the general regulations apply.

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TABLES AND FIGURES

Table 1.—Annual sport fishing effort, in angler days, for Alaska, Region III, and the Kuskokwim Management Area waters as estimated by the SWHS, 1977–2006.

Year	Statewide	Region III	Percent of Statewide	Kuskokwim Mgmt Area	Percent of Region III
1977	1,197,590	123,161	10.3		
1978	1,285,063	145,492	11.3		
1979	1,364,739	126,096	9.2		
1980	1,488,962	160,266	10.8		
1981	1,420,172	148,886	10.5		
1982	1,623,090	198,791	12.2		
1983	1,732,528	199,361	11.5		
1984	1,866,837	199,041	10.7	14,597	7.3
1985	1,943,069	186,883	9.6	12,484	6.7
1986	2,071,412	194,713	9.4	11,842	6.1
1987	2,152,886	217,109	10.1	18,958	8.7
1988	2,311,291	233,559	10.1	26,171	11.2
1989	2,264,079	239,626	10.6	18,907	7.9
1990	2,453,284	245,629	10.0	15,858	6.5
1991	2,456,328	219,922	9.0	13,055	5.9
1992	2,540,374	181,852	7.2	14,404	7.9
1993	2,559,408	220,972	8.6	14,505	6.6
1994	2,719,911	209,987	7.7	18,117	8.6
1995	2,787,670	270,141	9.7	16,289	6.0
1996	2,006,528	201,166	10.0	16,420	8.2
1997	2,079,514	238,856	11.5	27,318	11.4
1998	1,856,976	227,841	12.3	27,913	12.3
1999	2,499,152	304,522	12.2	26,563	8.7
2000	2,627,805	241,574	9.2	20,030	8.3
2001	2,262,346	194,531	8.6	20,673	10.6
2002	2,259,091	220,276	9.8	20,645	9.4
2003	2,219,398	206,705	9.3	24,369	11.8
2004	2,473,961	217,041	8.8	25,406	11.7
2005	2,463,929	183,535	7.4	19,447	10.6
2006	2,298,092	175,274	7.6	22,389	12.8
2006 as % of 5-year average	98%	86%		99%	
1996-2005 Average	2,274,830	223,565	9.8	19,271	8.6
2001-2005 Average	2,335,664	204,339	8.7	22,563	11.0

Table 2.–Kuskokwim Management Area (including Kuskokwim Bay drainages) sport fish harvest by species, 1989–2006.

Species	Year																	Average	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	1996-2005	2001-2005
King Salmon	897	786	1,046	1,674	2,148	1,328	2,439	3,345	3,401	1,400	1,181	1,384	1,397	734	1,197	2,184	1,277	1,813	1,379
Coho Salmon	1,358	2,087	2,033	2,056	2,978	2,771	5,231	5,430	4,897	3,974	3,294	4,474	4,265	5,297	7,096	5,591	3,793	4,849	5,345
Sockeye Salmon	620	214	189	715	894	277	752	1,181	1,867	1,154	822	422	267	289	512	792	864	811	456
Pink Salmon	347	36	219	27	126	16	167	75	133	0	10	11	143	46	416	66	187	114	136
Chum Salmon	749	647	927	731	1,626	455	517	384	596	520	359	176	598	67	117	608	158	373	313
Rainbow Trout	475	774	404	486	299	429	567	1,336	539	510	106	17	76	204	457	141	107	369	179
Lake Trout	72	272	356	218	40	215	126	404	141	128	152	63	134	244	497	233	83	200	234
Dolly Varden/Arctic char	1,797	2,924	802	1,499	1,398	1,260	1,743	3,337	1,581	2,038	1,612	1,698	2,026	2,710	2,539	2,135	1,937	2,123	2,222
Arctic Grayling	1,340	2,603	545	739	850	845	663	1,292	3,554	1,290	361	807	1,464	1,259	1,953	1,287	637	1,324	1,354
Northern Pike	231	2,018	752	995	828	655	344	408	2,711	548	531	474	443	783	1,543	3,749	406	1,085	1,398
Whitefish	88	158	286	253	183	0	20	614	1,220	9	214	20	54	89	975	209	58	317	269
Burbot	1,125	40	169	214	20	0	0	0	185	228	588	50	15	87	111	75	0	122	68
Sheefish	107	154	292	54	390	272	20	589	277	268	250	124	81	45	182	1,079	173	281	302
Smelt	211	0	1,136	3,343	2,292	633	1,313	27	3,333	0	68	0	0	0	281	0	291	483	56
Halibut	144	0	33	54	45	21	0	50	350	0	53	0	0	0	0	32	0	44	6

Table 3.—Sport fishing effort (angler days) in the Lower Kuskokwim River and Kuskokwim Bay drainages, 1990–2006.

Year	Kuskokwim Bay				Lower Kuskokwim River					Grand Total
	Kanektok	Goodnews	Other	Total	Aniak	Kisaralik	Kwethluk	Other	Total	
1990	4,525	1,507	4,512	10,544	1,964			3,610	5,574	16,118
1991	3,078	1,328	2,656	7,062	3,078			2,126	5,204	12,266
1992	4,972	1,387	2,068	8,427	2,604		640	1,654	4,898	13,325
1993	3,791	2,276	2,844	8,911	2,056		554	2,275	4,885	13,796
1994	6,505	2,038	1,406	9,949	1,815	1,463	466	1,124	4,868	14,817
1995	5,512	1,030	743	7,285	3,569	369	387	1,600	5,925	13,210
1996	8,305	2,322	625	11,252	3,964	1,525	1511	2,891	9,891	21,143
1997	9,706	5,011	1,807	17,999	4,778	1,578	642	1,445	8,443	26,442
1998	8,114	4,007	1,158	13,626	5,548	1,021	1498	1,306	9,373	22,999
1999	8,194	8,353	705	17,560	3,235	1,316	402	1,992	6,945	24,505
2000	7,231	4,038	121	11,403	2,141	2,084	1,131	472	6,100	17,503
2001	9,063	2,826	201	12,206	2,121	1,304	1,069	258	4,752	16,958
2002	5,885	3,215	271	10,136	2,688	2,410	920	1,620	7,638	17,774
2003	7,655	3,622	133	11,659	2,998	1,439	2,646	3,548	10,631	22,290
2004	6,364	2,499	410	10,729	4,186	2,071	2,021	340	8,618	19,347
2005	5,789	2,612	32	8,854	2,497	714	2,022	525	5,758	14,612
2006	7,861	2,833	342	11,682	3,096	See Other	1,922	1,867	9,034	22,389
Average 1996-2005	7,631	3,851	546	12,542	3,416	1,546	1,386	1,440	7,815	20,357
Average 2001-2005	6,951	2,955	209	10,717	2,898	1,588	1,736	1,258	7,479	18,196

Table 4.–Sport fishing effort and harvest of principal species in the Upper Kuskokwim River drainage (1990–2006).

	Year																		Average		
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	1996-05	2001-05		
All Kuskokwim drainages upstream of the Aniak River (including Holitna)																					
Fishing Effort (angler-days)	2,275	1,966	1,829	2,650	2,993	2,181	1,417	2,643	2,557	2,207	2,453	3,531	669	3,241	4,121	2,758	1,630	2,560	2,864		
Harvests																					
King Salmon	-	-	55	85	108	169	288	279	174	36	55	219	-	48	186	241	29	170	174		
Chum Salmon	216	119	129	225	-	-	121	-	167	-	13-	41	-	-	-	325	0	164	183		
Sockeye Salmon	12	-	49	112	43	-	9	32	-	33	23	152	-	-	144	379	181	110	225		
Coho Salmon	36	481	275	55	244	170	327	872	95	1,028	730	408	227	1,446	1,504	602	148	724	837		
Arctic Grayling	301	569	107	218	284	357	309	209	1858	142	179	458	108	536	1,651	597	314	605	670		
Northern Pike	53	1,480	256	142	314	381	131	295	278	144	186	330	74	483	862	1,536	340	432	657		
Sheefish	53	141	173	45	130	151	47	310	43	130	92	124	-	45	156	803	153	194	282		
Dolly Varden	18	245	65	79	156	78	85	143	67	112	71	253	-	629	765	337	421	274	496		
Total Catch																					
Holitna River																					
Fishing Effort (angler-days)	398	1,022	480	763	949	640	747	1,678	771	1,236	791	1,853	1,296	1,748	993	1,452	542	1,257	1,468		
Harvests																					
King Salmon	-	-	23	68	40	19	256	166	54	25	22	73	53	48	136	180	16	101	98		
Chum Salmon	14	119	91	208	-	-	33	-	-	-	-	41	19	-	0	293	0	77	88		
Sockeye Salmon	-	-	-	43	-	-	-	21	-	-	12	48	16	-	124	345	136	94	133		
Coho Salmon	12	205	130	-	-	170	157	379	-	893	426	153	339	998	819	263	85	492	514		
Arctic Grayling	18	312	23	-	-	184	121	101	124	74	38	154	144	259	846	403	43	226	361		
Northern Pike	53	504	145	9	155	166	102	134	103	106	112	145	78	249	820	1,136	312	299	486		
Sheefish	53	128	173	45	130	113	26	168	35	102	58	124	18	15	156	349	14	105	132		
Dolly Varden	18	216	-	79	-	52	61	64	25	112	112	143	77	549	372	203	122	172	269		
Holitna total harvest	168	1,484	585	452	325	704	769	1,055	341	1,312	686	168	744	2,118	3,273	3,172	606	720			
Total harvest	775	3,151	1,411	1,578	1,404	1,378	1,459	2,191	2,789	1,688	1,550	1,985	1,747	3,261	6,198	6,089	2,192	1,364	1,895		

Table 5.–Sport catch of principal species in the Upper Kuskokwim River drainage (1990–2006).

	Year																	Average	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	1996-05	2001-05
<i>All Kuskokwim drainages upstream of the Aniak River (including Holitna)</i>																			
King Salmon	27	-	288	725	207	401	745	2,423	1,121	1,332	217	3,497	707	833	1,086	581	436	1,254	1,341
Chum Salmon	448	199	578	1,063	247	414	406	116	278	474	61	1,013	762	1,500	1,131	2,530	2,115	827	1,387
Sockeye Salmon	24	76	189	980	60	-	164	457	84	75	242	1,765	24	105	333	573	180	382	560
Coho Salmon	207	717	558	242	480	481	1,279	3,784	294	3,460	3,742	5,037	3,887	7,989	9,641	5,415	843	4,453	6,394
Arctic Grayling	2,761	4,082	1,775	2,103	2,556	2,036	2,241	3,881	11,015	1,636	2,149	7,255	2,428	8,646	15,161	2,192	2,637	5,660	7,136
Northern Pike	634	2,197	1,230	1,565	1,877	3,080	1,855	1,845	2,094	2,914	2,735	3,469	2,133	2,345	5,527	6,023	362	3,094	3,899
Sheefish	193	398	508	1,317	208	622	512	1,394	771	813	883	2,974	307	768	883	3,460	200	1,277	1,678
Dolly Varden	387	3,485	647	2,204	662	1,062	644	1,892	364	589	313	387	1,922	4,144	7,554	1,152	2,123	1,896	3,032
Total Catch	4,734	11,302	6,550	10,572	6,772	8,137	8,183	16,020	16,367	11,567	11,300	26,182	12,869	26,330	41,316	21,926	8,896	19,206	25,725
<i>Holitna River</i>																			
King Salmon	27	-	109	375	110	91	662	786	335	240	22	823	210	272	619	470	173	261	363
Chum Salmon	101	159	471	881	38	327	230	116	25	135	-	350	426	209	426	1,638	802	2,227	2,911
Sockeye Salmon	-	76	-	902	-	-	-	64	84	-	124	951	24	105	270	467	431	3,513	4,602
Coho Salmon	122	205	154	-	-	472	939	1,145	-	2,005	1,404	4,027	613	4,699	3,046	2,168	400	2,162	2,466
Arctic Grayling	264	1,953	8	372	228	631	615	1,803	8,303	1,016	381	4,859	1,200	5,492	10,241	1,218	704	743	829
Northern Pike	317	830	752	842	973	1,488	1,47	1,308	1,379	2,146	2,292	2,579	699	1,318	4,628	3,105	2,512	1,276	2,067
Sheefish	158	372	508	1,317	189	472	206	1,098	729	745	512	381	270	59	591	2,843	142	743	829
Dolly Varden	35	3,038	164	1,326	9	430	364	968	305	589	200	2,229	618	3,256	3,921	313	1,218	1,276	2,067
Holitna total catch	1,024	6,633	2,194	6,370	1,565	3,911	4,554	7,319	11,169	6,876	5,210	16,245	4,060	15,410	23,742	12,692	6,382	1,058	13,300

Table 6.–Peak aerial survey index counts of king salmon in tributaries of the Lower Kuskokwim River, 1983–2006.^a

Year	Eek River	Kwethluk River	Kisaralik River	Tuluksak River	Aniak River	Kipchuk River ^b	Salmon River ^b
1983	188	471	731	129	1,909		231
1984		273	157	93	1,409		
1985	1,118	629		135			
1986					909		336
1987	1,739	975		60		193	516
1988	2,255	766	840	188	945		244
1989	1,042	1,157	152		1,880	994	631
1990	1,983	1,295	631	166	1,255	537	596
1991	1,312	1,002		342	1,564	885	583
1992					2,284	670	335
1993					2,687	1,248	1,082
1994		848	1,021		1,848	1,520	1,218
1995			1,243		3,174	1,215	1,442
1996					3,496		983
1997			439	173	2,187	855	980
1998		27	457		2,239	353	
1999							
2000					714	182	152
2001							598
2002		1,795	2,285		1,856	1,615	1,236
2003	1,236	2,628	654	94	3,514	1,493	1,242
2004	4,653	6,801	6,913	1,196	5,569	1,868	2,177
2005		5,002	4,081	672		1,944	4,097
2006			4,734		5,639	1,618	
SEG ^c							
		580-1800	400-1200		1200-2300		600
Median							
	1,312			280		778	

^a Estimates are from peak aerial surveys conducted between July 20 and July 31 under fair, good, or excellent conditions.

^b Tributaries of Aniak River.

^c Sustainable Escapement Goal (ADF&G 2004)

Table 7.—Harvest of king salmon in the commercial, subsistence, test and sport fisheries of the Kuskokwim River, 1983–2006.

Year	Harvest				Total
	Commercial ^a	Subsistence ^b	Test Fishery	Sport ^c	
1983	33,174	47,412	1,139	420	82,145
1984	31,742	56,930	231	273	89,176
1985	37,889	43,874	79	85	81,927
1986	19,414	51,019	130	49	70,612
1987	36,179	67,325	384	355	104,243
1988	55,716	70,943 ^d	576	528	127,763
1989	43,217	81,176	543	1,218	126,154
1990	53,504	85,979	512	394	140,389
1991	37,778	85,554	117	401	123,850
1992	46,872	64,795	1,380	367	113,414
1993	8,735	87,512	2,483	587	99,317
1994	16,211	93,242	1,937	1,139	112,529
1995	30,846	96,436	1,421	541	129,244
1996	7,419	78,063	247	1,432	87,161
1997	10,441	81,577	332	1,227	93,577
1998	17,359	81,265	210	1,434	100,268
1999	4,705	73,194	98	252	78,249
2000	444	64,893	874	105	66,316
2001	90	73,610	86	290	74,076
2002	72	71,334	288	319	72,013
2003	150	67,788	409	734	68,347
2004	4,784	80,065	1,134	1,197	85,983
2005	2,777	68,213	883	1,092	71,873
2006	2,777	64,897	352	1,277	68,470
1996-2005 Average	4,824	74,000	456	808	79,786
% Total Harvest	6%	92.4%	0.6%	1.0%	
2001-2005 Average	1,575	72,202	560	726	74,458
% Total Harvest	2.1%	97%	0.7%	1.0%	

a. District 1 and 2; also includes harvests in District 3 from 1960 to 1965.

b. Estimated subsistence harvest expanded from villages surveyed.

c. Statewide Harvest Survey (1977-2006).

d. Beginning in 1988, subsistence estimates are based on new methodology, not comparable with previous years.

Table 8.–Harvest of king salmon in the commercial, subsistence, and sport fisheries in the Goodnews River, 1981–2006.

Year	Harvest			
	Commercial ^a	Subsistence ^b	Sport	Total
1981	7,190	1,409		8,599
1982	9,476	1,236		10,712
1983	14,117	1,066	31	15,214
1984	8,612	629		9,241
1985	5,793	426	323	6,542
1986	2,723	555		3,278
1987	3,357	816		4,173
1988	4,964	310 ^d		5,274
1989	2,966	467	68	3,501
1990	3,303	682		3,985
1991	912	682	26	1,620
1992	3,528	252	23	3,803
1993	2,117	488	81	2,686
1994	2,570	657	163	3,390
1995	2,922	552	41	3,515
1996	1,375	526	157	2,058
1997	2,039	449	86	2,574
1998	3,675	718	431	4,824
1999	1,888	871	223	2,982
2000	4,442	703	243	5,388
2001	1,519	895	147	2,561
2002	979	857	224	2,060
2003	1,412	649	10	3,483
2004	2,565	851	100	3,516
2005	2,035	868	0	
2006	2892	676	79	
1996-2005 Average	2,193	723	162	3,078
% Total Harvest	71.2%	23.5%	5.3%	
2001-2005 Average	1,702	792	96	2,590
% Total Harvest	65.7%	30.6%	3.7%	

a. Goodnews District commercial harvest (Linderman et. al *in prep*)

b. Subsistence harvest by the community of Goodnews (Linderman et. al. *in prep*)

d. Beginning in 1988, subsistence estimates are based on new methodology, not comparable with previous years.

* Estimate based on 10 year average 1995-2004.

Table 9.—Harvest of king salmon in the commercial, subsistence, and sport fisheries in the Kanektok River, 1983–2006.

Year	Harvest			
	Commercial ^a	Subsistence ^b	Sport	Total
1983	46,385	2,542	1,511	50,438
1984	33,633	3,109	922	37,664
1985	30,401	2,341	672	33,414
1986	22,835	2,682	938	26,455
1987	26,022	3,663	508	30,193
1988	13,883	3,690 ^f	1,910	19,483
1989	20,820	3,542	884	25,246
1990	27,644	6,013	503	34,160
1991	9,480	3,693	316	13,489
1992	17,197	3,447	656	21,300
1993	15,784	3,368	1,006	20,158
1994	8,564	3,995	751	13,310
1995	38,584	2,746	739	42,069
1996	14,165	3,075	689	17,929
1997	35,510	3,433	1,632	40,575
1998	23,158	4,041	1,475	28,674
1999	18,426	3,167	854	22,447
2000	21,229	3,106	833	25,168
2001	12,775	2,923	947	16,645
2002	11,480	2,475	779	14,734
2003	14,444	3,898	323	18,665
2004	25,465	3,726	228	29,419
2005	24,195	3,083	520	27,798
2006	24,853	n/a	754	
1996-2005 Average	20,085	3,293	828	24,205
% Total Harvest	83%	13.6%	3.4%	
2001-2005 Average	17,672	3,221	559	21,452
% Total Harvest	82.4%	15%	2.6%	

^a. Quinhagak District commercial harvest. Source: Whitmore et. al 2008.

^b. Subsistence harvest by the community of Quinhagak. Source: Whitmore et. al 2008.

^c. Beginning in 1988, subsistence estimates are based on new methodology, not comparable with previous years.

Table 10.—Sport angler harvest and catch of king salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

Year	Kanektok River		Goodnews River		Arolik River		Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	1,511		31				210		1,752	
1984	922						137		1,059	
1985	672		323				43		1,038	
1986	938						25		963	
1987	508						177		685	
1988	1,910						264		2,174	
1989	884		68				240		1,192	
1990	503	4,044					54	333	557	4,377
1991	316	1,742	26	68			93	176	435	1,986
1992	656	3,153	23	47			71	284	750	3,484
1993	1,006	5,245	81	469			143	1,249	1,230	6,963
1994	751	1,483	163	230			257	339	1,171	2,052
1995	739	3,226	41	279			42	174	822	3,679
1996	689	6,354	157	1,126			190	2,197	1,036	9,677
1997	1,632	13,244	86	1,569	0	0	147	203	1,865	15,016
1998	1,475	9,528	431	3,171	30	30	77	346	2,013	13,075
1999	854	4,205	223	3,823	0	115	12	25	1,089	8,168
2000	833	6,086	243	1,527	0	0	0	0	1,076	7,613
2001	947	10,842	147	2,769	0	0	0	212	1,094	13,823
2002	779	3,815	224	1,594	75	450	0	32	1,078	5,891
2003	323	3,480	10	695	0	36	0	11	343	4,222
2004	228	2,758	100	1,754	12	780	0	0	340	5,292
2005	520	10,116	0	375	0	0	0	0	520	21,127
2006	754	7,292	79	2,243	0	0	0	399	1,277	13,414
1996-2005 Average	828	5,683	129	1,359	12	142	90	352	1,056	8,227
2001-2005 Average	559	6,202	96	1,437	17	253	0	51	675	10,071

Table 11.—Sport angler harvest and catch of king salmon in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							168		168	
1984							137		137	
1985							43		43	
1986							24		24	
1987							178		178	
1988							264		264	
1989	738						240		978	
1990	285	1,181					55	333	340	1,514
1991	214	222					94	176	308	398
1992	172	827			31	47	71	285	274	1,159
1993	300	1,426			0	47	144	1,249	444	2,722
1994	437	573	148	196			257	339	842	1,108
1995	279	2,729					42	174	321	2,903
1996	592	3,375					190	1,038	782	4,413
1997	801	12,943	49	678	49	108	49	128	948	13,857
1998	1,058	5,896	6	74	75	467	44	167	1,183	6,604
1999	134	2,776	0	12	0	0	109	153	243	2,941
2000	10	435	10	343	20	171	0	0	40	949
2001	12	713	0	62	43	77	16	16	71	868
2002	135	1,759	46	531	30	195	0	33	211	2,518
2003	12	874	75	335	103	861	163	1880	353	4,167
2004	335	1,103	58	1,774	150	778	12	1,074	671	4,047
2005	189	594	40	907	68	385	0	123	331	2,071
2006	29	1,201	See Other	See Other	183	493	117	989	415	2,871
1996-2005 Average	318	2,272	43	491	63	302	101	480	399	3,242
2001-2006 Average	137	1,009	44	722	79	459	38	625	327	2,734

Table 12.–Harvest of coho salmon in the commercial, subsistence, test and sport fisheries in the Kuskokwim Management Area (including Kuskokwim Bay, and Upper Kuskokwim), 1983–2006.

Year	Harvest				Total
	Commercial	Subsistence ^a	Test Fishery ^b	Sport ^c	
1983	196,287			1,375	197,662
1984	623,447			1,442	624,889
1985	335,606	24,236		136	359,978
1986	659,988	29,693		1,222	690,903
1987	399,467	17,917		1,767	419,151
1988 ^e	524,296	38,387		927	563,610
1989	479,856	52,918		2,459	535,233
1990	410,332	44,791		581	455,704
1991	500,935	50,331		1,003	552,269
1992	666,170	40,168		1,692	708,030
1993	610,739	31,737		980	643,456
1994	724,689	33,050		1,925	759,664
1995	471,461	36,277		1,497	509,235
1996	937,299	32,741		3,423	973,463
1997	130,803	29,032		2,408	174,491
1998	210,481	24,864		2,419	237,764
1999	23,593	25,003		1,998	50,594
2000	261,379	33,786		1,689	296,854
2001	192,998	29,504		1,204	223,706
2002	83,463	34,304		2,030	119,797
2003	284,064	35,240		5,297	324,601
2004	433,809	35,735		7,096	469,544
2005	142,319	26,487		5,591	174,397
2006	185,598	n/a		3,793	
1996-2005 Average	270,021	30,670		3,316	304,521
% Total Harvest	88.7%	10.1%		1.1%	
2001-2005 Average	154,383	32,254		1,868	185,743
% Total Harvest	83.1%	17.4%		1.0%	

^a. Estimated subsistence harvest expanded from villages surveyed.

^b. Test fishery coho harvests not available.

^c. Statewide Harvest Survey (1977-2006).

^d. Beginning in 1988, subsistence estimates are based on methodology, previous estimates are not comparable.

Table 13.—Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Kanektok River, 1983–2006.

Year	Harvest			Total
	Commercial ^a	Subsistence ^b	Sport	
1983	32,442		367	32,809
1984	132,151		1,895	134,046
1985	29,992		622	30,614
1986	57,544		2,010	59,554
1987	50,070		2,300	52,370
1988	68,605	4,317 ^c	1,837	74,759
1989	44,607	3,787	1,096	49,490
1990	26,926	4,174	644	31,744
1991	42,571	3,232	358	46,161
1992	86,404	2,958	275	89,637
1993	55,817	2,152	734	58,703
1994	83,912	2,739	675	87,326
1995	66,203	2,561	970	69,734
1996	118,718	1,467	875	121,060
1997	32,862	1,264	1,220	35,346
1998	80,183	1,702	751	82,636
1999	6,184	2,021	1,091	9,296
2000	30,529	1,088	799	32,425
2001	18,531	1,525	2,448	22,504
2002	26,695	1,099	1,784	29,578
2003	49,833	2,047	1,076	54,157
2004	82,398	1,209	1,362	52,493
2005	51,708	1,443	1,006	48,833
2006	26,831	n/a	1,742	
1996-2005 Average	49,764	1,487	1,241	52,493
% Total Harvest	94.8	2.8	2.4	
2001-2005 Average	45,833	1,465	1,535	48,833
% Total Harvest	93.8	3.0	3.1	

^a Quinhagak (District 4) commercial harvest.

^b Subsistence harvests by the community of Quinhagak.

^c Beginning in 1988, subsistence estimates are based on new methodology, not comparable with previous years.

Table 14.—Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Goodnews River, 1983–2006.

Year	Harvest			
	Commercial ^a	Subsistence ^b	Sport	Total
1983	19,660		168	19,828
1984	71,176			71,176
1985	16,498	11	386	16,895
1986	19,378	8		19,386
1987	29,057	43		29,100
1988	30,832	1,162 ^c		31,994
1989	31,849	907	224	32,980
1990	7,804	1,646		9,450
1991	13,312	1,828	297	15,437
1992	19,875	1,353	138	21,366
1993	20,014	1,226	189	21,429
1994	47,499	512	170	48,181
1995	17,875	305	114	18,294
1996	43,836	352	466	44,654
1997	2,983	397	855	4,235
1998	21,246	331	574	22,151
1999	2,474	582	789	3,845
2000	15,531	517	795	16,843
2001	9,275	616	822	10,713
2002	3,041	297	429	3,767
2003	12,730	1,110	42	13,882
2004	23,690	1,411	622	25,723
2005	11,735	n/a	1,046	12,781
2006	12,436	n/a	553	
1996-2005 Average	14,654	624	644	15,859
% Total Harvest	92.4%	3.9%	4%	
2001-2005 Average	12,094	859	592	13,373
% Total Harvest	90.4%	6.4%	4.4%	

^a Goodnews Bay (District 5) commercial harvest

^b Subsistence harvests by the communities of Goodnews Bay and Platinum

^c Beginning in 1988, subsistence estimates are based on new methodology, not comparable with previous years.

Table 15.—Sport angler harvest and catch of coho salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

Year	Kanektok River		Goodnews River		Arolik River ^a		Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	367		168				714		1,249	
1984	1,895						864		2,759	
1985	622		386				74		1,082	
1986	2,010						684		2,694	
1987	2,300						1,232		3,532	
1988	1,837						1,356		3,193	
1989	1,096		224				905		2,225	
1990	644	4,044					260	333	904	4,377
1991	358	2,404	297	1,176			338	553	993	4,133
1992	275	3,174	138	1,571			291	707	704	5,452
1993	734	3,741	189	645			295	1,334	1,218	5,720
1994	675	1,322	170	456			755	1,089	1,600	2,867
1995	970	3,602	114	761			233	623	1,317	4,988
1996	1,251	5,084	466	1,375			379	1,153	2,096	7,612
1997	1,220	14,366	855	2,915	221	276	703	2,179	2,989	19,736
1998	751	15,017	574	7,852	74	737	172	184	1,571	23,790
1999	1,091	13,677	789	12,185	11	621	12	1,281	1,903	27,764
2000	799	13,043	795	9,045	0	0	0	0	1,594	22,088
2001	2,448	21,941	822	8,431	0	783	0	49	3,270	31,204
2002	1,784	10,922	429	6,889	22	1,179	0	174	2,235	19,164
2003	1,076	19,257	681	15,845			58	231	1,815	35,333
2004	1,362	23,845	622	10,985			0	3,656	1,984	38,486
2005	520	13,279	1,046	11,541			0	2,397	1,566	27,217
2006	1,742	12,282	553	7,091			24	243	2,319	19,640
1996-2005 Average	1,134	10,545	487	6,111	55	599	405	996	1,934	17,496
2001-2005 Average	1,438	17,849	720	10,738					2,174	30,281

^a Arolik and Other Rivers combined in Alaska Department of Fish and Game Division of Sport Fish Statewide Harvest Survey after 2002.

Table 16.—Sport angler harvest and catch of coho salmon in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							571		571	
1984							864		864	
1985							74		74	
1986							684		684	
1987							1,232		1,232	
1988							1,355		1,355	
1989	939						905		1,844	
1990	182	1,181					260	333	442	1,514
1991	327	1,432					338	553	665	1,985
1992	235	575			624	1,790	291	708	1,150	3,073
1993	213	753			313	566	295	1,334	821	2,653
1994	507	852	72	492			755	1,089	1,334	2,433
1995	852	2,246					233	623	1,085	2,869
1996	986	3,746					196	5,233	1,182	8,979
1997	978	4,576	182	838	274	490	102	127	1,536	6,031
1998	1,128	3,639	172	2,638	714	3,204	61	184	2,075	9,665
1999	436	3,971	270	2,315	131	774	98	700	935	7,760
2000	440	8,531	199	1,231	220	1,705	0	52	859	11,519
2001	335	2,186	195	2,605	237	1,608	19	39	786	6,438
2002	673	3,193	167	1,766	153	310	78	374	1,071	10,269
2003	405	11,480	377	1,518			892	9,826	1,311	15,395
2004	1,207	6,337	226	2,457	649	3,608	279	1,104	2,361	13,506
2005	1,164	3,813	298	751			0	2,397	2,937	7,788
2006	169	4,233			669	2,626	229	2,273	1,326	10,079
1996-2006 Average	647	3,657	216	1,661	368	1,562	417	1,542	1,028	5,784
2001-2006 Average	757	5,402	253	1,819	n/a	n/a	254	2,748	905	9,409

Table 17.—Harvest of chum salmon in the commercial, subsistence, test and sport fisheries in the Kuskokwim River, 1983–2006.

Year	Harvest				Total
	Commercial ^a	Subsistence ^b	Test Fishery	Sport	
1983	276,698	146,876 ^c	1,069	922	425,565
1984	423,718	142,542 ^c	1,186	520	567,966
1985	199,478	94,750	616	150	294,994
1986	309,213	141,931 ^c	1,693	245	453,082
1987	574,336	70,709	2,302	566	647,913
1988	1,381,674	151,967 ^d	4,379	764	1,538,784
1989	749,182	139,687	2,082	2,023	892,974
1990	461,624	126,508	2,107	533	590,772
1991	431,802	93,075	931	378	526,186
1992	344,603	96,491	15,330	608	457,032
1993	43,337	59,396	8,451	359	111,543
1994	271,115	72,025	11,998	1,280	356,418
1995	605,918	67,862	17,473	226	691,479
1996	207,877	88,965	2,864	280	299,986
1997	17,026	39,970	790	86	57,872
1998	207,809	63,537	1,140	291	272,777
1999	23,006	43,601	562	180	67,349
2000	11,570	51,696	1,038	26	64,330
2001	1,272	49,874	1,743	112	53,001
2002	1,900	72,603	2,666	53	77,203
2003	2,764	43,320	1,713	67	47,864
2004	20,429	52,374	1,810	117	74,730
2005	69,139	46,036	4,459	608	120,242
2006	44,070	n/a	3,547	158	
1996-2005 Average	139,083	60,953	4,873	294	205,202
% Total Harvest	67.8%	29.7%	2.4%	0.1%	
2001-2005 Average	49,111	56,262	1,430	129	106,932
% Total Harvest	45.9%	52.6%	1.3%	0.1%	

a. Districts 1 and 2, only; no chum harvests reported in District 3.

b. Estimated subsistence harvest expanded from villages surveyed.

c. Composite harvest includes chum salmon and small king, sockeye and coho salmon.

d. Beginning in 1989, subsistence estimates based on new methodology, previous estimates are not comparable.

Table 18.—Sport angler harvest and catch of chum salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

Year	Kanektok River		Goodnews River		Arolik River ^a		Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	315		10				461		786	
1984	376						260		636	
1985	149		124				75		348	
1986	777						123		900	
1987	111						283		394	
1988	618						382		1,000	
1989	537		0				442		979	
1990	202	4,532					187	523	389	5,055
1991	80	1,382	189	527			105	393	374	2,302
1992	251	3,994	0	402			91	380	342	4,776
1993	183	4,849	156	924			129	1,135	468	6,908
1994	156	6,386	15	381			496	1,186	667	7,953
1995	213	5,049	0	315			5	82	218	5,446
1996	200	8,155	0	351			9	352	209	8,858
1997	212	11,041	24	1,111	0	43	62	517	298	12,712
1998	213	11,560	50	2,955	0	17	11	175	274	14,707
1999	293	14,241	47	7,561	0	0	0	16	340	21,818
2000	231	10,200	12	4,243	0	24	0	0	243	14,467
2001	43	6,457	21	2,188	0	0	0	129	64	8,774
2002	446	10,779	99	4,059	0	590	0	105	545	15,533
2003	14	7,138	14	3,195			0	3,195	28	10,402
2004	33	4,715	0	1,757			0	2,309	33	8,781
2005	108	9,241	0	1,481			0	0	108	10,722
2006	145	21,528	0	5,566			0	0	145	26,986
1996-2005 Average	250	7482	19	2097	0	112	211	461	393	9951
2001-2005 Average	129	7666	27	2536	0		0	522	156	10,842

^a Arolik and Other Rivers combined in Alaska Department of Fish and Game Sport Fish Division Statewide Harvest Survey after 2002.

Table 19.—Sport angler harvest and catch of chum salmon in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							369		369	
1984							260		260	
1985							75			
1986							123		123	
1987							283		283	
1988							382		382	
1989	1,140						442		1,582	
1990	182	571					187	523	369	1,094
1991	169	656					105	393	274	1,049
1992	304	1,670			30	91	92	380	426	2,141
1993	101	2,412			0	2,269	129	1,135	230	5,816
1994	231	1,342	58	1,123			496	1,186	785	3,651
1995	127	2,785					5	82	132	2,867
1996	110	3,888					56	3,588	166	7,476
1997	86	2,369	0	9	0	53	0	125	86	2,556
1998	101	2,664	0	163	8	296	15	378	124	3,501
1999	139	4,055	0	456	41	176	0	22	180	4,709
2000	0	3,914	13	2,091	0	85	0	0	13	6,090
2001	0	1,899	0	106	71	425	0	213	71	2,643
2002	0	2,096	0	745	34	455	0	428	34	3,724
2003	0	2,347	0	450	0	0	25	598	25	3,395
2004	0	1,602	0	606	70	308	0	0	70	1,702
2005	0	788	0	247	0	0	80	595	80	1,630
2006	0	2,135			0	918	13	129	13	5,271
1996-2005 Average	158	2,191	7	600	23	378	136	603	267	3,378
2001-2005 Average	0	1,746	0	431	35	238	21	367	56	2,619

Table 20.—Harvest of sockeye salmon in the commercial, subsistence, test and sport fisheries in the Kuskokwim River, 1983–2006.

Year	Harvest				Total
	Commercial	Subsistence ^a	Test Fishery ^b	Sport ^c	
1983	68,855			41	68,855
1984	48,575				48,647
1985	106,647	32,822		72	139,665
1986	95,433	18,873		196	114,523
1987	136,602	23,158		217	160,051
1988	92,025	30,775 ^e		291	122,833
1989	42,747	35,224		33	78,052
1990	84,870	36,276		61	121,184
1991	108,946	52,984		38	162,061
1992	92,218	32,066		131	124,632
1993	27,008	49,348		348	76,715
1994	49,365	37,159		359	86,619
1995	92,500	27,791		95	120,606
1996	33,878	34,213		315	68,220
1997	21,989	40,097		423	62,160
1998	60,906	35,425		178	96,396
1999	16,976	46,677		54	63,699
2000	4,130	41,783		46	46,144
2001	84	48,601		231	50,175
2002	84	25,499		26	26,694
2003	282	34,452		289	35,023
2004	9,748	32,433		512	42,693
2005	27,645	33,878		792	62,315
2006	12,618	n/a		187	
1996-2005 Average	17,572	37,306		287	55,352
% Total Harvest	31.75%	67.40%		0.52%	
2001-2005 Average	7,569	34,973		370	43,380
% Total Harvest	17.45%	80.62%		0.85%	

a. Estimated subsistence harvest expanded from villages surveyed.

b. Test fishery sockeye harvests not available.

c. Statewide Harvest Survey (1977-2005).

d. Beginning in 1988, subsistence estimates are based on new methodology, previous estimates are not comparable.

Table 21.—Sport angler harvest and catch of sockeye salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

Year	Kanektok River		Goodnews River		Arolik River		Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	0		14				247		261	
1984	143						156		299	
1985	12		75				62		149	
1986	200		122				98		420	
1987	153		266				0		419	
1988	109						637		746	
1989	101		146				22		269	
1990	462	3,293					73	97	535	3,390
1991	88	1,147	63	2,003			25	126	176	3,276
1992	66	1,290	8	90			57	246	131	1,626
1993	331	1,887	53	321			260	1,296	644	3,504
1994	313	3,622	70	207			494	530	877	4,359
1995	148	733	34	380			42	64	224	1,177
1996	335	2,157	87	1,119			120	186	542	3,462
1997	607	2,155	61	1,625			10	248	678	4,028
1998	942	3,987	502	3,402			60	148	1,504	7,537
1999	496	4,537	561	1,999			0	278	1,057	6,814
2000	694	5,700	82	997			11	11	787	6,708
2001	83	1,415	108	1,128	0	68	0	290	191	2,901
2002	73	1,423	149	3,112	3	161	0	134	225	4,830
2003	107	5,082	42	1,502	na	na	0	60	149	6,644
2004	112	1,330	0	891	na	na	0	331	112	2,552
2005	156	5,692	0	683	na	na	0	43	156	6,418
2006	523	11,450	98	2,798	na	na	12	276	633	14,524
1996-2005 Average	361	3348	159	1646	2	115	20	173	540	5189
2001-2005 Average	106	2988	60	1463	2	115	0	172	167	4669

Table 22.—Sport angler harvest and catch of sockeye salmon in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983										
1984										
1985										
1986										
1987										
1988										
1989	22								22	
1990	49	182							49	182
1991	38	151							38	151
1992	25	74			0	58			25	132
1993	17	79			19	19			36	98
1994	17	87	0	452					17	539
1995	43	166					10	21	53	187
1996	186	367							186	367
1997	391	353							391	353
1998	195	367							195	367
1999	21	407							21	407
2000	23	286	0	117				12	23	415
2001	24	222	34	156	0	37	21	21	79	436
2002	26	54	0	16	0	61	0	101	26	232
2003	0	390	74	75			42	182	116	647
2004	119	185	22	45	65	218	11	11	217	459
2005	0	606	22	22		0	112	112	134	740
2006	16	1,042			0		12	253	50	1,464
1996-2005 Average	70	249	22	126	17	79	33	66	96	357
2001-2005 Average	34	291	30	63	22	105	37	85	114	503

Table 23.—Sport angler harvest and catch of rainbow trout in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

Year	Kanektok River		Goodnews River		Arolik River		Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	640		52				467		1,159	
1984	312						552		864	
1985	156		451				26		633	
1986	259						111		370	
1987	132						230		362	
1988	400						599		999	
1989	126		316				107		549	
1990	281	7,810					79	1,205	360	9,015
1991	182	5,856	258	2,776			129	517	569	9,149
1992	55	1,496	0	1,282			123	835	178	3,613
1993	130	4,106	145	3,994			71	1,535	346	9,635
1994	59	4,779	19	945			45	326	123	6,050
1995	198	3,046	43	1,263			10	1,324	251	5,633
1996	138	6,833	36	1,581			0	914	174	9,328
1997	231	27,325	433	9,653	43	1,798	25	525	732	39,301
1998	0	13,567	97	5,738	0	631	8	877	105	20,813
1999	73	11,151	133	5,926	0	2,070	12	159	218	19,306
2000	0	6,019	0	2,446	0	24	11	110	11	8,599
2001	0	7,984	0	2,312	0	46	0	547	0	10,889
2002	0	8,846	32	2,915	0	2,160	0	572	32	14,493
2003	0	8,455	44	3,125			0	453	44	12,033
2004	68	8,525	68	2,540			12	5,183	148	16,248
2005	0	7,070	0	2,747			0	1,769	0	11,586
2006	0	11,793	0	3,446			0	5,412	67	20,651
1996-2005 Average	150	8,304	118	3,283	7	1122	114	1,053	358	12,856
2001-2005 Average	14	8,176	29	2,728	0	1103	2	1,705	45	13,050

Table 24.—Sport angler harvest and catch of rainbow trout in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							467		467	
1984							552		552	
1985							26		26	
1986							111		111	
1987							230		230	
1988							600		600	
1989	101						107		208	
1990	35	2,216					79	1,205	114	3,421
1991	76	1,881					129	517	205	2,398
1992	32	934			71	158	123	835	226	1,927
1993	10	1,144			58	333	72	1,535	140	3,012
1994	8	656	124	1,226			45	326	177	2,208
1995	0	1,581					9	1,234	9	2,815
1996	24	3,347					357	3,329	381	6,676
1997	53	12,293	218	7,060	227	334	24	2,040	522	21,727
1998	349	5,004	0	1,289	69	980	23	2,242	441	9,515
1999	175	4,659	0	1,877	117	269	12	143	304	6,948
2000	24	4,643	47	3,076	24	1,054	0	0	95	8,773
2001	0	1,268	0	1,010	17	896	0	8	17	3,182
2002	0	2,942	29	5,520	0	3,398	15	1,275	44	13,135
2003	0	2,477	21	1,241			21	650	42	4,368
2004	0	1,908	99	3,134	117	1,027	0	0	216	6,069
2005	0	1,077	78	3,378			53	487	131	4,942
2006	0	4,772			0	5,990	0	4,612	0	15,531
1996-2005 Average	59	3,317	63	2,881	51	924	198	1,273	256	5,293
2001-2005 Average	0	1,934	45	2,857	45	1,774	18	484	90	6,339

Table 25.—Sport angler harvest and catch of Dolly Varden/Arctic char in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

Year	Kanektok Rivers		Goodnews River		Arolik River		Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	1,406		147				1,583		3,136	
1984	1,116						384		1,500	
1985	815		780				261		1,856	
1986	1,213						195		1,408	
1987	752						704		1,456	
1988	2,146						1,082		3,228	
1989	2,032		530				635		3,197	
1990	1,020	10,572					80	1,013	1,100	11,585
1991	389	10,757	605	9,936			361	2,629	1,355	23,322
1992	66	3,990	82	5,694			233	1,286	381	10,970
1993	378	10,136	343	8,156			206	3,917	927	22,209
1994	233	9,242	132	3,538			197	677	562	13,457
1995	212	6,231	158	2,336			95	1,110	465	9,677
1996	474	13,954	240	4,352			118	1,223	832	19,529
1997	789	41,748	1,071	23,498	21	685	14	1,570	1,895	67,501
1998	368	24,287	460	16,680	0	643	0	25	828	41,635
1999	615	21,700	917	18,174	33	3,248	34	811	1,599	43,933
2000	417	13,490	658	11,422	0	0	12	424	1,087	25,336
2001	543	15,673	418	12,613	0	0	44	815	1,005	29,101
2002	497	15,555	664	14,436	85	1,985	12	990	1,258	32,966
2003	457	16,988	555	19,016			0	298	1,012	36,302
2004	482	29,990	331	10,886			289	14,829	1,102	55,705
2005	256	17,443	742	18,994			12	3,198	1,010	39,635
2006	339	30,420	395	7,270			396	7,889	1,143	45,592
1996-2005 Average	725	16,360	491	11,982	23	1,094	285	2,176	1,400	31,546
2001-2005 Average	447	19,130	525	13,675	28	662	71	3,471	1,093	35,882

Table 26.—Sport angler harvest and catch of Dolly Varden / Arctic char in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							1,583		1,583	
1984							384		384	
1985							261		261	
1986							196		196	
1987							704		704	
1988							1,082		1,082	
1989	808						635		1,443	
1990	598	6,174					81	1,013	679	7,187
1991	547	3,514					360	2,629	907	6,143
1992	115	3,736			57	57	233	1,286	405	5,079
1993	260	9,340			97	349	206	3,917	563	13,606
1994	496	3,115	117	1,013			197	677	810	4,805
1995	481	3,454					95	1,110	576	4,564
1996	159	4,883					642	3,367	801	8,250
1997	316	12,066	413	4,708	243	243	14	1,189	986	18,206
1998	394	21,053	92	599	14	188	102	1,595	602	23,435
1999	114	5,909	181	3,875	0	44	34	342	329	10,170
2000	40	5,333	367	3,664	47	95	0	36	454	9,128
2001	87	1,857	320	2,454	33	142	0	22	440	4,475
2002	212	6,288	345	4,494	53	2,223	11	1,020	621	14,025
2003	178	4,033	432	2,693			155	1,360	765	8,086
2004	288	6,496	114	4,343	230	2,376	27	27	659	13,242
2005	296	2,477	246	1,241			0	650	542	4,368
2006	150	7,064			76	365	147	4,566	373	12,547
1996-2005 Average	317	6,233	263	2,908	86	635	304	1265	687	9,673
2001-2005 Average	212	4,230	291	3,045	105	1,580	39	616	605	8,839

Table 27.—Sport angler harvest and catch of Arctic grayling in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

Year	Kanektok River		Goodnews River		Arolik River		Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983	231		178				4,343		4,752	
1984	169						1,033		1,202	
1985	87		416				694		1,197	
1986	213						513		726	
1987	244						1,124		1,368	
1988	164						1,593		1,757	
1989	58		198				875		1,131	
1990	123	3,940					398	2,296	521	6,236
1991	54	3,092	122	461			671	3,295	847	6,848
1992	23	391	0	609			163	2,278	186	3,278
1993	25	2,727	17	851			181	3,636	223	7,214
1994	0	1,599	0	1,813			332	1,674	332	5,086
1995	0	1,128	14	412			167	1,952	181	3,492
1996	0	2,960	47	941			66	2,702	113	6,603
1997	99	5,335	74	2,706	0	180	88	1,703	261	9,924
1998	33	5,576	28	3,126	0	221	105	1,365	166	10,288
1999	159	4,218	84	2,544	0	447	194	1,191	437	8,400
2000	25	3,632	0	1,726	0	0	0	86	25	5,444
2001	47	3,955	65	2,431	0	0	19	458	131	5,844
2002	47	3,622	221	2,543	0	670	0	512	268	7,347
2003	0	3,888	42	1,130			0	380	42	5,398
2004	33	3,417	130	2,343			60	1,329	223	8,418
2005	11	1,895	29	749			0	51	40	2,695
2006	28	2,180	17	1,044			20	1,726	65	4,950
1996-2005 Average	80	3,211	93	1,626	0	253	549	1,557	701	6,148
2001-2005 Average	28	3,355	97	1,839	0	335	16	546	141	5,940

Table 28.—Sport angler harvest and catch of Arctic grayling in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							4,343		4,343	
1984							1,033		1,033	
1985							694		694	
1986							513		513	
1987							1,124		1,124	
1988							1,593		1,593	
1989	909						875		1,784	
1990	422	5,259					398	2,296	820	7,555
1991	1,085	4,841					671	3,295	1,756	8,136
1992	121	3,855			75	120	163	2,278	359	6,253
1993	288	5,580			47	166	181	3,636	516	9,382
1994	116	2,022	69	1,920			333	1,674	518	5,616
1995	53	2,266					167	1,952	220	4,218
1996	103	5,102					158	2,711	261	7,813
1997	162	15,089	303	3,746	256	499	20	984	741	20,318
1998	715	11,930	64	984	8	1,408	90	1,333	877	15,655
1999	437	8,659	63	3,641	0	226	211	609	711	13,135
2000	42	5,950	29	3,605	38	995	0	946	109	11,496
2001	77	3,300	64	3,356	77	3,058	0	69	218	9,783
2002	172	11,518	507	8,184	226	3,000	25	2,263	930	24,965
2003	58	6,787	280	3,188			121	1,518	459	11,493
2004	0	3,844	45	4,669	23	697	11	147	79	9,357
2005	108	2,149	346	2,822			131	1,248	585	6,219
2006	58	2,357	83	1,845	97	2,701	0	1,111	258	8,112
1996-2005 Average	286	6,134	177	3,612	83	1,130	559	1,685	880	10,712
2001-2005 Average	83	5,520	248	4,444	109	2,252	58	1,049	454	12,363

Table 29.—Sport angler harvest and catch of northern pike in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Rivers		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							6,420		6,420	
1984							1,520		1,520	
1985							1,595		1,595	
1986							856		856	
1987							878		878	
1988							4,019		4,019	
1989	70						3,383		3,453	
1990	18	53					213	2,376	231	2,429
1991	244	1,448					1,774	3,173	2,018	4,621
1992	43	794			60	231	504	1,956	607	2,981
1993	0	45			329	526	666	3,094	995	3,665
1994	54	698	0	18			565	2,694	619	3,410
1995	77	623					164	1,423	241	2,046
1996	10	399					176	1,950	186	2,349
1997	42	303	21	119	0	206	99	270	162	898
1998	553	1,883	67	67	18	247	85	241	723	2,438
1999	94	674	0	27	0	0	66	189	160	890
2000	0	298	11	55	0	153	296	557	307	1,063
2001	65	493	0	0	14	41	65	78	144	612
2002	45	655	0	47	78	350	131	645	254	1,697
2003	10	1,756	0	65			24	467	34	2,288
2004	121	713	0	692	289	1,603	166	965	576	3,973
2005	77	805	247	283			591	1,148	915	2,236
2006	0	877	0	114	0	152	66	552	66	2,043
1996-2005 Average	90	728	35	139	88	373	811	1,327	932	2,350
2001-2005 Average	64	884	49	217	127	665	195	661	385	2,161

Table 30.—Sport angler harvest and catch of sheefish: Aniak and Lower Kuskokwim, Holitna and Upper Kuskokwim Rivers 1983–2006.

Year	Aniak River		Other Lower Kuskokwim Rivers		Total Lower Kuskokwim		Holitna River		Other Upper Kuskokwim		Upper Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983			901		901							
1984			481		481							
1985			210		210							
1986			194		194							
1987			452		452							
1988			1,074		1,074							
1989			722		722							
1990			107	316	107	316	53	158	53	193		316
1991	13	141	154	539	154	539	128	372	141	398		539
1992	0	11	119	130	119	130	173	508	173	508		130
1993	0	626	54	1,952	54	1,952	45	1,317	45	1,317		1,952
1994	88	154	212	325	212	325	130	189	130	208		325
1995	9	623	103	1,160	103	1,160	113	472	151	622		1,160
1996	20	89	64	372	64	372	26	206	47	512		372
1997	22	225	149	694	149	694	168	1,098	18	1,394		694
1998	30	47	94	789	124	836	35	729	15	771		836
1999	81	290	27	69	108	359	102	745	156	813		359
2000	0	7	158	158	158	165	58	512	349	883		165
2001	0	232	0	0	0	232	124	381	124	2,974		232
2002	51	133	0	0	51	133	–	270	0	307		133
2003	0	0	0	0	0	0	45	59	45	768		0
2004	0	0	0	29	0	29	156	591	156	883		29
2005	32	32	162	325	194	357	803	2,843	803	3,460		357
2006	0	141	0	0	20	182	14	142	139	200	153	342
1996-2005												
Average	30	106	65	244	85	318	169	743	171	1,277		318
2001-2005												
Average	21	79	32	71	49	150	282	829	226	1,678		150

Table 31.—Sport angler harvest and catch of lake trout in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1983–2006.

	Kanektok River		Goodnews River		Arolik River		Other Locations		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983									0	
1984							117		117	
1985							7		7	
1986							555		555	
1987							14		14	
1988							90		128	
1989			38				7		7	
1990							27	308	27	308
1991			0	38			171	631	171	669
1992							155	810	164	857
1993		18	9	29			104	496	104	496
1994							0	448	0	448
1995	80	90	20	38			27	125	127	253
1996	27	182	9	283			0	203	36	668
1997	113	154	23	211	0	0	137	499	273	864
1998	0	333	40	230	0	0	0	29	40	592
1999	0	33	25	450	0	0	0	9	25	492
2000	0	61	9	163	0	0	0	63	9	287
2001	0	19	9	152	0	0	0	0	9	171
2002	10	50	0	91	0	32	17	57	27	230
2003	0	30	59	2,532	0	0	0	249	59	2811
2004	30	81	0	163	0	0	0	65	30	146
2005	18	72	0	0	0	0	0	209	18	72
2006	0	50	11	58	0	235	41	109	52	452
1996-2005 Average	20	102	17	428	0	0	15	138	53	633
2001-2005 Average	10	21	18	778	0	0	5	90	13	850

Table 32.—Angler harvest and catch of lake trout in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Locations		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							419		419	
1984							545		545	
1985							10		10	
1986							555		555	
1987							14		14	
1988							91		91	
1989	63						7		70	
1990	18	475					27	308	45	783
1991							172	631	172	631
1992	47	555					155	810	202	1,365
1993		10					105	496	105	506
1994		0					0	448	0	448
1995	61	163					27	125	88	288
1996	9	54					56	203	65	257
1997	56	179	90	170	0	0	96	189	242	538
1998	9	62	67	282	0	0	15	44	91	388
1999	18	18	0	67	0	0	0	24	18	109
2000	9	27	0	9	0	0	28	120	37	156
2001	17	34	37	37	0	0	0	0	54	71
2002	0	58	17	57	36	181	54	975	107	1,271
2003	68	94	0	113			102	339	170	546
2004	30	45	0	0	60	60	0	33	78	138
2005	18	145	0	0			0	632	18	777
2006	0	0	0	0	0	0	0	0	0	0
1996-2005 Average	30	128	23	82	14	34	108	315	139	517
2001-2005 Average	27	75	11	41	32	80	31	327	85	561

Table 33.—Sport angler harvest and catch of burbot in the Aniak, Kisaralik, Kwethluk and other Lower Kuskokwim rivers, 1983–2006.

Year	Aniak River		Kisaralik River		Kwethluk River		Other Locations		Lower Kuskokwim Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1983							472		472	
1984							0		0	
1985							105		105	
1986							146		146	
1987							126		126	
1988							91		91	
1989							47		47	
1990							1,125	1,125	1,125	1,125
1991							40	50	40	50
1992							169	169	169	169
1993					107	107	107	107	214	214
1994							20	20	20	20
1995							0	0	0	0
1996							0	0	0	0
1997					180	180	0	0	180	180
1998							136	298	136	298
1999	13	13	0	0	76	76	139	139	228	228
2000	0	0	0	0	0	0	588	588	588	588
2001	0	0	0	0	0	0	50	50	50	50
2002	0	5	0	0	0	0	15	15	15	20
2003	0	0	0	0	0	0	87	97	87	97
2004		0		0		0	61	61	61	61
2005	0	0	0	0	0	0	50	50	50	50
2006	0	0	0	0	0	0	0	0	0	0
1996-2005 Average	0	5	0	0	26	26	113	130	188	226
2001-2005 Average	0	2	0	0	0	0	53	55	218	219

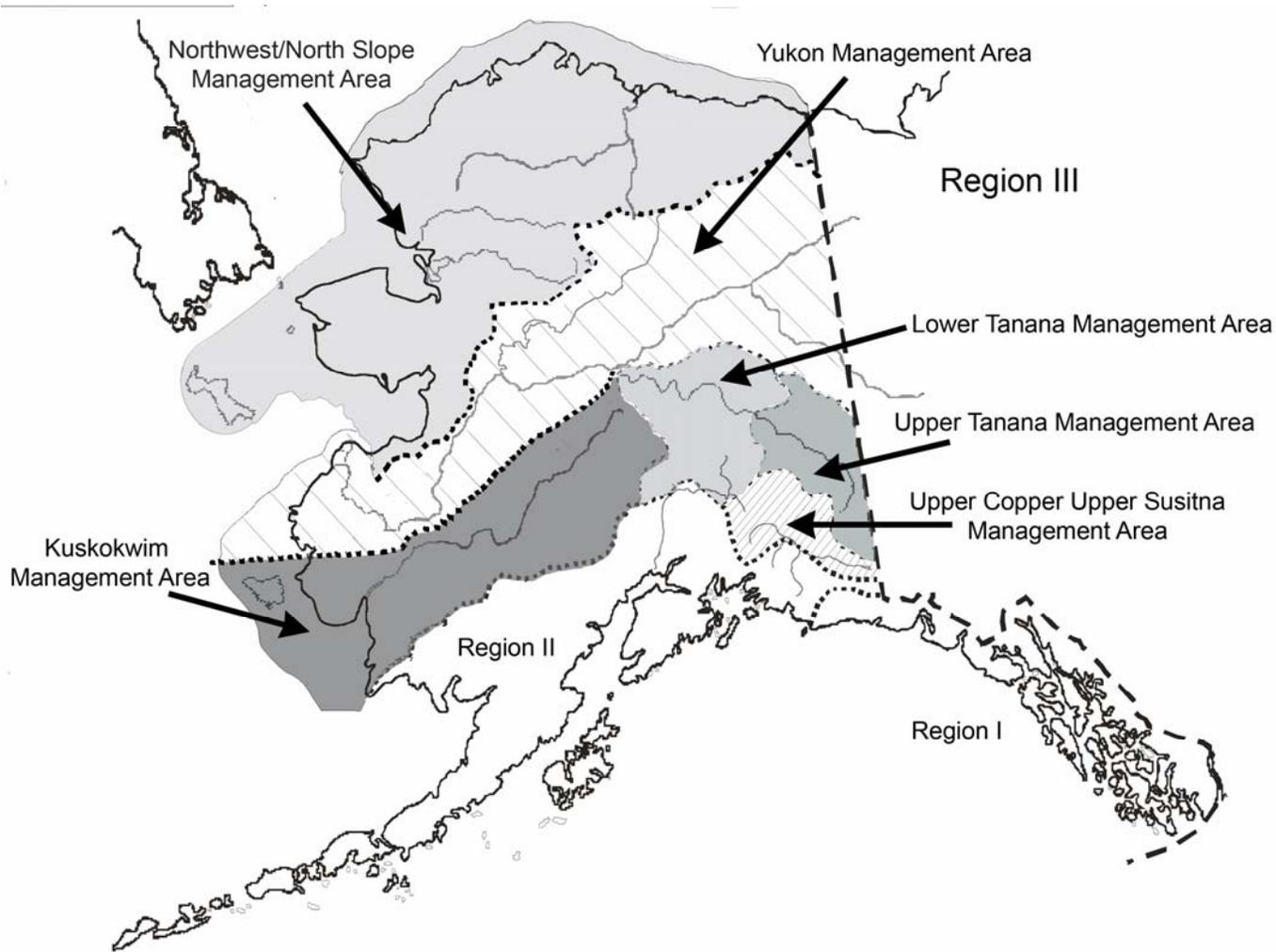


Figure 1.—Arctic-Yukon-Kuskokwim Region and Management areas.

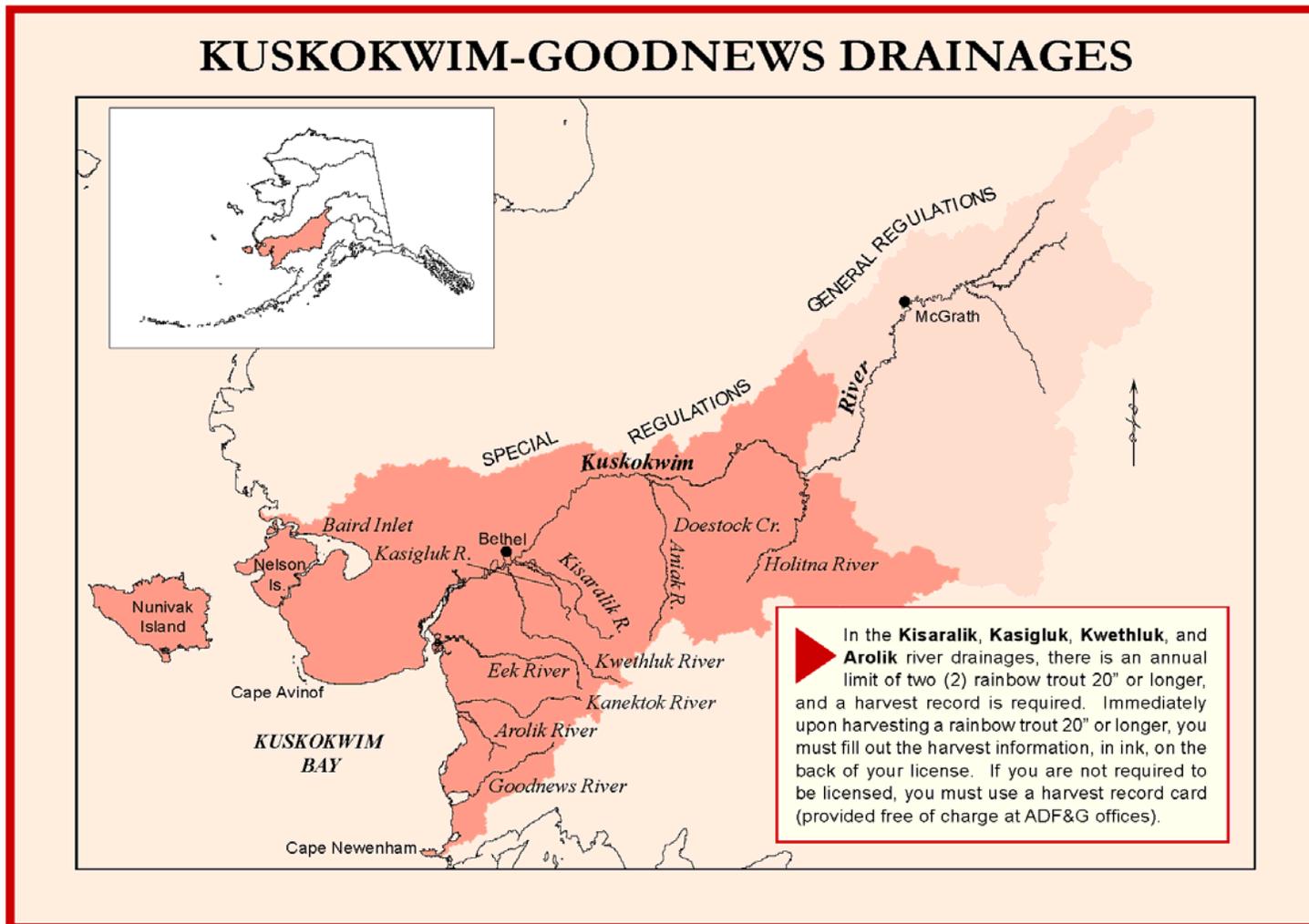


Figure 2.—Kuskokwim-Goodnews Area.

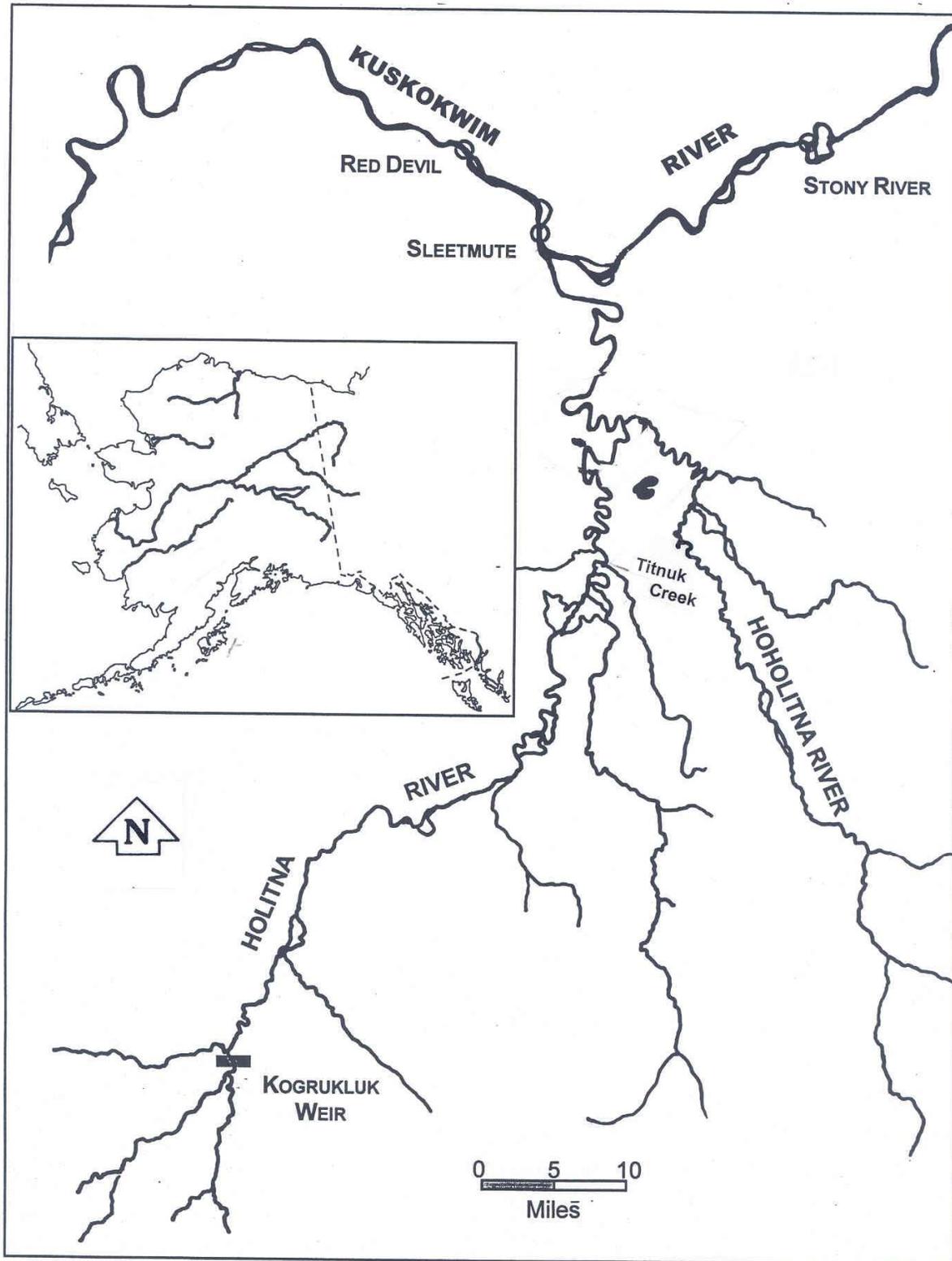


Figure 3.—Holitna River Drainage.



Figure 4.—Aniak River Drainage.

APPENDIX A.
TOGIAK NATIONAL WILDLIFE REFUGE PUBLIC USE
MANAGEMENT PLAN DIRECTION AND ALTERNATIVES

Appendix A1.—Togiak PUMP Management Plan and Alternatives.

Chapter 2: Public Use Management Plan Direction and Alternatives

Table 2-3 Alternatives for the Togiak Refuge Draft Public Use Management Plan

	Alternative A (current management)	Alternative B	Alternative C (Preferred Alternative)	Alternative D	Alternative E
Issue 1. Public Use at Cape Peirce Wildlife Viewing Area and Public Facilities at Sangor Lake	Management Direction —Emphasize wildlife viewing that complements the research and study of fish, wildlife, plants, and their habitats	Management Direction —Same as Alternative A	Management Direction —Facilitate wildlife viewing that complements the protection and preservation of the area’s natural and cultural resource values	Management Direction —Emphasize a structured wildlife-viewing experience.	Management Direction —Emphasize wildlife viewing and educational and outreach programs that focus on cultural and natural significance of the area
	Visitation —Maximum one flight per day and six people at one time	Visitation —Same as Alternative A	Visitation —Additional opportunities for as many as two flights per day and 12 people at one time. Guide or refuge staff may accompany. At low use levels refuge manager may waive permits.	Visitation —Same as Alternative C	Visitation —Same as Alternative C
	Allocation —Permits for all visitors issued on first-come, first-served basis	Allocation —50 percent commercially guided/ and 50 percent general public; unused permits available through a common pool	Allocation —Same as Alternative B	Allocation —100 percent commercially guided use	Allocation —30 percent commercially guided and 70 percent general public (accompanied by Refuge staff); unused permits available through a common pool

Chapter 2: Public Use Management Plan Direction and Alternatives

	Alternative A (current management)	Alternative B	Alternative C (Preferred Alternative)	Alternative D	Alternative E
	Facilities —No facilities constructed. An outhouse could be constructed to protect natural resources and public health	Facilities —Same as Alternative A	Facilities —Minimal facilities for as many as 12 people to ensure public health, and safety (i.e., tent platforms, food storage, outhouse)	Facilities —Moderate facilities to accommodate as many as 12 people, (i.e., one cabin, tent platform, and outhouse)	Facilities —Same as Alternative D, plus accommodations for interpretive cultural and natural history programs (i.e., large cabin with meeting area and outhouse)
Issue 2. Unguided Recreational Opportunities: Kanektok and Goodnews River Watersheds	No limits	Kanektok —One trip every other day; maximum four boats and 12 people per trip Goodnews —Limit to existing level of use	One trip every other day, and on the Goodnews River only, two trips on weekends during peak use seasons (June 25–July 15; August 10–September 7); maximum four boats and 12 people per trip. Permits required. At low use levels refuge manager may waive permits.	Voluntary trip registration available all season	One trip every three days; maximum three boats and nine people per trip
Issue 3. Waste Management	Bury waste 100 feet from surface waters on public lands only; outhouses at Kagati and Goodnews lakes	If monitoring suggests standards are at risk of being exceeded, require all float groups to carry out solid human waste on the Kanektok River	In addition to actions in Alternative B, work with partners to facilitate the construction and voluntary use of DEC-approved disposal sites for packing out human waste	Same as Alternative B	Implement human-waste pack-out program for all users as DEC-approved disposal sites become available and accessible

Chapter 2: Public Use Management Plan Direction and Alternatives

Table 2-4 Issue 4. Commercial Sport Fishing Guide Alternatives for the Togiak Refuge Public Use Management Plan Revision Draft

	Alternative A (current management)	Alternative B	Alternative C (Preferred Alternative)	Alternative D	Alternative E
Goodnews River North Fork	Motorized Up to 9 motorboats and 18 clients at one time. Average use 1990–2001; 17 trips per year Float —One trip per week; maximum 4 boats and 12 people per trip	Same as Alternative A	Motorized —One boat and three people per day Float —One trip per week (with option of using Middle Fork); maximum four boats and 12 people per trip	Motorized —Temporary camp; maximum nine motorboats and 27 people per day Float —One trip every other day; maximum four boats and 12 people per trip	Same as Alternative A
Middle Fork	Motorized —One temporary camp; two boats and six people per day Float—None	Motorized —One temporary camp, three boats and 10 people per day Float—None	Motorized —Same as Alternative A Float —One trip per week (with option of using North Fork); maximum four boats and 12 people per trip	Motorized —One temporary camp; three motorboats and 10 people per day Float —One trip every week; maximum four boats and 12 people per trip	Same as Alternative A
Osviak and Matogak Rivers	No permits	Same as Alternative A	Same as Alternative A	Motorized —One trip per week (either river); maximum two boats and six people per trip	Same as Alternative A
Togiak River	Motorized —Maximum seven motorboats and 28 people per day Float —Two trips per week; two boats and eight people per trip	Same as Alternative A	Same as Alternative A	Motorized —Maximum 14 motorboats and 42 people per day Float —Two trips per week maximum two boats and eight people per trip	Same as Alternative A

NOTES: Management activities undertaken by the Service, or by volunteers, cooperators, or contractors working for the Service, with limited exception, are exempt from compatibility review [Part 603, Compatibility, of the Service Manual (Draft)].
The term “temporary” refers to any structure or other human-made improvement that can be readily and completely dismantled and removed from the site when the period of authorized use terminates.
Management of activities occurring on navigable waters will be coordinated with the appropriate state agency.