

Fishery Management Report No. 12-43

Fishery Management Report for Sport Fisheries in the Kuskokwim-Goodnews Management Area, 2011

by

John Chythlook

December 2012

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric) &		General		Mathematics, statistics	
		Alaska Administrative		<i>all standard mathematical</i>	
centimeter &	cm	Code	AAC	<i>signs, symbols and abbreviations</i>	
deciliter &	dL	all commonly accepted &		alternate hypothesis	H_A
gram &	g	abbreviations	e.g., Mr., Mrs., &	base of natural logarithm	e
hectare &	ha		AM, PM, etc.	catch per unit effort	CPUE
kilogram &	kg	all commonly accepted &		coefficient of variation	CV
kilometer &	km	professional titles	e.g., Dr., Ph.D., &	common test statistics	(F, t, χ^2 , etc.)
liter &	L		R.N., etc. &	confidence interval	CI
meter &	m	at	@ &	correlation coefficient	
milliliter &	mL	compass directions:	&	(multiple)	R
millimeter &	mm	east	E	correlation coefficient	
&		north	N	(simple)	r
Weights and measures (English)		south	S	covariance	cov
cubic feet per second	ft ³ /s	west	W	degree (angular)	°
foot &	ft	copyright	© &	degrees of freedom	df
gallon &	gal	corporate suffixes:	&	expected value	E
inch &	in	Company	Co.	greater than	>
mile &	mi	Corporation	Corp.	greater than or equal to	≥
nautical mile &	nmi	Incorporated	Inc.	harvest per unit effort	HPUE
ounce &	oz	Limited	Ltd.	less than	<
pound &	lb	District of Columbia	D.C. &	less than or equal to	≤
quart &	qt	et alii (and others)	et al. &	logarithm (natural)	ln
yard &	yd	et cetera (and so forth)	etc. &	logarithm (base 10)	log
&		exempli gratia &		logarithm (specify base)	log ₂ , etc.
Time and temperature		(for example)	e.g. &	minute (angular)	
day &	d	Federal Information &		not significant	NS
degrees Celsius	°C	Code	FIC &	null hypothesis	H_0
degrees Fahrenheit	°F	id est (that is)	i.e. &	percent	%
degrees kelvin &	K	latitude or longitude	lat. or long. &	probability	P
hour &	h	monetary symbols &		probability of a type I error	
minute &	min	(U.S.)	\$, ¢ &	(rejection of the null	
second &	s	months (tables and &		hypothesis when true)	α
&		figures): first three &		probability of a type II error	
Physics and chemistry		letters	Jan,...,Dec &	(acceptance of the null	
all atomic symbols		registered trademark	® &	hypothesis when false)	β
alternating current	AC	trademark	™ &	second (angular)	"
ampere &	A	United States &		standard deviation	SD
calorie &	cal	(adjective)	U.S. &	standard error	SE
direct current &	DC	United States of &		variance	
hertz &	Hz	America (noun)	USA &	population	Var
horsepower &	hp	U.S.C.	United States &	sample	var
hydrogen ion activity	pH		Code		
(negative log of)		U.S. state	use two-letter		
parts per million	ppm		abbreviations		
parts per thousand	ppt,		(e.g., AK, WA)		
	‰				
volts	V				
watts	W				

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KUSKOKWIM-GOODNEWS MANAGEMENT AREA, 2011**

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by '
,

John Chythlook '
Division of Sport Fish, Bethel/Fairbanks '

Alaska Department of Fish and Game '
Division of Sport Fish, Research and Technical Services '
333 Raspberry Road, Anchorage, Alaska, 99518-1599 '

,
December 2012 '

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

John Chythlook
Alaska Department of Fish and Game, Division of Sport Fish
P.O. Box 1467, Bethel, AK 99559-1467, USA

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ABSTRACT

Information specific to recreational fisheries in the Kuskokwim-Goodnews Management Area in 2011 and preliminary information for 2012 is presented. Estimates of fishing effort, total catch, and effort is summarized through the 2011 season. This information is provided to the Alaska Board of Fisheries (board), as well as to the general public and interested parties. Summaries of major fisheries within the area are detailed, including descriptions of the performance of these fisheries, regulatory actions by the board, social and biological issues, and descriptions of ongoing research and management activities. The remote waters of the Kuskokwim-Goodnews Management Area supported approximately 22,000 angler-days of sport fishing in 2011. Salmon species (73%) dominated the total harvest of approximately 9,000 fish, while freshwater species (64%) dominated the total catch of approximately 214,000 fish. Coho salmon were the majority of the salmon species harvest (58%) and catch (47%), while Dolly Varden/Arctic char were the majority (51%) of the freshwater species harvest, and Arctic grayling, Dolly Varden/Arctic char, and rainbow trout comprised 95% of the total catch.

Key Words: Kuskokwim River, Kuskokwim Bay, Kanektok River, Arolik River, Kwethluk River, Eek River, sport fisheries, subsistence, king salmon, coho salmon, sockeye salmon, chum salmon, Arctic grayling, Dolly Varden, rainbow trout, northern pike.

EXECUTIVE SUMMARY

This document provides a wide array of information specific to recreational angling opportunities that exist within the Kuskokwim-Goodnews Management Area (Figure 1). Information specific to the proposals that the Alaska Board of Fisheries (board) will address at its January 15–20, 2013 meeting is contained within this report. Appendix B (page 62) directs board members to information specific to the January meeting. This table guides the reader to specific information contained within the text, tables, and graphic format that may be useful in evaluating regulatory proposals. Information specific to recreational fisheries within the Kuskokwim-Goodnews Management Area during 2011, including preliminary data from 2012, are presented, along with a brief history of these fisheries and past board decisions that have affected them.

INTRODUCTION

This area management report provides information regarding the Kuskokwim-Goodnews Management Area (KGMA) and its fisheries for 2011, with preliminary information from the 2012 season. This report is organized into two primary sections: a management area overview, including a description of the KGMA and a summary of fishing effort, harvest, and catch for the area, and a section on the significant area fisheries, including specific harvest and catch by species and drainage.

ADVISORY COMMITTEES

Local Fish and Game advisory committees (ACs) have been established throughout the state to assist the boards of Fisheries and Game in assessing fisheries and wildlife issues, and proposed regulation changes. AC meetings allow opportunity for direct public interaction with Alaska Department of Fish and Game (department) staff attending the meetings that answer questions and provide clarification concerning proposed regulatory changes regarding resource issues of local and statewide concerns. The Boards Support Section within ADF&G's Division of Administrative Services provides administrative and logistical support for the board and ACs. During 2011, the department had direct support responsibilities for 82 ACs in the state.

Within the KGMA, there are five ACs: Lower Kuskokwim, Central Bering Sea, Central Kuskokwim, Stony-Holitna, and McGrath. In addition, Lower Yukon and Togiak ACs often comment on proposals concerning fisheries in the KGMA.

ADF&G EMERGENCY ORDER AUTHORITY

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

FEDERAL SUBSISTENCE

The Alaska National Interest Lands Conservation Act (ANILCA) established a priority subsistence use of fish and game for federally-qualified rural residents on lands and waters for which the federal government asserts jurisdiction. The State of Alaska has also established a priority for subsistence use of fish and game by Alaskan residents (AS 16.05.258) on all lands and waters, but cannot discriminate between rural and urban residents (Alaska State Constitution Article VIII, sections 3 and 15). Because of this difference, the federal government asserted authority to ensure a priority subsistence use of fish and game for rural residents on federal lands and certain adjacent waters. On October 1, 1999, the federal government asserted regulatory authority for assuring the rural priority for subsistence fisheries on federal public lands, which includes nonnavigable waters on public lands. Following the *State of Alaska v. Katie John* decision by the Ninth Circuit Court in 1995, the federal government expanded the definition of public land to include waters for which the federal agencies assert federal reserved water rights. Under current practice, the federal land management agencies adopt regulations to provide for priority subsistence use by qualified rural residents in nonnavigable waters within federal public lands (including Bureau of Land Management (BLM) lands) and in navigable waters adjacent to or within federal conservation system units (generally does not include BLM lands). The state retains all other fish and wildlife management authorities, including management on federal land. Development of regulations for subsistence fisheries under the federal subsistence program occurs within the established Federal Subsistence Board (FSB) process. The public provides input concerning regulation changes by testifying in Federal Subsistence Regional Advisory Council (RAC) meetings or by becoming council members. Ten RACs have been established throughout Alaska to assist the FSB in determining local subsistence issues and providing recommendations on proposed fishing and hunting regulations on the fish and game populations under consideration. Each RAC meets twice a year, and subsistence users and other members of the public can comment on subsistence issues at these meetings.

Within the KGMA, the subsistence fisheries for which the federal government asserts management responsibility include those in the Yukon Delta National Wildlife Refuge (YDNWR) and the Togiak National Wildlife Refuge (TNWR). The KGMA fisheries fall mainly under the purview of the Yukon-Kuskokwim Delta RAC and peripherally, the Western Interior and Bristol Bay RACs. The Yukon-Kuskokwim Delta RAC's most recent meeting was held in October 2012 in Bethel. At this meeting, no federal fisheries proposals for the Kuskokwim-Goodnews Area were addressed; however, there was discussion in support of the Kuskokwim River board proposals 111 and 112, as well as discussion without resolution regarding proposal 105.

STATEWIDE HARVEST SURVEY

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey. The Statewide Harvest Survey (SWHS) is designed to provide estimates of effort, harvest, and catch on a site-by-site basis. It is not designed to provide estimates of effort directed towards a single species. Species-specific catch per unit effort (CPUE) information can seldom be derived from the report. Questionnaires are mailed to a stratified random sample of households containing at least one individual with a valid fishing license (resident or nonresident). Information gathered from the survey includes participation (number of anglers and days fished), number of fish caught, and number harvested by species and site. These surveys estimate the number of angler-days of fishing effort expended by sport anglers fishing Alaskan waters, as well as the sport harvest. Beginning in 1990, the survey was modified to include estimation of catch (release plus harvest) on a site-by-site basis. Survey results for each year are available the following year; hence, the results for 2011 were available fall 2012. Additionally, creel surveys have been used to verify the mail survey for fisheries of interest, or for fisheries that require more detailed information or inseason management.

The utility of SWHS estimates depends on the number of responses received for a given site (Mills and Howe 1992; Clark 2009). In general, estimates from smaller fisheries with low participation are less precise than those of larger fisheries with high participation. Therefore, the following guidelines were implemented for evaluating survey data:

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

For purposes of reporting and organizing statistics in the SWHS, KGMA sites are designated within survey area V.

SPORT FISH GUIDE LICENSING AND LOGBOOK PROGRAM

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

In 2004, the Alaska Legislature adopted House Bill 452 that established licensing requirements for sport fishing guide business owners and sport fishing guides on a statewide basis (effective 2005). This legislation also required logbook reporting for all freshwater guiding businesses, in addition to the existing saltwater reporting requirements. The logbook data provides location of fishing effort,

level of participation, and number of species kept and released by clients. This information is used for the regulation, development, and management of fisheries and has been published annually since 2009 (data since 2006) in a Fishery Data Series report (Sigurdsson and Powers 2009–2012).

SECTION I: MANAGEMENT AREA OVERVIEW

MANAGEMENT AREA DESCRIPTION

The KGMA includes all waters of the Kuskokwim River drainage and all drainages in Kuskokwim Bay (Figure 2). Additionally, the KGMA includes all drainages that flow into the Bering Sea north of Cape Newenham and south of the westernmost point of the Naskonat Peninsula (approximately Hooper Bay) to the north. Nunivak, St. Matthew, and adjacent islands are also included within the area.

For sport fish management purposes, the KGMA is partitioned into two sections: the Kuskokwim River and Kuskokwim Bay (Figure 2).

The KGMA 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 KGMA, 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 KGMA during the early 1980s (Chythlook 2006, 2009; Lafferty 2001). It was during this time period that sport fisheries in this area were captured in the SWHS. Largely, sport fisheries of the KGMA were small, isolated, and received little effort and hence, low catch and harvest (Tables 1–3).

Angling effort in the KGMA is third in ranking of the angling effort in the AYK region. The Upper Copper/Upper Susitna and Tanana Management areas support more fishing effort and are largely road accessible. 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 Kuskokwim River and Kuskokwim Bay reached a high of 27,913 angler-days in 1998, and has fluctuated between 17,000 and 27,000 in recent years, suggesting a fairly stable amount of fishing effort in this area. Even with 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 3 sport fisheries that dominate the area; they are the Kanektok, Aniak, and Goodnews rivers (Tables 4, 5; Figure 2). These three streams provide salmon fisheries for all 5 species of Pacific salmon, as well as rainbow trout *O. mykiss*, in a remote Alaska setting. Other rivers in the Kuskokwim River area that receive small-to-moderate fishing pressure are the Kisaralik, Kwethluk, and Holitna rivers (Table 5; Figure 2). Most other rivers in the area do not receive enough fishing effort to be reported consistently 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 Kuskokwim River upstream of the Holitna River drainage sees very little effort (Table 5).

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 important, and regularly reaches harvests of over 80,000 for the entire Kuskokwim River drainage based on recent 10- and 15-year averages (Simon et al. 2007; Hamazaki 2011; Carroll and Hamazaki 2012).

Commercial fisheries in the Kuskokwim-Goodnews drainages are relatively small and center on the Lower 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 the chum salmon *O. keta*-directed fisheries have been irregular in prosecution since the late 1990s due to factors including poor markets, limited processing capacity, and conservation of king salmon (J. Linderman, Commercial Fisheries Biologist, ADF G, Anchorage, personal communication).

Sport fisheries in the KGMA are small by comparison to other sport fisheries in the state with better access (Table 1). The majority of effort occurs in the Kuskokwim Bay area, focusing mainly on the Kanektok River. Fishing effort on the Kanektok River averages over 6,000 angler-days annually (Table 4). Rainbow trout are the most desired species by anglers on the Kanektok River. Fishing for other resident species, such as Arctic grayling *Thymallus arcticus* and Dolly Varden *Salvelinus malma*, occurs there also, as well as for salmon, especially king and coho *O. kisutch* salmon. Important rainbow trout sport fisheries also occur in the Lower Kuskokwim rivers: the Kisaralik, Kasigluk, Kwethluk, and Aniak Rivers. Fishing for the 5 Pacific salmon species occurs throughout much of the Kuskokwim River and Kuskokwim Bay drainages. The rivers that drain into the Central and Upper Kuskokwim River, such as the Holitna River, attract a moderate number of sport anglers annually (Table 5).

ESTABLISHED MANAGEMENT PLANS AND POLICIES

Regulations governing fisheries in the KGMA are found in 5 AAC 71.010 through 5 AAC 71.995, 5 AAC 75.001 through 5 AAC 75.995 (sport fishing), in 5 AAC 77.001 through 5 AAC 77.035, and 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).

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

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

Currently, there are 3 management plans specific to sport fisheries in the KGMA: the *Southwest Rainbow Trout Plan*, the *Wild Arctic Grayling Management Plan* (5 AAC 71.055), and the *Wild Lake Trout Management Plan* (5 AAC 71.040). 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 provide managers guidance over inseason management, frequently addressing salmon management. Salmon management in the KGMA is governed by subsistence regulations and several management plans directed at controlling commercial fisheries harvests. Subsequently, managers from Division of Commercial Fisheries take a lead role in management of salmon in this area of the state. Most subsistence and commercial fishing regulations are interconnected to provide opportunity to harvest salmon surpluses in the Kuskokwim River drainage.

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). There are two salmon management plans that guide subsistence, commercial, and sport fishing management in the KGMA, including streams in Kuskokwim Bay. These include the:

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

The *Policy for the Management of Sustainable Salmon Fisheries* (SSFP, 5 AAC 39.222) provides guidance for the salmon management plans of the Kuskokwim River and Kuskokwim Bay. In 2001, comprehensive rebuilding measures were instituted for king and chum salmon in the *Kuskokwim River Salmon Rebuilding Management Plan* by placing windows of salmon passage in migratory routes in freshwater and marine environments. Many of the existing and a few new restrictions in the Aniak River sport fishery were included within the *Kuskokwim River Salmon Rebuilding Management Plan* (5 AAC 07.365), including continuation of the king salmon season from May 1 to July 25, with a bag 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 3 other salmon species (pink *O. gorbuscha*, sockeye *O. nerka*, and coho salmon) per day remains in effect. Inclusion of chum salmon in the aggregate bag limit was reinstated in the Aniak River by board action in 2007. A correction of the *Kuskokwim River Salmon Rebuilding Management Plan* at the 2010 AYK board meeting reflected continuation of the same action.

Resident Fish Management Plans

As recently as the 1990s, sport fishing bag limits for resident fish species were generous and were used as a surrogate for subsistence uses in the Kuskokwim River drainage. Management of resident fish species in the KGMA is under subsistence and sport fishing regulations. Subsistence regulations of the Kuskokwim Area are an exception to resident species management throughout the State of Alaska. This area, the Lower Yukon and portions of the Norton Sound Area, are some of the few areas of the state where a resident of Alaska can harvest unlimited quantities of resident fish (except rainbow trout) during the open water season with hook-and-line under subsistence regulations.

The *Policy for the management of sustainable wild trout fisheries* (5 AAC 75.222; 5 AAC 75.210), directs the department to manage wild trout populations in Alaska for long-term sustained yield through a conservative harvest regime. The policy establishes a conservation plan for wild trout populations, and defines the management approaches under which the department shall manage wild trout populations in the KGMA. The policy establishes that wild trout stocks and habitats should be maintained at levels that assure optimum sustained yield. The policy also outlines guidelines and considerations for the department, public and/or board to change or address the management approach for a water body or fish stock.

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

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

MAJOR ISSUES

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 nonlocal 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, ADF G 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 KGMA.
2. &Rod-and-reel subsistence. In 2000, the board 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’ area of the Lower Yukon and Kuskokwim rivers. In 2001, rod-and-reel subsistence fishing was extended upstream to include the remainder of the Kuskokwim River drainage by emergency regulation in response to a petition to the board

from Nikolai Native Village and the Western Interior RAC. Prior to these actions being taken, rod and reel for subsistence fishing was permitted only through the ice under state 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. Since all Alaskans qualify for subsistence, resident anglers could choose to rod-and-reel fish under subsistence regulations instead of sport fish regulations. Resident sport fishing effort has not yet declined as a result of this regulation change, based on the SWHS. The greatest concerns relate to changes in urban resident behavior in regard to license sales, participation in rural fisheries, harvests of fish populations, and ability to measure these harvests in the absence of harvest surveys or permits.

3. Federal fishery regulation 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 KGMA, this loss of opportunity is a concern for sport fishermen in the area. Recent proposals to the FSB to exclude recreational anglers from popular fisheries have required substantial efforts by ADF&G staff to maintain current opportunities.
4. Jurisdictional issues involving navigable water bodies. Jurisdiction over navigable water bodies that run through federal conservation units is in dispute between state and federal managers. For example, land managers of the TNWR are investigating implementation of several options put forward in the Togiak Comprehensive Conservation Plan (CCP) and Public Use Management Plan (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 (Togiak PUMP). In a similar issue, land status surrounding the Arolik River continues to be in dispute between the federal and state governments. BLM determined that portions of the Arolik River were nonnavigable and under the Alaska Native Claims Settlement Act (ANCSA) conveyed shoreline to Qanirtuuq Inc. as part of its entitlement under ANCSA. 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 the shoreline was 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 (Dingell-Johnson or D-J) mandates that at least 15% of federal funds collected from taxes on boat gas and sport fishing equipment be used by states for development and maintenance of motorized boating access facilities. A broad range of access facilities can be approved for funding if 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 KGMA. An upgrade of the boat launching site in the community of McGrath has been considered, as well as the

possibility of access projects involving boating facilities in Bethel or Aniak. None of these project possibilities have advanced beyond initial discussion at this time. Presently, there are no major access issues for sport fishing in the KGMA, largely because of the remote character of the entire region.

INFORMATION AND EDUCATION

Information regarding regulations, publications, fishing reports, news releases, and EOs for the KGMA can be found from the *Fishing* and *Sport* links at the department's website (http://www.adfg.alaska.gov/index.cfm?adfg_fishingSport.main). From the *Interior Area* and *Kuskokwim-Goodnews* link on this website, anglers interested in fishing in the KGMA can read the area descriptions and other fishing information. The TNWR and YDNWR are the two federal land units within the area, and a portion of the major rivers in the area are within these lands. The federal refuges have their own corresponding reports and news releases at their websites (<http://togiak.fws.gov>) and (<http://yukondelta.fws.gov>).

There are 3 regional information and education (I E) staff located in the department's Fairbanks office. An Information Officer II and a seasonal Fisheries Biologist I respond to questions from the public at the office, and via phone and e-mail. In addition, I E staff distribute and update fishery brochures, fishing regulations, the regional webpage, coordinate the Fairbanks Outdoor Show booth, Kid's Fish and Game Fun Day, and the Becoming an Outdoors-Woman program. An Education Associate II coordinates the sport fishing component of the Alaska Conservation Camp and works with schools in various communities throughout the region to provide a curriculum in sport fishing and aquatic education.

SPORT FISHING EFFORT, HARVEST, AND CATCH

Effort, harvest, and catch statistics for KGMA sport fisheries have been estimated from response to the SWHS since 1977 and reported under the headings of the *Kuskokwim River/Kuskokwim Bay drainages* (Area V)(Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995-1996, 2001a-d, Walker et al. 2003, Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, *In prep*). Estimates of angling effort in the KGMA averaged more than 21,000 angler-days during the last 5- (2006–2010) and 10-year (2001–2010) periods. Angling effort in the region and statewide has also, on average, remained relatively stable during this period (Table 1).

The majority of the sport fishing effort occurs in 3 areas: Kuskokwim Bay tributaries (including the Kanektok, Goodnews, and Arolik rivers), the Aniak River, and the Lower Kuskokwim River tributaries near Bethel (Kwethluk and Kisaralik rivers, Tables 4 and 5). There is some sport fishing effort in the Holitna River, but considering the size of this drainage, effort remains exceptionally low.

Fishing effort in the KGMA has remained stable overall, but a general overall decrease was observed in 2009 and 2010. The effort was higher in 2011 than 2010, and approximated the 5- and 10-year averages. It was anticipated that there would be a drop in travel to the area due to travel restrictions following September 11, 2001, but effort remained relatively stable comparable to that prior to 2001 (Tables 4 and 5). There has been considerable speculation that this stability in effort may be relatively short-lived, however, as anecdotally, many individuals and guides throughout the region expressed concern over the high energy costs. The 2011 and recent years' data show a relatively stable fishery (Table 5).

Coho salmon is the primary sport fish species that is harvested in the KGMA (Table 3). Dolly Varden/Arctic char surpasses coho salmon in numbers of fish caught in the Kuskokwim River, but the vast majority of Dolly Varden/Arctic char are released and not harvested.

SECTION II: FISHERIES

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

SALMON FISHERIES

King Salmon

Background and Historical Perspective

King salmon are present in most streams throughout the KGMA, but are predominantly 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 2 sport fisheries average approximately 6,000 and 3,000 angler-days of effort, respectively, for all fish species (Tables 4 and 5). Very few king salmon are caught and harvested in the sport fisheries in the upper Kuskokwim River 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 sport fishing effort 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 and are summarized in previous fishery management reports (FMRs) (Lafferty 2001, 2003; Chythlook 2006, 2009, 2011). Additional KGMA commercial and subsistence harvest information for 2005–2009 can be found in Bavilla et al. (2010). Division of Sport Fish has monitored both the Kanektok and Aniak river sport fisheries with additional inseason 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 TNWR has archived age and size data from king salmon spawning in the Kanektok River (Lisac and MacDonald 1995; MacDonald 1996; M. Lisac, Fisheries Biologist, USFWS, Dillingham, personal communication).

Sport harvests of king salmon are minor in comparison to the commercial and subsistence harvests of the area (Tables 6, 7, and 8). However, there is angler desire to participate in the king salmon fisheries of the Kuskokwim-Goodnews area. The average angler trip length in Western Alaska is at least 6 days (Lafferty and Bingham 2002). Kuskokwim Bay sport fisheries average about 10,000 angler-days per season (Table 4), which is about half the KGMA total annual effort (Table 5).

Historically, approximately 10% of king salmon caught in the KGMA were harvested annually from 1991–2005 (Tables 9 and 11). Harvests during the last 5 years have remained similar, though catch numbers have fluctuated greatly in the last few years. Catches in the Kuskokwim Bay area peaked at 21,000 king salmon in 2005, while from 2008 through 2010; catches were near 3,000 king salmon. In 2011, catches in Kuskokwim Bay increased to over 9,100. Most anglers participate in the KGMA king salmon fisheries 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. Accepting that delayed hooking mortality is minor, 10% or less (Bendock and Alexandersdottir 1992), overall fishing mortality (harvest + delayed mortality) may account for an additional 1,000 king salmon from KGMA sport fisheries, and bring the total removal by the sport fishery to around 2,500 king salmon under current regulations.

The estimated harvest of king salmon in the Kuskokwim River drainage sport fisheries has remained low (< 1,000 in recent years) (Table 9). This is probably due, in part, to care taken by anglers to not retain sport-caught king salmon in the Kuskokwim River due to perceptions regarding the sport fishery and the stock of concern designation placed on king salmon stocks in 2001. The board removed the stock of concern designation for Kuskokwim River king salmon at its 2007 meeting, but many sport fishermen and guides still exercise restraint in harvesting king salmon, especially in light of recent poor escapements (C. Brazil, Commercial Fisheries Biologist, ADF G, Anchorage, personal communication).

Recent Fishery Performance

In 2010, though the king salmon run strength was considered to be below average to poor, the subsistence fishing schedule was not implemented (Brazil et al. 2011). An (EO) was issued to close the sport fishery for king salmon in the Kwethluk and Tuluksak rivers (3-KS-03-10) in response to a special action by USFWS YDNWR to close the federal fisheries on those rivers due to low escapements.

In the commercial fishery, there were a total of 16 commercial fishing periods in District 1 during the 2010 season, between June 25 and August 12, with 2 registered commercial fish buyers (Brazil et al. 2011). Slightly increased processing capacity allowed for a slight increase in fishing time over the previous year (Brazil et al. 2011). King salmon harvest was below average at 2,731 king salmon (Table 6).

In 2010, king salmon abundance in the Kuskokwim River was below average overall. King salmon escapement goals were achieved at only 2 weir projects. Kogrukluuk River king salmon escapement (a tributary of the Holitna River and often used as a gauge of the strength of a salmon run) was within the escapement goal range, and aerial survey goals were exceeded or within range (C. Brazil, Commercial Fisheries Biologist, ADF G, Anchorage, personal communication; Table 10).

The 2011 king salmon run was characterized as below average (C. Brazil, Commercial Fisheries Biologist, ADF G, Anchorage, personal communication). An EO was issued in 2011 (3-KS-01-11) to close the Kwethluk, Tuluksak, and Kisaralik rivers, and Kuskokuak Slough to sport fishing for king salmon. This EO was issued prior to the king salmon season in cooperation with conservation measures taken by the Division of Commercial Fisheries and USFWS.

In 2012, the king salmon run was expected to be below average and it was anticipated that several of the escapement goals would not be met. Preseason actions included sport, commercial, and subsistence closures on the Kwethluk, Kisaralik, George, Aniak, and Tuluksak Rivers, as well as Kuskokuak Slough. An EO (3-KS-01-12) was issued to close the Kwethluk, Kisaralik, George, Aniak, and Tuluksak rivers, and Kuskokuak Slough to sport fishing for king salmon. This EO was issued June 13, prior to the king salmon season, in cooperation with conservation measures taken by the Division of Commercial Fisheries and USFWS.

As the 2012 king salmon run showed up below expectations, additional restrictions inseason were instituted. As the subsistence fishery was put onto “rolling closures” or gear restrictions, an EO was issued to close the mainstem Kuskokwim to sport fishing for king salmon and reduced the bag limit to 1 king salmon in streams not already closed to sport fishing for king salmon on June 13 (3-KS-03-12). As the king salmon run remained below average, the king salmon sport fishery in the entire Kuskokwim drainage was closed by EO on June 22 (3-KS-04-12).

Fishery Objectives and Management

The department has assessed king salmon escapements and harvest through several programs in the Kuskokwim River 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, test fishing, and weirs in the Kuskokwim River and tributaries. The primary king salmon escapement programs in the Kuskokwim River drainage are aerial surveys and the Kogruklu River weir. There have been recent weir additions to further department understanding of Kuskokwim River drainage escapements, as well as mark-recapture studies (Schaberg et al. 2012).

Most Kuskokwim River king salmon escapement goals 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, location of these weirs is not based on the proportion of the total run using a tributary, but on suitability of the site for weir maintenance. Many of the larger tributaries and the larger stocks of king salmon, such as the Aniak and Holitna rivers (Schaberg et al. 2012), are not completely assessed, but are assessed with sporadic aerial surveys of king salmon and a weir on the Kogruklu River. Test fishing in the Lower Kuskokwim River, near Bethel, provides relative abundance and run timing at Bethel, but not a measure of escapement, except for king salmon.

Current Issues and Fishery Outlook

Kuskokwim River and Tributaries

King salmon sport fisheries were characterized as below average from 2010 through 2012, and some subsistence users characterized the subsistence fishery as average to poor (Elison et al. 2012). Division of Commercial Fisheries considered 2010 escapements as below average at most escapement projects, with the exception of the Kogruklu River, which was within the escapement goal range. The 2010 king salmon escapement was below the escapement goals in the Kwethluk and Tuluksak rivers, and emergency closures for subsistence and sport fisheries were implemented from July 10–25. In 2011, prior to the salmon season, similar restrictions were implemented, with inclusion of the Kisaralik River and Kuskokuak Slough. King salmon

escapements were slightly larger, overall, in the Kuskokwim River weir projects (including the Kwethluk and Tuluksak rivers) in 2011, but still were under established escapement goals. In 2012, further preseason restrictions were implemented to include the George and Aniak rivers, in addition to the Kwethluk, Kisaralik, Tuluksak rivers and Kuskokuak Slough. There were also mainstem closures and gear restrictions in the subsistence fishery in 2012. Enumeration projects were largely hampered by high water in 2012, but projects with acceptable estimates had higher escapements than in 2010 and 2011 (Elison et al. 2012). In summary, abundance of king salmon in the Kuskokwim River over the past 3 years has encompassed some of the lowest known escapements. This has resulted in closures to sport fisheries, restriction to subsistence fisheries, and delay of chum salmon-directed commercial fisheries to avoid incidental catch of king salmon. However, recent advances in estimation of total run and escapement have provided the necessary information to conduct spawner-recruit analysis on the Kuskokwim River king salmon stock (Schaberg et al. 2012; Bue et al. 2012). This analysis indicates the recent escapement levels are low, but sustainable, and similar escapements in past years have been highly productive.

Kuskokwim Bay Tributaries

The 2010 king salmon escapement into the Goodnews River achieved the escapement goal range of 1,500–2,900 salmon, with an estimated weir passage of 2,244 (Brazil et al. 2011). The Division of Commercial Fisheries has been operating a 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 spawn upstream of the weir site. Escapement in the Kanektok River is estimated with aerial surveys and the estimated escapement in 2010 was below the escapement goal. In 2010, operation of the weir was from June 28 through August 5. King salmon passage through the Kanektok River weir was estimated at 5,800 salmon. There is no formal escapement goal established for king salmon on the Kanektok River weir. In 2011, king salmon returns were slightly lower, with 5,032 estimated past the Kanektok River weir, and 1,861 estimated past the Goodnews River weir. For 2012, the preliminary king salmon estimated escapement at the Kanektok River weir was 1,568, but counting operations started late due to high water. The Middle Fork Goodnews River weir was largely inoperable due to high water in 2012, and estimated escapement (380) was below the escapement goal and the aerial survey of the Goodnews River was below the escapement goal.

Recent Board of Fisheries Actions

There have been no proposals specific to the Kuskokwim River or Kuskokwim Bay king salmon sport fisheries during the past 2 board meeting cycles.

Current or Recommended Research and Management Activities

In recent years, weirs have been used to enumerate king salmon escapements on the Kwethluk, Tuluksak, George, Kogrukluk, Tatlawiksuk, and Takotna rivers (Whitmore et al. 2008; Brazil et al. 2011). 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). Additionally, in 2002, a mainstem mark-recapture project was implemented by Division of Commercial Fisheries to assess king, chum, and coho salmon abundance upstream of Kalskag. Division of Sport Fish conducted a king salmon radiotelemetry project on the mainstem Kuskokwim from 2002 through 2006 (Stubby 2007). Division of Commercial Fisheries continued this project in 2007. Aerial

surveys conducted by Division of Commercial Fisheries remain an important component of king salmon assessment in the Kuskokwim-Goodnews area (Table 10).

In the Kuskokwim Bay drainages (Goodnews and Kanektok rivers), it has been suggested that the distance of the weir from the mouth of the river is too far upstream to accurately assess the king salmon run. This is partially mitigated by the aerial surveys that are conducted. It may be important to estimate the percentage of king salmon that spawn below the weir, and thus, be able to extrapolate the number of king salmon returning to the river. In both Quinhagak and Goodnews Bay, there is considerable opposition to radiotelemetry projects at this time. In the future, a king salmon radiotelemetry project in one or both of these rivers may add valuable information to the weir projects.

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 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 32,000 in 1999 to nearly 1.1 million coho salmon in 1996 (Tables 12–14). The historic commercial harvest has averaged approximately 450,000 coho salmon in the Kuskokwim River (Brazil et al. 2011). The Kuskokwim River itself is characterized by broad channels and turbid water, thereby limiting 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, Goodnews, and Aniak rivers (Tables 15 and 16).

Sport harvests and catch of coho salmon are estimated through the SWHS. Commercial and subsistence harvests are managed by Division of Commercial Fisheries located in Bethel (Bavilla et. al 2010; Brazil et al. 2011; Burkey et al. 1997-2001; Ward et al. 2003; Whitmore et al. 2005). The Kanektok River has the most complete commercial, subsistence, and sport harvest, and escapement information on coho salmon in the area (Table 13). Division of Sport Fish has monitored both the Kanektok and Aniak rivers with additional inseason harvest surveys and stock assessment projects in the past (Dunaway 1997; Dunaway and Bingham 1992; Dunaway and Fleischman 1995; Lafferty and Bingham 2002; Minard 1987; Minard and Brookover 1988). Data from the Division of Sport Fish Guide Logbook program, collected since 2006, provides additional information to the catch-and-harvest estimates from the SWHS (Sigurdsson and Powers 2009-2011). Additionally, USFWS staff from the TNWF archived age and size data from coho salmon spawning in the Kanektok Rivers (Lisac and MacDonald 1995; MacDonald 1996).

Prior to 1987, bag limits for coho salmon were very liberal, allowing 15 fish per day, 30 fish in possession. 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. In 1987, the board recognized the significance of the harvest potential of the Kanektok River sport fishery and reduced bag and possession limits to 5 fish. These limits have remained the standard for most of the area, with the exception of recent changes in the Aniak River. Repeatedly, harvest surveys conducted on the Kanektok River indicate that sport anglers rarely (7%–15%) took 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 coho salmon fisheries is great. In the recent 5-year average (2006–2010) approximately 4,900 coho salmon were harvested, while approximately 40,000 coho salmon were caught and released (Tables 2, 3). Delayed mortality has been a concern in some coho salmon fisheries within the state; however, these coho salmon fisheries studies were situated in estuarine waters. Most of the anglers participating in the KGMA fisheries are on float trips in tributary headwaters, and furthermore, these headwaters have special management regulations to protect rainbow trout, with only unbaited single-hook, artificial lures permitted. Accepting that delayed hooking mortality is minor (15% or less, Stuby 2002), the overall mortality of coho salmon caused by the area sport fisheries is considered sustainable given escapement levels.

In 2010 and 2011, coho salmon escapements were characterized as average to below average at most of the 7 tributary weirs (Elison et al. 2012). In 2011, sport fish catch rates for coho salmon were average throughout Kuskokwim Bay and well below average for the Kuskokwim River (Tables 15 and 16). Sport harvest for the entire management area at the end of the 2011 season was well below average (Table 12). High water conditions adversely affected coho salmon catchability in both 2011 and 2012.

Fishery Objectives and Management

The department has focused on assessing salmon escapements and harvests through several programs in the Kuskokwim-Goodnews area. Harvest monitoring is conducted through commercial fish tickets and surveys designed to estimate harvests from subsistence and sport fisheries. Salmon escapement is monitored through aerial surveys, test fishing, and weirs in the Kuskokwim River drainage. The primary coho salmon escapement programs in the Kuskokwim River drainage are aerial surveys, and the Kogrukuk River weir. An escapement goal for coho salmon was established for the Kwethluk River in 2010 with a lower-bound sustainable escapement goal of >19,000 fish; however, counts thus far remain incomplete due to operational periods that do not encompass the entire coho salmon run, or persistent high water events. The Bethel test fishery only provides relative abundance and run timing at Bethel.

There are only a few escapement goals for coho salmon in this area, and weather conditions during the coho salmon run seldom allow reliable aerial surveys to be flown to index escapements.

Current Issues and Fishery Outlook

Coho salmon returns to the area have fluctuated during the last 10 years, with especially large returns in 2003 and 2004. Coho salmon return to the Kuskokwim River drainage primarily at 4 years of age; the 2008 brood was the main parent year for the 2012 return. Preliminary estimates for all escapement enumeration projects in the Kuskokwim River except the Kwethluk River weir were slightly below average for 2012; however, several weir projects were largely nonfunctional during the coho salmon season due to high water. For Kuskokwim Bay streams, weirs were not operated far enough into the coho salmon return to enumerate total escapement, and also had long periods where they were not operational due to high water, though the Goodnews River weir was estimated to have observed 80% of the run (Elison et al 2012). The outlook for coho salmon returning in 2013 is likely to be near average.

Recent Board of Fisheries Actions

There have been no proposals specific to the Kuskokwim River or Kuskokwim Bay coho salmon sport fisheries during the past 2 board meeting cycles.

Current or Recommended Research and Management Activities

A study using radiotelemetry and mark-recapture methods, based on the existing Kuskokwim River weir projects, operated in 2008 and 2009. This project used the combined expertise that divisions of Sport Fish and Commercial Fisheries have gained through recent king and sockeye salmon projects (Stuby 2007; S. Gilk Commercial Fisheries Biologist, ADF G, Anchorage, personal communication; Pawluk et al. 2006; Schaberg et al. 2012). Studies that evaluate catch-and-release mortality (Stuby 2002) in KGMA sport fisheries may be useful in interpreting catch estimates. Such studies may answer questions brought about by the general public regarding catch-and-release mortality.

Chum Salmon

Background and Historic Perspective

Kuskokwim-Goodnews 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 setnet.

Directed commercial fishing for chum salmon in the Kuskokwim River began in 1971. This fishery continued and expanded, with a record harvest of 1.4 million in 1988 (Burkey et al. 2000). Since then, commercial harvests declined to less than 100,000 in the late-1990s and more recently, ranged broadly from 1,000 to 118,000 (Table 17). Commercial harvests of Kuskokwim River chum salmon have generally declined from harvests that occurred in the 1980s, first due in part to low returns in the late 1990s, then largely due to low market demand during the mid-2000s and most recently, due to king salmon conservation. The harvest of chum salmon has been very high in recent years during sockeye salmon-directed commercial fisheries in Kuskokwim Bay.

Recent Fishery Performance

On average, sport harvests of chum salmon represent less than 1 percent of the total KGMA chum salmon harvests (Table 17). Approximately 300 chum salmon were harvested and 16,000 to 21,000 chum salmon released annually from 2005 to 2011 (Tables 18 and 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, at most 10%, the overall removal of chum salmon is approximately 2,000 fish in sport fisheries of the KGMA.

Fishery Objectives and Management

The department has focused on assessing salmon escapements and harvests through several programs in the KGMA. 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, test fishing and weirs in the Kuskokwim River drainage.

From 2007 to 2010, the subsistence fishing schedule (“windows”) was not implemented on the mainstem Kuskokwim River. This was, in part, because of the removal of the stock of concern designation during the January 2007 board meeting, and partly, because of better than average run indicators and corresponding escapement (Brazil et al. 2011).

Current Issues and Fishery Outlook

Recent trends in chum salmon production have provided surpluses for commercial and sport fisheries in the past 4 years.

Recent Board of Fisheries Actions

At its 2007 meeting, the board removed the stock of concern designation on Aniak River chum salmon and the chum salmon no-retention regulation was removed from Aniak River sport fish regulations. Chum salmon can now be harvested under the 3-fish aggregate bag limit for salmon other than king salmon. The chum salmon no-retention clause remained in the *Kuskokwim River Salmon Rebuilding Plan*; this oversight was addressed by a proposal adopted at the January 2010 board meeting to remove contradictory regulations for chum salmon retention in the Aniak River sport fishery.

Current or Recommended Research and Management Activities

Mark-recapture studies of chum salmon in the Kuskokwim River have been attempted in recent years, but have not been successful. An understanding of Kuskokwim River chum salmon total run size would be very beneficial to the management of this species. Division of Commercial Fisheries has archived chum salmon samples from throughout the Kuskokwim River drainage for future genetics analysis.

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 KGMA. Sockeye stocks of the Kuskokwim River are relatively small and located sporadically throughout the drainage, with the largest occurring in the Holitna River drainage and at Telaquana Lake in the Stony River drainage (S. Gilk, Commercial Fisheries Biologist, ADF G, Anchorage, personal communication). Most anglers venturing to Western Alaska are interested in king salmon and rainbow trout opportunities; however, sockeye and coho salmon opportunities have been becoming increasingly important to recreational anglers. Anglers seeking sockeye salmon fishing opportunities in the Kanektok and Goodnews rivers focus their efforts during the month of July prior to the king salmon spawning season closure of July 25. Sport harvests and effort are estimated through the SWHS, while commercial and subsistence harvests are managed by Division of Commercial Fisheries located in Bethel and are reported in their FMRs (Ward et al. 2003; Whitmore et al. 2005, 2008; Bavilla et al. 2010; Brazil et al. 2011).

As with the other Pacific salmon, sport harvests of sockeye salmon represent less than 1 percent of the total KGMA sockeye salmon harvests (Table 20). Commercial fisheries of Kuskokwim Bay target sockeye salmon in July. Though sockeye salmon commercial harvests were above

average in 2010, they were below average in Kuskokwim Bay in 2011, with about 38,500 fish taken in the commercial fishery in the Quinhagak District and about 24,500 fish taken in the Goodnews Bay District (Brazil et al. 2011). Harvests in 2012 were below average at about 37,700 fish for the Quinhagak District and well above average at about 50,600 fish for the Goodnews Bay District (T. Elison, Commercial Fisheries Biologist, ADF G, Anchorage, personal communication).

Recent Fishery Performance

With strong returns recently, sport anglers in the Kuskokwim Bay streams have responded by catching more sockeye salmon, with a record catch of over 14,000 in 2006 (Table 21). In 2011, the numbers were near average, at about 6,600 caught. Recreational sockeye salmon catches in the Kanektok and Goodnews rivers, in recent years, have been a few thousand. Harvest in Kuskokwim Bay rivers has not increased as much as the catch, with most anglers practicing catch-and-release. In general, for the Goodnews and Kanektok rivers, less than 1 sockeye salmon is harvested per 10 caught (Table 21). A small sport fishery for sockeye salmon exists on Lower Kuskokwim River tributaries, such as the Aniak, Kisaralik, and Kwethluk rivers, but historically, catches have averaged over 7,000 fish, with 2006 being a standout year with over 16,000 salmon caught (Table 22). The 2011 sport fish catch of sockeye salmon in Lower Kuskokwim River tributaries was just over 1,300 with a harvest of 98 fish (Table 22).

Fishery Objectives and Management

Sockeye salmon management of Kuskokwim Bay is outlined under the *District 4 Salmon Management Plan* (5 AAC 07.367); sockeye salmon management in Goodnews Bay, District 5 follows a similar regulation pattern, although there is no formal management plan (Ward et al. 2003; 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 a reliable method of assessing salmon escapements has not been an easy task in the Kanektok River. Counting towers and sonar projects have been attempted, but water conditions, staff availability, and budgetary constraints have limited the success of these projects. A resistance-board weir has been successful; unfortunately, the weir site is 42 miles upstream from the mouth and commercial fishery. The Goodnews River weir is located on the Middle Fork, 15 miles upstream of the mouth and commercial fishery, and represents an index of sockeye salmon escapement into the entire drainage. Aerial surveys are still used to estimate sockeye salmon escapement in other tributaries of the Goodnews River drainage. Additional sockeye salmon assessment has been conducted to evaluate the contribution of escapement in the mainstem of the Goodnews River in relation to index counts from the weir (Menard 1998; Estensen 2003). The Goodnews River weir has an escapement goal range of 18,000 to 40,000 for sockeye salmon. The Kanektok River aerial escapement objective for sockeye salmon is 18,000 to 34,000 fish. Counting sockeye salmon escapement using aerial surveys in the Kanektok and Goodnews rivers have historically had some success, but surveys have not been successful in every year and this has made escapement-based management difficult. However, commercial fisheries management has followed a simple fishing schedule based on fishery performance in relation to the historic mean harvest and CPUE of the commercial fishery, and this has worked to provide sustained yields.

Current Issues and Fishery Outlook

In 2011, the sockeye salmon run to the Kuskokwim River drainage and Kuskokwim Bay was characterized as below average. In 2011, the Kanektok and Goodnews sockeye escapement was estimated through a combination of weir counts and aerial survey (Elison et al. 2012). Estimates of escapement in 2011 indicate sockeye salmon numbers to be slightly below the lower range of the Goodnews River escapement goal, with just under 18,000 salmon. Though the Kanektok River has no escapement goal, at just under 85,000 fish, the escapement of sockeye salmon is the third lowest since 2002. The 2012 estimates of sockeye salmon escapements in the Kuskokwim River mainstem drainages suggest that most were below average, but in some cases, the weir projects were inoperable for long periods of time (Elison et al. 2012). The Kanektok sockeye salmon returns for 2012 were characterized as below average, but with strong years of returns before 2011 in the Kuskokwim Bay and Kuskokwim River drainage streams, it is difficult to predict whether this will continue into 2013.

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, the majority of the sockeye salmon fishery occurs in the Kuskokwim Bay. Kuskokwim Bay fisheries are subject to the *District 4 Salmon Management Plan*. This management plan sets guideline dates for opening of the commercial salmon fishery before June 16. The plan also describes the management strategy based on percentages of king salmon and sockeye salmon in the commercial catch.

Current or Recommended Research and Management Activities

Sockeye salmon radiotelemetry projects and sampling for genetics has been undertaken by Division of Commercial Fisheries (S. Gilk, Commercial Fisheries Biologist, ADF G, Anchorage, personal communication). Approximately half of the sockeye salmon in the Kuskokwim River have origins in the Holitna River drainage, followed by the Aniak River, and distantly, by other smaller drainages. Other current projects include a weir at Telaquana Lake operated with volunteers and in cooperation with the National Park Service; a recently completed mark-recapture study; and a genetic mark-recapture study (Elison et al. 2012).

RESIDENT SPECIES FISHERIES

Rainbow Trout

Background and Historic Perspective

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

Rainbow trout of the KGMA 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 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 climate and food availability. The *Southwest Alaska Rainbow Trout Management Plan* (ADF G 1990: SWAKRTMP) recognizes these factors and provides a policy for conservative management and maintenance of rainbow trout stocks in the Lower Kuskokwim River and Kuskokwim Bay.

Sport fishing effort, catch, and harvest are estimated by the SWHS. In the past, subsistence harvest surveys have focused on salmon, but in 2000, the Division of Subsistence began to estimate resident fish harvests, including rainbow trout on a community basis. The value of this data to management is limited since estimates are based on communities, rather than drainage, of harvest. Division of Commercial Fisheries manages all subsistence fisheries in the region.

Recent Fishery Performance

Total areawide rainbow trout sport harvests have rarely exceeded the 1,500 fish taken in 1988 (Lafferty 2003; Chythlook 2006), and the recent 5-year average is less than 100 rainbow trout (Table 23).

In 2011, catches were near average, likely due to better conditions and fewer high-water events than recent years. The weather remained somewhat wet in both the Kuskokwim River and Kuskokwim Bay drainages, but without major flooding events until late in the season. Rainbow trout catches were reported to be good at most Kuskokwim Bay/Kuskokwim River locations when water conditions permitted. The 2011 catch for the Lower Kuskokwim River drainages was over 13,000 rainbow trout caught (Table 23). Though catch rates were characterized as good to average, nearly all sport-caught rainbow trout caught in the entire Kuskokwim-Goodnews area were released.

Fishery Objectives and Management

During the mid-1980s, bag limits were adopted in the KGMA to eliminate excessive harvests. Bag limits at this time were very liberal, providing opportunity for local people to meet their subsistence needs. In conjunction with adoption of the SWAKRTMP, the Aniak River drainage (Figure 2) 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 under the guidelines of the *Southwest Alaska Rainbow Trout Management Plan* (ADF G 1990), resulting in regulations allowing only unbaited, single-hook, artificial lures. Parts of this plan were subsequently adopted into the statewide rainbow trout management plan (5 AAC 75.220).

Current Issues and Fishery Outlook

The rainbow trout stocks of the KGMA provide high catch rates in all size classes, strong indicators of healthy fish populations. Local anglers and the sport fishing guide industry continue to provide positive comments on rainbow trout stocks. Some concerns have been raised about rainbow trout stocks on the Aniak and Kanektok rivers. These concerns, voiced by some guides and individuals, generally involve a lower number of large rainbow trout, and fewer rainbow trout in general. The outlook for rainbow trout stocks in the KGMA is generally good. Rainbow trout greater than 25 inches are occasionally caught. In the short term, impacts of rod-and-reel subsistence fishing appear to be minor, but resident fish populations rebuild slowly, particularly on the edge their distribution range.

In March 2003, the board adopted the *Statewide Management Standards for Wild Trout* (5 AAC 75.220, 2003) that consolidated regulations for rainbow trout stocks not under special management. Within the KGMA, the Kasigluk, Arolik, Kisaralik, and Kwethluk rivers are not under special management regulations in the *Southwest Rainbow Trout Management Plan* and fall under the statewide standard bag limit of 2 fish, only one 20 inches or greater in length and

an annual limit of 2 fish, 20 inches or greater in length. There are currently no major biological concerns for rainbow trout fisheries in the Kuskokwim River drainage 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 2013 season and beyond.

Recent Board of Fisheries Actions

At its January 2004 meeting, the board adopted regulations for the Arolik, Kasigluk, Lower Kisaralik, and Kwethluk rivers which aligned rainbow trout regulations in these 4 rivers with the *Statewide Management Standards for Wild Trout*. The bag and possession limit became 2 fish, only one 20 inches or greater in length, and created an annual limit of 2 fish 20 inches or greater in length.

Current or Recommended Research and Management Activities

Several onsite creel surveys in the Kanektok and Aniak rivers have been conducted to verify catch, harvest, and angler effort (Adams 1996; Alt 1986; Dunaway 1997; Dunaway and Bingham 1992; Dunaway and Fleischman 1995; Lafferty and Bingham 2002; Minard 1987, 1990; Minard and Brookover 1988). The emphasis of these surveys was on sport fisheries that included rainbow trout fisheries.

Another tagging study of Kisaralik River rainbow trout in 1997 by the USFWS estimated the rainbow trout population to be in excess of 16,000 rainbow trout in a 79-km study section (Harper et al. 2005). 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 provide confidence that existing catches estimated by SWHS are sustainable. Area rainbow trout stocks continue to be conservatively managed.

A rainbow trout radiotelemetry project began in the Aniak River drainage in fall of 2008 (Schwanke and Thalhauser 2011). This project followed radiotagged fish the next 2 seasons in an attempt to gain insight into spawning areas and migratory habits. One of the major conclusions of this project was that rainbow trout that are caught in the winter subsistence fishery through the ice near the village of Aniak are likely a separate population of fish than those caught by sport and subsistence users upriver during the open-water season.

Similar work on the Kanektok River was initiated in 2009. Somewhat predictably, preliminary data from this project suggest that rainbow trout on the Kanektok River move downriver and into the mainstem during the winter, and spread upriver and into tributaries during the spring/summer.

In addition, work on the Kisaralik River was conducted in 2011. This cooperative project (including YDNWR, Kenai Fisheries Resource Office, and ADF G Division of Sport Fish staff) involved a mark-recapture study on the Kisaralik River drainage. This updated the 1997 Kisaralik River study done by the USFWS to assess for change in the 10+ years since that study was completed. The estimate generated by this study suggests a slightly lower population than the 1997 study (about 5,000 rainbow trout larger than 350 mm compared to about 7,000), but biometric review is in progress. A small follow-up study may occur in summer 2013.

Dolly Varden/Arctic Char

Background and Historical Perspective

Dolly Varden/Arctic char (DV/AC) of the Kuskokwim River drainage are found throughout the area. Distribution of both Dolly Varden and Arctic char *S. alpinus* 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, these closely-related species are treated as a composite.

Anglers focusing on DV/AC target mainly clear-water tributaries and lakes of the area. Within the KGMA, the largest catches of DV/AC occur in tributaries of Kuskokwim Bay and the Aniak River. Many DV/AC are caught incidentally while anglers are fishing for salmon and rainbow trout. Regulations that protect rainbow trout also protect other resident fish species, such as DV/AC. Local residents seek DV/AC when salmon are not available as a fresh source of fish. Stock sizes of DV/AC in the KGMA remain unknown, and the DV/AC of the Kuskokwim River tributaries remain largely unstudied. Life history and run timing of stocks in the Kanektok and Goodnews rivers have been studied and are suspected to be similar to stocks in the Lower Kuskokwim tributaries such as the Kwethluk and Kisaralik rivers.

Recent Fishery Performance

In 2011, weather conditions remained cool and wet. River levels were high, with occasional high turbidity and flooding. Catches were characterized as average at most Kuskokwim Bay/Kuskokwim River locations when water conditions permitted. This is reflected in catch reported by the SWHS, in the Lower Kuskokwim River at about 17,800 fish (Table 24). Though catch rates were near or above average, nearly all sport-caught DV/AC in the KGMA were released.

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. Current regulations and harvests appear to be within sustainable levels for DV/AC of the Kuskokwim River drainage. Declining sport harvests of DV/AC from the early 1980s to the 1990s (Lafferty 2001) can be attributed to additional protection from the *Southwest Alaska Rainbow Trout Management Plan*, resulting in conservative methods and means (no bait, single-hook regulations) and changing attitudes of anglers regarding the harvest of DV/AC (Table 24).

Current Issues and Fishery Outlook

The DV/AC stocks of the KGMA are believed to be well protected in area sport fisheries with current regulations. The outlook for DV/AC and other resident fish species in the Kuskokwim-Goodnews 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 KGMA. Area stocks should continue to provide good angling opportunities for the 2013 season.

Recent Board of Fisheries Actions

At its 2004 meeting, the board reinstituted individual bag and possession limits for resident species in the Aniak River drainage, replacing the aggregate bag and possession limits adopted in 2001. The current DV/AC limit in the Aniak River drainage is 3 fish, no size limit. Kuskokwim Bay rivers (Kanektok, Arolik, and Goodnews) have the same limit for AC/DV, as does the entire Holitna River drainage. Upper Kuskokwim River drainages upstream of the Holitna River are governed by the general regulation for AC/DV and lake trout *S. namaycush*, which for flowing waters is a bag limit of 10 per day, only 2 fish 20 inches or longer, 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. Kuskokwim River drainages downstream of the Holitna River, with the exceptions already named, have a DV/AC bag limit of 5 fish, with only 2 fish 20 inches or longer.

Current or Recommended Research and Management Activities

No major activities are planned or recommended for AC/DV in the near future. However, in conjunction with other studies, incidentally-caught DV/AC should be measured and fin clips taken. Other agencies (USFWS) are developing a baseline genetic database to which any samples taken can be added.

Arctic grayling

Background and Historical Perspective

Arctic grayling are probably the most widely distributed and abundant resident fish in the KGMA. Arctic grayling are found throughout many lakes, streams, and clear-water tributaries of the area. Nonresident anglers access most of the area via fly-in float trips on many of these tributaries. Anglers typically catch Arctic 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 sport fish Arctic grayling harvests in Kuskokwim River and Kuskokwim Bay drainages range from 500 to about 1000 fish (Table 2). Recent sport catches average between 23,000 and 35,000 Arctic grayling (Table 3). The Aniak River supports the largest Arctic grayling harvest in the area (100 to 200 fish) with the Kisaralik, Kwethluk, and other Lower Kuskokwim tributaries contributing to harvests to a lesser extent.

Recent Fishery Performance

In 2011, Arctic grayling catches in Kuskokwim River drainages were reported to be below average at most locations (Tables 3, 25). Nearly all sport-caught Arctic grayling caught in the entire KGMA were released. Though the summer started out with good weather conducive to excellent catches, by mid-August conditions deteriorated somewhat due to rain causing 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 do not exceed sustained yield. The focus of sport fishing regulation development is to enhance opportunity and provide sustainable harvests. Current regulations appear to be maintaining harvests within sustainable levels for Arctic grayling in the KGMA. Declining harvest rates of Arctic grayling from the early 1980s to the 1990s (Lafferty 2003) can be attributed to more restrictive regulations and changing attitudes of

anglers regarding the harvest of Arctic grayling (Tables 2, 3, 25), as well as 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 reduces the catch (and harvest) of Arctic grayling, as well as providing added protection for rainbow trout.

Management strategies for Arctic grayling stocks in the KGMA are found in the *Kuskokwim-Goodnews Area Wild Arctic Grayling Management Plan* (5 AAC 71.055). The goal of management is to maintain naturally-reproducing populations of Arctic grayling, with characteristics that are sustainable and are desirable to the public.

Current Issues and Fishery Outlook

Arctic grayling stocks of the KGMA are well protected with current sport fishing regulations. There are currently no major biological concerns for Arctic grayling fisheries in the area. Area stocks should continue to provide good angling opportunities for the 2013 season.

Recent Board of Fisheries Actions

There have been no Board of Fisheries actions for the past 2 board cycles.

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TABLES AND FIGURES

Table 1.—Annual sport fishing effort (angler-days) for Alaska, Region III, and the Kuskokwim-Goodnews Management Area waters as estimated by the SWHS, 1991–2011.

Year	Statewide	Region III	Percent of Statewide	Kuskokwim Mgmt Area	Percent of Region III
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	2,261,941	194,138	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	2,297,961	175,274	7.6	22,389	12.8
2007	2,543,674	204,032	8.0	21,206	10.4
2008	2,315,601	183,084	7.9	25,862	14.1
2009	2,216,445	194,019	8.8	17,791	9.2
2010	2,000,167	184,824	9.2	19,455	10.5
2011	1,919,313	144,755	7.5	22,141	7.6
Average 2006–2010	2,274,770	188,247	8.3	21,341	11.4
Average 2001–2010	2,305,217	196,293	8.5	21,724	11.1

Table 2.—Kuskokwim-Goodnews Management Area (including Kuskokwim Bay drainages) sport fishing harvest by species, 1991–2011.

Year	King Salmon	Coho Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	Rainbow Trout	Lake Trout	Dolly Varden/Arctic char	Arctic Grayling	Northern Pike	Whitefish	Burbot	Sheefish
1991	401	2,087	214	36	647	774	272	2,924	2,603	2,018	158	40	154
1992	367	2,033	189	219	927	404	356	802	545	752	286	169	292
1993	587	2,056	715	27	731	486	218	1,499	739	995	253	214	54
1994	1,139	2,978	894	126	1,626	299	40	1,398	850	828	183	20	390
1995	541	2,771	277	16	455	429	215	1,260	845	655	0	0	272
1996	1,432	5,231	752	167	517	567	126	1,743	663	344	20	0	20
1997	1,788	5,430	1,181	75	384	1,336	404	3,337	1,292	408	614	0	589
1998	1,464	4,897	1,867	133	596	539	141	1,581	3,554	2,711	1,220	185	277
1999	279	3,974	1,154	0	520	510	128	2,038	1,290	548	9	228	268
2000	105	3,294	822	10	359	106	152	1,612	361	531	214	588	250
2001	290	4,474	422	11	176	17	63	1,698	807	474	20	50	124
2002	319	4,265	267	143	598	76	134	2,026	1,464	443	54	15	81
2003	401	5,297	289	46	67	204	244	2,710	1,259	783	89	87	45
2004	857	7,096	512	416	117	457	497	2,539	1,953	1,543	975	111	182
2005	572	5,591	792	66	608	141	233	2,135	1,287	3,749	209	75	1,079
2006	444	3,793	864	187	158	107	83	1,937	637	406	58	0	173
2007	1,478	675	110	0	55	0	0	138	631	73	51	0	174
2008	708	6,344	1,109	32	262	219	22	2,038	713	165	96	0	191
2009	904	4,724	394	337	351	197	29	2,176	1,307	981	664	0	161
2010	354	3,527	459	80	235	106	11	1,565	530	909	54	92	67
2011	1,733	3,713	662	0	354	13	24	1,231	713	247	70	0	114
Average 2001–2010	1,187	4,891	598	132	301	176	136	2,032	1,078	980	256	43	254
Average 2006–2010	1,432	4,438	740	127	289	172	37	1,842	803	561	243	18	205

Table 3.–Kuskokwim-Goodnews Management Area sport fishing catch by species, 1991–2011.

Year	King Salmon	Coho Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	Rainbow Trout	Lake Trout	Dolly Varden/Arctic char	Arctic Grayling	Northern Pike	Whitefish	Burbot	Sheefish
1991	2,621	6,538	3,528	741	3,491	11,546	1,019	30,155	14,983	4,621	329	50	539
1992	4,752	8,776	1,791	9,262	7,525	5,540	1,426	16,229	9,539	3,878	638	169	638
1993	9,684	8,390	3,637	1,132	10,741	12,646	1,314	35,825	16,596	3,721	395	214	1,952
1994	3,370	5,564	4,898	4,516	11,848	8,258	1,861	18,320	10,930	4,383	500	20	628
1995	7,271	8,990	1,364	310	9,693	10,532	540	17,503	9,598	5,430	63	0	1,416
1996	21,217	34,170	9,326	8,101	23,217	16,823	1,094	33,449	16,403	6,928	100	0	675
1997	32,990	29,726	5,744	2,766	15,498	61,566	1,167	89,299	34,586	4,432	732	180	2,091
1998	20,980	35,162	8,186	13,826	20,023	30,450	951	65,720	38,856	5,704	2,087	307	1,708
1999	12,859	40,902	7,360	1,209	27,261	26,254	1,089	54,597	23,975	5,643	109	228	1,381
2000	8,786	37,624	7,365	528	20,876	17,671	1,076	34,927	19,215	3,857	994	588	1,048
2001	18,480	42,689	5,102	1,031	12,430	14,494	243	36,550	22,813	4,081	814	50	742
2002	9,116	33,454	5,086	708	20,019	28,170	1,629	48,913	34,740	3,915	284	20	446
2003	9,242	68,545	7,527	1,128	15,513	16,902	3,435	50,250	26,782	2,645	433	97	768
2004	10,719	63,233	3,422	18,212	13,161	22,979	6,941	76,194	31,680	10,613	1,331	111	938
2005	13,143	40,420	7,854	2,454	15,457	17,128	1,951	49,353	11,599	10,425	334	75	3,933
2006	13,414	30,962	16,599	10,778	35,174	36,755	515	61,570	16,493	4,917	894	0	524
2007	21,013	28,406	6,544	1,128	19,563	29,150	655	42,337	20,907	4,606	769	0	452
2008	10,313	45,382	9,824	19,854	19,292	54,877	807	83,835	35,486	2,779	380	0	1,046
2009	6,879	23,143	3,595	1,650	14,398	49,534	654	57,625	35,693	4,354	957	0	768
2010	6,812	25,413	7,646	10,320	16,327	35,470	1,215	55,241	27,870	4,359	688	216	280
2011	13,448	36,033	8,301	1,105	17,247	37,049	485	64,818	29,418	4,129	555	6	1,593
Average 2001–2010	11,913	40,165	7,320	6,726	18,133	30,546	1,805	56,187	26,406	5,269	688	57	990
Average 2006–2010	11,686	30,661	8,842	8,746	20,951	41,157	769	60,122	27,290	4,203	738	43	614

Table 4.—Sport fishing effort (angler-days) in the Kuskokwim Bay drainages, 1991–2011.

Year	Kuskokwim Bay			Total
	Kanektok	Goodnews	Other	
1991	3,078	1,328	2,656	7,062
1992	4,972	1,387	2,068	8,427
1993	3,791	2,276	2,844	8,911
1994	6,505	2,038	1,406	9,949
1995	5,512	1,030	743	7,285
1996	8,305	2,322	625	11,252
1997	9,706	5,011	1,807	17,999
1998	8,114	4,007	1,158	13,626
1999	8,194	8,353	705	17,560
2000	7,231	4,038	121	11,403
2001	9,063	2,826	201	12,206
2002	5,885	3,215	271	10,136
2003	7,655	3,622	133	11,659
2004	6,364	2,499	410	10,729
2005	5,789	2,612	32	8,854
2006	7,861	2,833	342	11,682
2007	5,071	3,375	960	9,406
2008	8,024	3,738	969	10,775
2009	3,267	2,212	1,031	6,510
2010	5,307	2,258	1,122	8,867
2011	7,235	3,064	1,431	2,000
Average				
2001–2010	6,429	2,919	547	10,064
Average				
2006–2010	5,906	2,883	885	9,412

Table 5.—Sport fishing effort (angler-days) in the Kuskokwim River, 1991–2011.

Year	Kuskokwim River					KGMA Area
	Aniak	Kisaralik	Kwethluk	Other	Holitna	Total
1991	3,078	ND	ND	3,610	1,022	13,055
1992	2,604	ND	640	2,126	480	14,044
1993	2,056	ND	554	2,275	763	14,505
1994	1,815	1,463	466	1,124	949	18,817
1995	3,569	369	387	1,600	640	16,289
1996	3,964	1,525	1511	2,891	747	16,420
1997	4,778	1,578	642	1,445	1,678	27,318
1998	5,548	1,021	1498	1,306	771	27,913
1999	3,235	1,316	402	1,992	1,236	26,563
2000	2,141	2,084	1,131	472	791	20,030
2001	2,121	1,304	1,069	258	1,853	20,673
2002	2,688	2,410	920	1,620	1,296	20,645
2003	2,998	1,439	2,646	3,548	1,748	24,369
2004	4,186	2,071	2,021	340	993	25,406
2005	2,497	714	2,022	525	1,452	19,447
2006	3,096	ND	1,922	1,867	9,034	22,389
2007	3,363	ND	1,067	4,414	9,217	21,206
2008	4,559	2,576	1,092	1,958	10,185	25,862
2009	2,611	2,235	1,387	1,203	7,346	17,791
2010	2,909	2,056	1,453	975	575	19,455
2011	1,715	2,417	369	92	2,673	22,141
Average						
2001–2010	3,103	1,851	1,560	1,671	1,058	21,724
Average						
2006–2010	3,308	2,289	1,384	2,083	648	21,341

Note: Cells without a number indicates a year where there were not enough Statewide Harvest Survey respondents, so estimates for that year may be in the “Other” category.

Table 6.–Harvest of king salmon in the commercial, subsistence, test, and sport fisheries of the Kuskokwim River, 1991–2011.

Year	Harvest				Total
	Commercial ^a	Subsistence ^b	Test Fishery	Sport ^c	
1991	37,778	74,820	117	401	123,850
1992	46,872	82,648	1,380	367	113,414
1993	8,735	87,674	2,483	587	99,317
1994	16,211	103,343	1,937	1,139	112,530
1995	30,846	102,110	1,421	541	129,243
1996	7,419	96,415	247	1,432	87,160
1997	10,441	79,382	332	1,227	94,138
1998	17,359	81,219	210	1,434	100,297
1999	4,705	72,775	98	279	78,276
2000	444	70,833	874	105	66,316
2001	90	78,009	86	290	74,076
2002	72	80,983	288	319	67,486
2003	158	67,228	409	401	68,756
2004	2,305	97,110	691	857	83,918
2005	4,784	85,097	608	444	76,357
2006	2,777	90,094	352	1,397	66,750
2007	179	96,139	503	1,397	74,176
2008	8,865	98,099	420	708	108,514
2009	6,664	78,225	470	917	86,542
2010	2,731	66,053	292	354	69,433
2011	748	58,836	337	579	60,500
Average					
2001–2010	2,863	83,704	412	626	87,604
Average					
2006–2010	4,243	85,722	407	764	91,137

^a & Districts 1 and 2.

^b & Estimated subsistence harvest expanded from villages surveyed. 2010 and 2011 estimates are preliminary. Methodology changed starting in 2008.

^c & Statewide Harvest Survey (1991–2011).

Table 7.–Harvest of king salmon in the commercial, subsistence, and sport fisheries in the Goodnews River, 1991–2011.

Year	Harvest			
	Commercial ^a	Subsistence ^b	Sport	Total
1991	912	852	26	1,620
1992	3,528	548	23	3,803
1993	2,117	590	81	2,686
1994	2,570	672	163	3,390
1995	2,922	789	41	3,515
1996	1,375	392	157	2,058
1997	2,039	441	86	2,574
1998	3,675	735	431	4,824
1999	1,888	759	223	2,982
2000	4,442	564	243	5,388
2001	1,519	863	147	2,561
2002	979	723	224	2,060
2003	1,412	807	10	3,483
2004	2,565	863	100	3,516
2005	2,035	869	0	2,903
2006	2,892	713	79	3,647
2007	3,112	647	177	3,313
2008	1,278	1,012	78	2,416
2009	6,670	585	31	7,242
2010	1,752	480	0	2,246
2011	2,092	784	51	2,927
Average				
2001–2010	1,907	756	85	3,337
Average				
2006–2010	2,112	687	72	3,770

^a& Goodnews District commercial harvest (J. Estensen, Commercial Fisheries biologist, ADF G, Anchorage, personal communication)

^b& Subsistence harvest by the community of Goodnews (J. Estensen Commercial Fisheries biologist, ADF G, Anchorage, personal communication)

Table 8.—Harvest of king salmon in the commercial, subsistence, and sport fisheries in the Kanektok River, 1991–2011.

Year	Harvest			
	Commercial ^a	Subsistence ^b	Sport	Total
1991	9,480	3,753	316	13,549
1992	17,197	4,394	656	22,247
1993	15,784	3,634	1,006	20,424
1994	8,564	3,977	751	13,292
1995	38,584	2,864	739	42,187
1996	14,165	3,506	689	18,360
1997	35,510	3,186	1,632	40,328
1998	23,158	3,774	1,475	28,407
1999	18,426	2,815	854	22,095
2000	21,229	3,053	833	25,115
2001	12,775	3,177	947	16,899
2002	11,480	2,649	779	14,908
2003	14,444	2,563	323	17,330
2004	25,465	4,563	228	30,526
2005	24,195	3,505	520	28,220
2006	19,184	5,163	754	25,101
2007	19,573	4,686	633	24,892
2008	13,812	3,923	220	17,735
2009	13,920	2,976	400	17,296
2010	14,230	2,692	552	17,474
2011	15,387	2,177	891	18,455
Average 2001–2010	16,908	3,590	571	21,011
Average 2006–2010	16,144	3,888	585	20,500

^a & Kanektok District commercial harvest (T. Elison, Commercial Fisheries biologist, ADF G, Anchorage, personal communication)

^b & Subsistence harvest by the community of Quinhagak (T. Elison, Commercial Fisheries biologist, ADF G, Anchorage, personal communication)

Table 9.—Sport fishing harvest and catch of king salmon in the Aniak, Kisaralik, Kwethluk, and other Kuskokwim rivers, 1991–2011.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	214	222	ND	ND	ND	ND	0	0	351	2,621
1992	172	827	ND	ND	31	47	23	109	296	4,752
1993	300	1,426	ND	ND	ND	ND	68	375	444	9,684
1994	437	573	148	196	ND	ND	40	110	977	3,370
1995	279	2,729	ND	ND	ND	ND	19	91	506	3,592
1996	592	3,375	ND	ND	ND	ND	256	662	1,506	11,540
1997	801	12,943	49	678	49	108	166	786	1,480	17,974
1998	1,058	5,896	6	74	75	467	54	335	1,388	7,905
1999	134	2,776	0	12	0	0	25	240	351	4,691
2000	10	435	10	343	20	171	22	22	105	1,173
2001	12	713	0	62	43	77	73	823	290	4,657
2002	135	1,759	46	531	30	195	53	210	319	3,225
2003	12	874	75	335	103	861	48	272	391	5,020
2004	335	1,103	58	1,774	150	778	136	619	857	5,427
2005	189	594	40	907	68	385	180	470	572	2,652
2006	29	1,201	86	359	183	493	16	173	444	3,480
2007	218	5,380	446	1,096	93	733	86	171	1,683	11,224
2008	26	3,612	148	1,578	149	844	122	992	739	7,382
2009	10	796	51	287	42	499	0	676	917	3,586
2010	0	1,902	0	717	136	584	39	130	354	3,564
2011	51	1,069	17	864	0	0	318	1,641	579	3,851
Average										
2001–2010	97	1,793	95	765	100	545	75	454	657	5,022
Average										
2006–2010	57	2,578	146	807	121	631	53	428	827	5,847

Table 10.—Peak aerial survey index counts of king salmon in tributaries of the Lower Kuskokwim River, 1983–2011.

Year	Eek River	Kwethluk River	Kisaralik River	Tuluksak River	Aniak River	Kipchuk River ^a	Salmon River ^c
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	-
2007	-	-	692	173	3,984	2,147	1,458
2008	-	487	1,074	-	3,222	1,061	589
2009	-	-	-	-	-	-	-
2010	-	-	235	-	-	-	-
2011	249	-	610	-	-	116	79
SEG							
580–1,800		400–1,200		1,200–2,300		600	

Note: Estimates are from peak aerial surveys conducted between July 20 and July 31 under fair, good, or excellent conditions. Blank cells indicate years in which surveys were not flown. '

^a Tributaries of Aniak River. '

^b Lower Kuskokwim drainages not surveyed in 2009 due to poor weather conditions. '

Table 11.—Sport fishing harvest and catch of king salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1991–2011.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	147	203	1,865	15,016
1998	1,475	9,528	431	3,171	107	376	2,013	13,075
1999	854	4,205	223	3,823	12	140	1,089	8,168
2000	833	6,086	243	1,527	0	0	1,076	7,613
2001	947	10,842	147	2,769	0	212	1,094	13,823
2002	779	3,815	224	1,594	75	482	1,078	5,891
2003	323	3,480	10	695	0	47	343	4,222
2004	228	2,758	100	1,754	12	7,800	340	5,292
2005	520	10,116	0	375	0	0	520	21,127
2006	754	7,292	79	2,243	0	399	1,277	13,414
2007	633	6,331	177	1,461	922	1,997	1,732	9,789
2008	78	2,490	220	365	0	138	298	2,993
2009	400	2,522	31	561	51	210	482	3,293
2010	552	2,619	0	547	0	82	552	6,812
2011	891	6,911	51	1,000	34	1,288	976	9,199
Average 2001–2010	571	5,227	85	1,236	106	1,137	772	8,309
Average 2006–2010	585	4,251	72	1,035	195	565	868	6,547

Table 12.—Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Kuskokwim River, 1991–2011.

Year	Harvest ^a			Total
	Commercial	Subsistence ^{a,b}	Sport ^c	
1991	500,935	39,252	1,003	540,187
1992	666,170	52,305	1,692	718,475
1993	610,739	28,485	980	639,224
1994	724,689	36,609	1,925	761,298
1995	471,461	36,828	1,497	508,289
1996	937,299	43,199	3,423	980,498
1997	130,803	29,817	2,408	160,620
1998	210,841	24,623	2,419	235,104
1999	23,593	27,409	1,998	51,002
2000	261,379	45,911	1,689	307,290
2001	192,998	31,089	1,204	224,087
2002	83,463	42,617	2,030	126,080
2003	284,064	33,291	3,482	317,355
2004	435,407	48,898	5,047	484,305
2005	142,319	33,351	3,539	175,670
2006	185,598	41,272	1,474	226,870
2007	141,049	35,212	2,504	176,261
2008	142,862	46,461	4,031	189,323
2009	104,546	29,559	3,526	134,105
2010	58,031	32,094	1,549	90,125
2011	74,122	29,183	1,693	103,705
Average				
2001–2010	177,034	37,384	2,839	214,418
Average				
2006–2010	126,417	36,920	2,617	163,337

^a Estimated subsistence harvest expanded from villages surveyed.

^b 2008–2010 are preliminary estimates (H. Carroll, Commercial Fisheries biologist, ADF G, Anchorage, personal communication).

^c Statewide Harvest Survey (1991–2011).

Table 13.—Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Kanektok River, 1991–2011.

Year	Harvest			Total
	Commercial ^a	Subsistence ^a	Sport ^b	
1991	42,571	3,230	358	46,159
1992	86,404	3,291	275	89,970
1993	55,817	2,029	734	58,580
1994	83,912	2,544	675	87,131
1995	66,203	2,480	970	69,653
1996	118,718	1,734	875	121,327
1997	32,862	1,105	1,220	35,187
1998	80,183	1,537	751	82,471
1999	6,184	1,781	1,091	9,056
2000	30,529	1,042	799	32,370
2001	18,531	1,719	2,448	22,698
2002	26,695	1,133	1,784	29,612
2003	49,833	1,868	1,076	52,777
2004	82,398	1,435	1,362	85,195
2005	51,708	1,558	1,006	54,344
2006	26,831	1,315	1,742	29,888
2007	34,710	1,550	1,087	36,260
2008	94,257	2,217	1,541	44,597
2009	48,115	1,703	876	50,773
2010	13,690	1,547	1280	16,517
2011	30,457	1,361	981	32,799
Average 2001–2010	43,391	1,582	1,410	46,354
Average 2006–2010	41,343	1,616	1,284	44,029

^a Estimated subsistence harvest expanded from villages surveyed.

^b Statewide Harvest Survey (1991–2011).

Table 14.–Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Goodnews River, 1991–2011.

Year	Harvest			Total
	Commercial ^a	Subsistence ^b	Sport	
1991	13,312	1,740	297	15,349
1992	19,875	1,961	138	21,974
1993	20,014	1,145	189	21,348
1994	47,499	515	170	48,184
1995	17,875	279	114	18,268
1996	43,836	371	466	44,673
1997	2,983	403	855	4,241
1998	21,246	390	574	22,210
1999	2,474	568	789	3,831
2000	15,531	480	795	16,806
2001	9,275	666	822	10,763
2002	3,041	294	429	3,764
2003	12,730	1,372	42	14,102
2004	23,690	1,808	622	26,120
2005	11,735	857	1,046	13,638
2006	12,436	721	553	13,157
2007	13,689	599	211	14,499
2008	22,547	1,075	220	23,842
2009	8,406	349	284	9,039
2010	4,900	516	597	6,013
2011	15,358	416	733	16,507
Average				
2001–2010	12,245	826	529	13,494
Average				
2006–2010	12,396	652	328	13,310

^a Goodnews Bay (District 5) commercial harvest.

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

Table 15.—Sport fishing harvest and catch of coho salmon in Kuskokwim Bay drainages, 1991–2011.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	358	2,404	297	1,176	ND	ND	993	4,133
1992	275	3,174	138	1,571	ND	ND	704	5,452
1993	734	3,741	189	645	ND	ND	1,218	5,720
1994	675	1,322	170	456	ND	ND	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	924	2,455	2,989	19,736
1998	751	15,017	574	7,852	246	921	1,571	23,790
1999	1,091	13,677	789	12,185	23	1,902	1,903	27,764
2000	799	13,043	795	9,045	0	0	1,594	22,088
2001	2,448	21,941	822	8,431	0	832	3,270	31,204
2002	1,784	10,922	429	6,889	22	1,353	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
2007	1,087	12,768	211	3,528	0	625	1,298	16,358
2008	1,541	18,083	220	5,425	552	948	2,313	24,456
2009	876	6,896	284	2,805	38	2,252	1,198	11,953
2010	1280	7,192	597	10,164	101	1,090	1,978	18,446
2011	981	11,506	733	11,253	306	1,299	2,020	24,058
Average 2001–2010	1,372	14,647	532	8,270	80	1,363	1,961	24,868
Average 2006–2010	1,305	11,444	373	5,803	143	1,032	1,821	18,102

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

Table 16.—Sport fishing harvest and catch of coho salmon in the Aniak, Kisaralik, Kwethluk and Holitna Rivers, 1991–2011.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	327	1,432	ND	ND	ND	ND	0	0	1,003	2,958
1992	235	575	ND	ND	ND	ND	23	109	1,692	4,031
1993	213	753	ND	ND	ND	ND	68	375	980	4,004
1994	507	852	72	492	ND	ND	40	110	1,925	4,242
1995	852	2,246	ND	ND	ND	ND	19	91	1,497	4,627
1996	986	3,746	ND	ND	ND	ND	256	662	3,423	18,310
1997	978	4,576	182	838	274	490	166	786	2,408	12,316
1998	1,128	3,639	172	2,638	714	3,204	54	335	2,419	12,993
1999	436	3,971	270	2,315	131	774	25	240	1,998	15,040
2000	440	8,531	199	1,231	220	1,705	22	22	1,689	15,547
2001	335	2,186	195	2,605	237	1,608	73	823	1,204	11,485
2002	673	3,193	167	1,766	153	310	53	210	2,030	14,290
2003	405	11,480	377	1,518	824	6,276	48	272	5,297	33,212
2004	1,207	6,337	226	2,457	649	3,608	136	619	7,096	24,747
2005	1,164	3,813	298	751	387	588	180	470	5,591	13,203
2006	169	4,233	184	2,027	669	2,626	16	173	1,474	11,322
2007	339	3,553	84	801	96	1,225	86	171	2,504	11,485
2008	799	7,969	807	5,029	117	1,026	91	497	3,976	20,867
2009	298	3,249	559	1,358	445	2,153	0	676	3,526	11,190
2010	70	1,406	172	1,764	136	348	146	391	1,482	6,049
2011	173	2,909	257	3,402	0	0	298	1,110	1,482	8,698
Average										
2001–2010	546	4,742	307	2,008	371	1,977	83	430	3,418	15,785
2006–2010										
Average	335	4,082	361	2,196	293	1,476	68	382	2,592	12,183

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

Table 17.—Harvest of chum salmon in the commercial, subsistence, test, and sport fisheries in the Kuskokwim River, 1991–2011.

Year	Harvest ^e				Total ^d
	Commercial ^a	Subsistence ^{b,c}	Test Fishery	Sport	
1991	431,802	87,237	931	378	520,348
1992	344,603	116,373	15,330	608	476,914
1993	43,337	59,797	8,451	359	111,944
1994	271,115	76,937	11,998	1,280	361,330
1995	605,918	70,977	17,473	226	694,594
1996	207,877	100,900	2,864	280	311,921
1997	17,026	37,366	790	86	55,268
1998	207,809	61,652	1,140	291	270,892
1999	23,006	44,242	562	180	67,990
2000	11,570	59,369	1,038	26	72,003
2001	1,272	56,005	1,743	112	59,132
2002	1,900	86,406	2,666	53	91,025
2003	2,764	41,217	1,713	67	45,761
2004	20,429	64,899	1,810	117	86,976
2005	69,139	58,020	4,459	608	132,226
2006	44,070	89,500	3,547	158	137,275
2007	10,763	73,561	3,237	424	87,985
2008	30,798	68,678	2,954	121	102,269
2009	78,205	43,621	2,204	204	122,819
2010	93,148	46,143	2,872	85	142,248
2011	118,316	49,717	2,289	83	170,405
Average					
2001–2010	35,051	62,805	2,721	195	100,772
Average					
2006–2010	51,057	64,301	2,963	198	118,519

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

^b Estimated subsistence harvest expanded from villages surveyed.

^c 2008–2010 estimates are preliminary (H. Carroll, Commercial Fisheries biologist, ADF G, Anchorage, personal communication).

^d Total does not include test fish. No test fishing data are available.

Table 18.—Sport fishing harvest and catch of chum salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1991–2011.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	80	1,382	189	527	105	393	274	1,049
1992	251	3,994	0	402	91	380	426	2,141
1993	183	4,849	156	924	129	1,135	230	5,816
1994	156	6,386	15	381	496	1,186	785	3,651
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	62	560	298	12,712
1998	213	11,560	50	2,955	11	192	274	14,707
1999	293	14,241	47	7,561	0	16	340	21,818
2000	231	10,200	12	4,243	0	24	243	14,467
2001	43	6,457	21	2,188	0	129	64	8,774
2002	446	10,779	99	4,059	0	695	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
2007	15	7,971	0	3,026	0	1,362	15	12,359
2008	48	9,232	26	922	67	1,113	141	11,267
2009	44	3,802	22	3,193	0	542	66	7,537
2010	150	10,298	0	1,334	0	430	150	12,062
2011	271	9,541	0	2,762	7	978	130	13,162
Average 2001–2010	105	9,116	18	2,672	7	978	130	12,442
Average 2006–2010	80	10,556	10	2,808	13	689	103	14,042

Table 19.—Sport fishing harvest and catch of chum salmon in the Aniak, Kisaralik, Kwethluk, and Holitna rivers, 1991–2011.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	169	656	ND	ND	ND	ND	119	159	373	2,442
1992	304	1,670	ND	ND	30	91	91	471	501	5,384
1993	101	2,412	ND	ND	0	2,669	208	881	501	4,925
1994	231	1,342	ND	ND	ND	ND	0	38	841	8,197
1995	127	2,785	ND	ND	ND	ND	0	327	237	4,247
1996	110	3,888	ND	ND	ND	ND	0	230	308	14,359
1997	86	2,369	0	9	0	53	33	116	86	2,786
1998	101	2,664	0	163	8	296	0	25	322	5,316
1999	139	4,055	0	456	41	176	0	135	180	5,443
2000	0	3,914	13	2,091	0	85	0	0	116	6,409
2001	0	1,899	0	106	71	425	73	350	112	3,656
2002	0	2,096	0	745	34	455	53	426	53	4,486
2003	0	2,347	0	450	0	0	48	209	39	5,111
2004	0	1,602	0	606	70	308	136	426	84	4,380
2005	0	788	0	247	0	0	180	1,638	500	4,735
2006	0	2,135	0	80	0	2,089	0	802	13	8,188
2007	0	3,191	0	140	0	21	0	0	40	7,204
2008	45	2,427	31	2,465	0	960	45	408	121	8,025
2009	156	1,487	22	778	0	1,218	0	538	285	6,861
2010	0	1,360	24	2,069	61	524	0	37	85	4,265
2011	15	1,178	0	681	0	0	0	928	83	3,100
Average 2001–2010	20	1,933	8	769	24	600	54	483	133	5,691
Average 2006–2010	40	2,120	15	1,106	12	962	9	537	109	6,909

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

Table 20.—Harvest of sockeye salmon in the commercial, subsistence, test, and sport fisheries in the Kuskokwim River, 1991–2011.

Year	Harvest				Total
	Commercial	Subsistence ^a	Test Fishery ^b	Sport ^c	
1991	108,946	47,370	ND	38	156,354
1992	92,218	43,486	ND	131	135,835
1993	27,008	51,616	ND	348	78,972
1994	49,365	42,362	ND	359	92,086
1995	92,500	30,905	ND	95	123,500
1996	33,878	40,589	ND	315	74,782
1997	21,989	38,745	ND	423	61,157
1998	60,906	36,052	ND	178	97,136
1999	16,976	47,360	ND	54	64,390
2000	4,130	48,766	ND	46	52,492
2001	84	53,245	510	231	54,070
2002	84	32,272	228	26	32,610
2003	282	32,237	0	289	32,808
2004	9,748	40,405	742	512	50,191
2005	27,645	41,517	1,062	792	71,016
2006	12,618	43,143	519	187	56,467
2007	703	47,272	488	382	48,745
2008	15,601	58,732	584	273	75,190
2009	26,012	34,943	515	631	61,762
2010	22,428	38,130	495	419	61,472
2011	13,497	40,207	380	98	54,182
Average 2001–2010	11,365	42,189	514	374	49,027
Average 2006–2010	15,405	44,444	520	378	54,674

^a Estimated subsistence harvest expanded from villages surveyed.

^b Test fishery sockeye harvests not available.

^c Statewide Harvest Survey (1990–2011).

Table 21.—Sport fishing harvest and catch of sockeye salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1991–2011.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	88	1,147	63	2,003	ND	ND	176	3,276
1992	66	1,290	8	90	ND	ND	131	1,626
1993	331	1,887	53	321	ND	ND	644	3,504
1994	313	3,622	70	207	ND	ND	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	358	191	2,901
2002	73	1,423	149	3,112	3	195	225	4,830
2003	107	5,082	42	1,502	0	60	149	6,644
2004	112	1,330	0	891	0	331	112	2,552
2005	156	5,692	0	683	0	43	156	6,418
2006	523	11,450	98	2,798	12	276	633	14,524
2007	385	3,481	84	903	0	0	469	4,384
2008	654	6,777	104	1,185	78	758	836	6,331
2009	75	768	111	1,205	46	623	232	2,596
2010	404	4,872	15	1,184	0	499	419	6,555
2011	429	5,260	135	1,157	0	250	564	6,667
Average								
2001–2010	257	4,229	71	1,459	14	314	342	5,774
Average								
2006–2010	408	5,470	82	1,455	27	431	518	6,878

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

Table 22.—Sport fishing harvest and catch of sockeye salmon in the Aniak, Kisaralik, Kwethluk, and Holitna rivers, 1991–2011.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	38	151	ND	ND	ND	ND	0	76	214	3,528
1992	25	74	ND	ND	ND	ND	0	0	189	1,791
1993	17	79	ND	ND	ND	ND	43	902	715	3,637
1994	17	87	ND	ND	ND	ND	0	0	894	4,898
1995	43	166	ND	ND	ND	ND	0	0	277	1,364
1996	186	367	ND	ND	ND	ND	0	0	752	9,326
1997	353	391	ND	ND	ND	ND	21	0	1,181	5,744
1998	195	367	ND	ND	ND	ND	0	64	1,867	8,186
1999	21	407	ND	ND	ND	ND	0	84	1,154	7,360
2000	23	286	0	117	ND	ND	12	124	822	7,365
2001	24	222	34	156	0	37	48	951	422	5,102
2002	26	54	0	16	0	61	16	24	267	5,086
2003	0	390	74	75	42	42	0	105	289	7,527
2004	119	185	22	45	65	218	124	270	512	3,422
2005	0	606	22	22	0	0	345	467	792	7,854
2006	16	1,042	67	160	0	0	136	431	864	16,599
2007	0	118	0	179	0	0	0	81	110	6,544
2008	102	450	171	410	0	188	0	42	1,109	9,824
2009	0	203	10	82	12	130	20	91	394	3,595
2010	0	577	0	312	0	0	0	71	40	1,051
2011	0	184	14	759	0	0	26	58	98	1,320
Average 2000–2009	32	363	44	127	13	75	77	274	424	7,284
Average 2005–2009	24	478	50	229	2	64	31	143	314	7,523

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

Table 23.—Sport fishing harvest and catch of rainbow trout in the Aniak, Kisaralik, Kwethluk, and other Kuskokwim rivers 1991–2011.

Year	Aniak River		Kisaralik River		Kwethluk River		Kwethluk/Other Rivers		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	76	1,881	ND	ND	ND	ND	129	517	205	2,398
1992	32	934	ND	ND	71	158	123	835	226	1,927
1993	10	1,144	ND	ND	58	333	72	1,535	140	3,012
1994	8	656	124	1,226	ND	ND	45	326	177	2,208
1995	0	1,581	ND	ND	ND	ND	9	1,234	9	2,815
1996	24	3,347	ND	ND	ND	ND	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	ND	ND	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	ND	ND	53	487	131	4,942
2006	0	4,772	0	4,339	0	5,990	0	4,612	0	15,531
2007	0	7,243	21	1,457	31	3,277	0	409	52	10,929
2008	0	13,081	136	9,237	26	6,688	0	3,005	162	32,011
2009	0	11,019	136	10,006	26	6,615	0	880	162	28,520
2010	0	5,452	0	9,490	55	4,037	0	215	55	19,194
2011	0	8,645	0	4,162	0	362	0	0	0	13,208
Average 2001–2010	2	5,124	52	4,881	34	3,991	9	1,154	88	13,845
Average 2006–2010	0	8,313	59	6,906	28	5,321	0	1,824	86	21,350

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

Table 24.—Sport fishing harvest and catch of Dolly Varden/Arctic char in the Aniak, Kisaralik, Kwethluk, and other Lower Kuskokwim rivers, 1990–2010.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna and Upper Kuskokwim		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	547	3,514	ND	ND	ND	ND	245	3,845	1,569	6,833
1992	115	3,736	ND	ND	57	57	65	647	421	5,259
1993	260	9,340	ND	ND	97	349	79	2,204	572	13,616
1994	496	3,115	117	1,013	ND	ND	156	662	836	4,863
1995	481	3,454	ND	ND	ND	ND	78	1,062	795	7,826
1996	159	4,883	ND	ND	ND	ND	85	644	911	13,920
1997	316	12,066	413	4,708	243	243	143	1,892	1,442	21,798
1998	394	21,053	92	599	14	188	67	364	753	24,085
1999	114	5,909	181	3,875	0	44	112	589	439	10,664
2000	40	5,333	367	3,664	47	95	71	313	525	9,591
2001	87	1,857	320	2,454	33	142	253	387	693	7,449
2002	212	6,288	345	4,494	53	2,223	0	1,922	768	15,947
2003	178	4,033	432	2,693	77	1,196	629	4,144	1,698	13,948
2004	288	6,496	114	4,343	230	2,376	765	7,554	1,437	20,489
2005	296	2,477	246	1,241	106	237	337	1,152	1,125	9,718
2006	150	7,064	14	3,655	76	365	421	3,341	794	15,978
2007	291	7,193	147	1,311	0	1,586	138	1,784	865	12,791
2008	948	16,771	113	6,627	36	1,874	306	5,746	1,539	37,286
2009	510	9,756	232	4,949	129	5,418	301	980	1,677	23,851
2010	400	8,875	125	6,542	133	2,174	0	56	658	18,925
2011	72	8,564	128	4,479	19	133	146	4,390	448	17,750
Average										
2001–2010	336	7,081	209	3,831	87	1,759	336	2,856	1,144	17,638
Average										
2006–2010	460	9,932	126	4,617	75	2,283	275	2,680	1,148	21,766

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

Table 25.—Sport fishing harvest and catch of Arctic grayling in the Aniak, Kisaralik, Kwethluk, and other Kuskokwim rivers, 1991–2011.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna and Upper Kuskokwim		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1991	1,085	4,841	ND	ND	ND	ND	569	4,082	2,603	14,983
1992	121	3,855	ND	ND	75	120	107	1,775	545	9,539
1993	288	5,580	ND	ND	47	166	218	2,103	739	16,596
1994	116	2,022	69	1,920	ND	ND	284	2,556	850	10,930
1995	53	2,266	ND	ND	ND	ND	357	2,036	845	9,598
1996	103	5,102	ND	ND	ND	ND	309	2,241	663	16,403
1997	162	15,089	303	3,746	256	499	209	3,881	1,292	34,586
1998	715	11,930	64	984	8	1,408	1858	11,015	3,554	38,856
1999	437	8,659	63	3,641	0	226	142	1,636	1,290	23,975
2000	42	5,950	29	3,605	38	995	179	2,149	361	19,215
2001	77	3,300	64	3,356	77	3,058	458	7,255	807	22,813
2002	172	11,518	507	8,184	226	3,000	108	2,428	1,464	34,740
2003	58	6,787	280	3,188	ND	ND	536	8,646	1,259	26,782
2004	0	3,844	45	4,669	23	697	1,651	15,161	1,953	31,680
2005	108	2,149	346	2,822	ND	ND	597	2,192	1,287	11,599
2006	58	2,357	83	1,845	97	2,701	314	3,341	637	16,493
2007	38	4,242	38	1,255	0	3,440	64	1,792	631	20,907
2008	253	5,794	121	9,911	42	2,828	106	2,012	713	35,486
2009	253	8,055	121	5,269	42	4,144	498	4,162	1,307	35,693
2010	26	5,502	0	8,814	114	3,355	376	1,549	530	27,870
2011	7	1,753	0	3,117	0	214	579	13,001	704	19,037
Average										
2001–2010	104	5,355	161	4,931	78	2,903	471	4,854	1,057	25,572
Average										
2006–2010	126	5,190	73	5,419	59	3,294	272	2,700	761	25,621

Note: Blank spaces indicate years in which these rivers did not show up in the Statewide Harvest Survey, or were included in the estimates with other rivers.

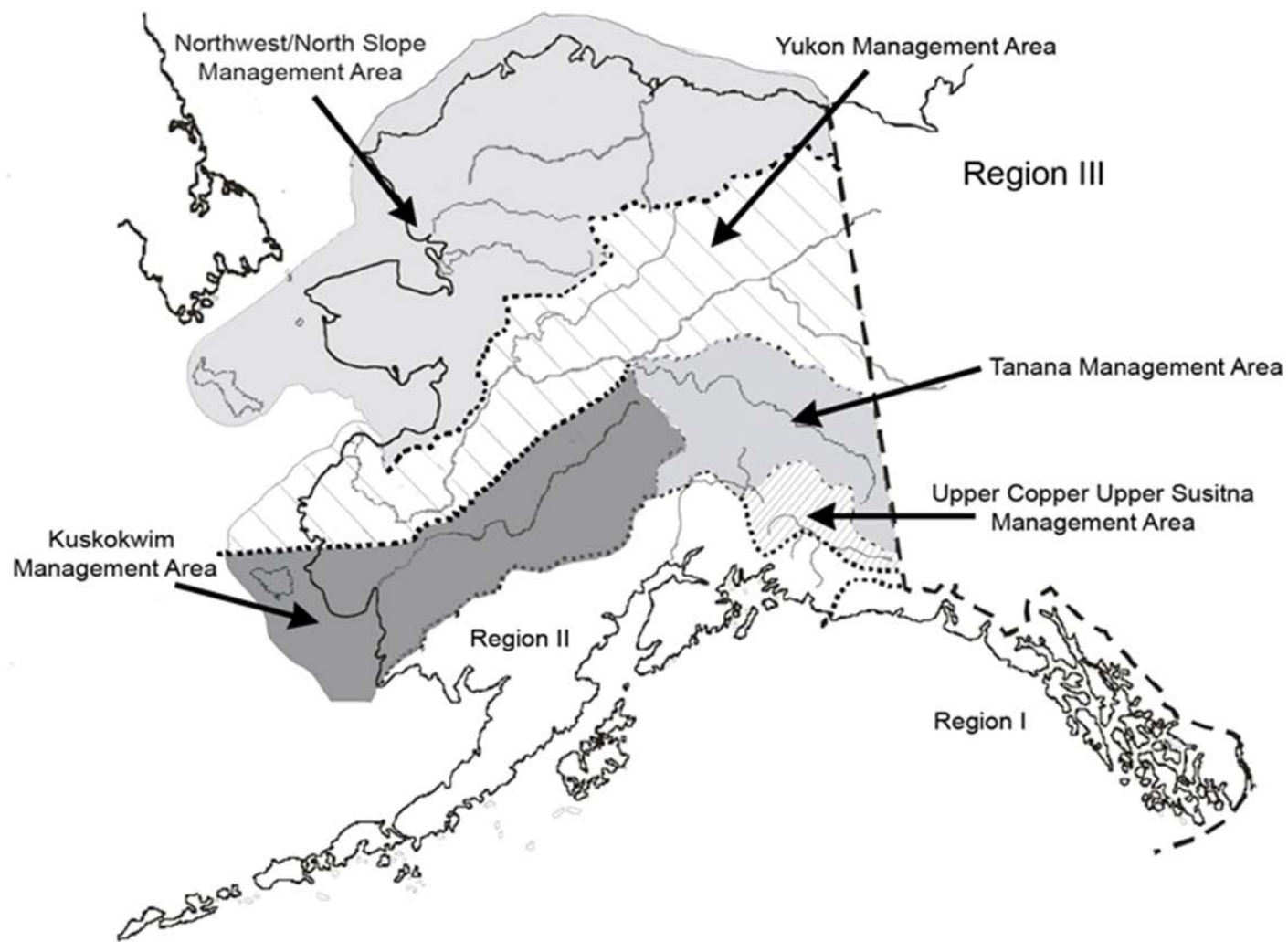


Figure 1.—Map of the sport fish regions in Alaska and the five Region III management areas.

Kuskokwim-Goodnews Drainages

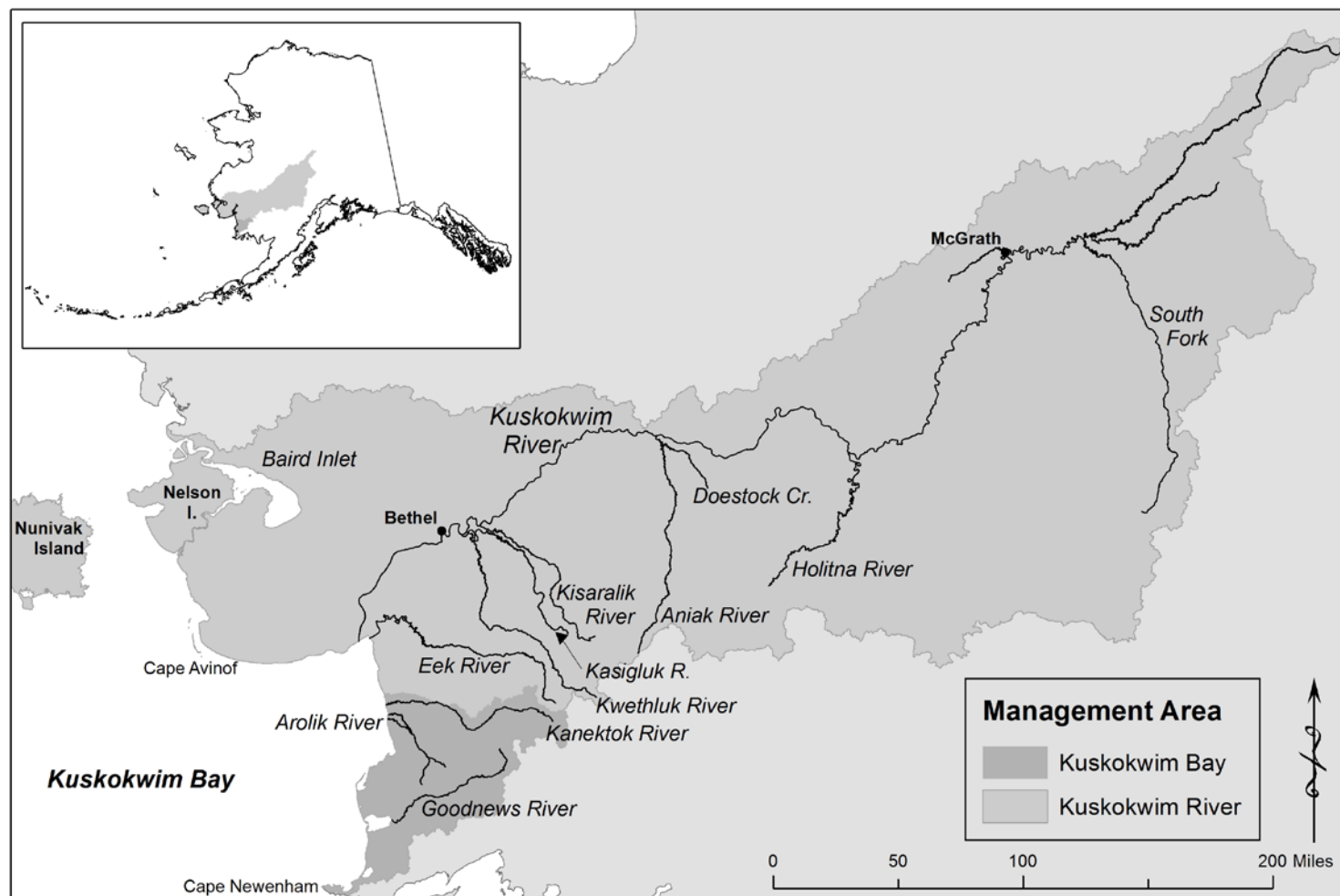


Figure 2.—Kuskokwim-Goodnews Management Area.

APPENDIX A

Appendix A.—Emergency orders issued for KGMA sport fisheries for 2011 and 2012.

Year	E. O. Number	Explanation
2011	3-KS-01-11	Closed all waters to sport fishing for king salmon in Kuskokuak Slough between ADF G regulatory markers located at the upstream and downstream mouth of the slough including all waters of the old Kuskokuak slough; the Kisaralik, Kasigluk, and Kwethluk River drainages to their confluence with Kuskokuak Slough; and the Tuluksak River drainage including its confluence with the Kuskokwim River and downstream to the upstream side of Mishevik Slough effective 12:01 a.m. Wednesday, June 1, 2011
2012	3-KS-01-12	Closed all waters to sport fishing for king salmon in Kuskokuak Slough between ADF G regulatory markers located at the upstream and downstream mouth of the slough including all waters of the old Kuskokuak slough; the Kisaralik, Kasigluk, and Kwethluk River drainages to their confluence with Kuskokuak Slough; the Tuluksak River drainage including its confluence with the Kuskokwim River and downstream to the upstream side of Mishevik Slough; the George River drainage including its confluence with the Kuskokwim River drainage to an ADF G regulatory marker; the Aniak River drainage to ADF G regulatory markers at its confluence with the Kuskokwim River effective 12:01 a.m. Friday, June 1, 2012.
2012	3-KS-03-12	Reduced the sport fishing bag and possession limit for king salmon to one king salmon in all tributaries of the Kuskokwim River that are not previously closed by EO 3-KS-01-12, effective 12:01 a.m. Wednesday, June 13. This EO also closes all waters of the mainstem Kuskokwim River to sport fishing for king salmon, effective 12:01 a.m. Wednesday, June 13, 2012.
2012	3-KS-04-12	Superseded EO Nos. 3-KS-01-12 and 3-KS-03-12, issued in Fairbanks on April 13 and June 11, 2012. This EO closes all waters of the Kuskokwim River drainage to sport fishing for king salmon, effective 12:01 a.m. Friday, June 22, 2012.

APPENDIX B

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

Proposal	Proposal Subject	Text (page #)	Table #	Figure #
93	Clarify the single-hook artificial lure regulation.			
95	Prohibit putting fish parts in water where use of bait is prohibited.			
111	Close all sport fishing on the Eek River	34, 35, 38, 40	2, 3, 5, 7	2
112	Close all sport and commercial guide fisheries in the Kwethluk River from June 1 through July 25 and limit the size of net gear.	34, 35, 38, 40, 44, 48, 52, 56, 58	2, 3, 5, 7, 11, 15, 19, 22, 23, 25	2
113	Prohibit catch-and-release fishing for salmon on the Kanektok and Arolik rivers.	34, 35, 36, 37, 42, 43, 44, 45, 47, 51, 54	2, 3, 4, 5, 9, 10, 11, 12, 13, 15, 18, 21	2
114	Prohibit sport fishing on all salmon spawning beds on the Kanektok and Arolik River drainages.	35, 36, 37, 42, 43, 44, 45, 47, 51, 54	2, 3, 4, 5, 9, 10, 11, 12, 13, 15, 18, 21	2