

## **Fishery Management Report No. 15-38**

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# **Fishery Management Report for Sport Fisheries in the Kuskokwim–Goodnews Management Area, 2013**

by

**John Chythlook**

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October 2015

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Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



## Symbols and Abbreviations

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

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

***FISHERY MANAGEMENT REPORT NO. 15-38***

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KUSKOKWIM-GOODNEWS MANAGEMENT AREA, 2013**

by

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## ABSTRACT

This report presents sport fisheries season and management summaries for 2013 with preliminary information for 2014 in the Kuskokwim–Goodnews Management Area. The Kuskokwim–Goodnews Management Area (KGMA) consists of all waters of the Kuskokwim River drainage, Kuskokwim Bay, and waters extending from the Naskonat Peninsula in the north to the south side of Cape Newenham in the south. Sport and subsistence fisheries target all 5 Pacific salmon species, as well as rainbow trout *Oncorhynchus mykiss*, Dolly Varden *Salvelinus malma*, sheefish *Stenodus leucichthys*, Arctic grayling *Thymallus arcticus* and northern pike *Esox lucius*. In 2013, angler-days totaled 21,642 with the largest proportion coming from the Kanektok River drainage (0.41 or 8,792). Coho salmon *Oncorhynchus kisutch* was the predominant sport species harvested in 2013 with 5,946 fish taken, followed by Dolly Varden (2,032). The estimated 2013 Chinook salmon *O. tshawytscha* harvest in the KGMA was 132, solely in Kuskokwim Bay before those drainages closed to sport fishing for Chinook salmon. Summaries of major sport, commercial, and subsistence fisheries within the KGMA are detailed in this report, including descriptions of recent performances, Alaska Board of Fisheries regulatory actions, social and biological issues, and descriptions of ongoing research and management activities.

Key words: Southwest Alaska, Bethel, Kuskokwim River, Aniak, McGrath, Kuskokwim Bay, Kanektok River, Holitna River, sport fisheries, subsistence, Chinook salmon, coho salmon, pink salmon, Arctic grayling, Dolly Varden, sheefish, northern pike.

## INTRODUCTION

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

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

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

Division of Sport Fish (SF) management and research activities are funded by ADF&G and Federal Aid in Fisheries Restoration funds. ADF&G funds are derived from the sale of state fishing licenses. Federal aid funds are derived from federal taxes on fishing tackle and equipment established by the Federal Aid in Sport Fish Restoration Act (also referred to the Dingell–Johnson Act or D–J Act). The D–J funds are provided to the states at a match of up to

3-to-1 with the ADF&G funds. Additional funding specified for providing, protecting, and managing access to fish and game is provided through a tax on boat gas and equipment established by the Wallop-Breaux (W-B) Act. Other peripheral funding sources may include contracts with various government agencies and the private sector.

This area management report provides information regarding the KGMA and its fisheries for 2013, with preliminary information from the 2014 season. This report is organized into 2 primary sections: a management area overview including a description of the KGMA and a summary of effort, harvest, and catch for the area; and a section on significant area fisheries, including specific harvest and catch by species and drainage.

The BOF divides the state into 18 regulatory areas to organize the sport fishing regulatory system by drainage and fishery. These areas (different from regional management areas) are described in Title 5 of the Alaska Administrative Code Chapters 47-74. The Division of Sport Fish of ADF&G divides the state into 3 administrative Regions with boundaries roughly corresponding to groups of the BOF regulatory areas. Region I covers Southeast Alaska (the Southeast Alaska regulatory area). Region II covers portions of Southcentral and Southwest Alaska (including the Prince William Sound, Kenai Peninsula, Kenai River drainage, Cook Inlet-Resurrection Bay Saltwater, Anchorage Bowl drainages, Knik Arm drainages, Susitna River drainage, West Cook Inlet, Kodiak, Bristol Bay, and the Alaska Peninsula and Aleutian Islands regulatory areas). Region III includes Upper Copper River and Upper Susitna River areas and the Arctic-Yukon-Kuskokwim Region (including the North Slope, Northwestern, Yukon River, Tanana River, and Kuskokwim-Goodnews regulatory areas).

Region III is the largest geographic region, encompassing the majority of the landmass of the state of Alaska (Figure 1). The region contains over 442,500 mi<sup>2</sup> (1,146,000 km<sup>2</sup>) of land, some of the state's largest river systems (Yukon, Kuskokwim, Colville, Noatak, and Upper Copper and Upper Susitna river drainages), thousands of lakes, thousands of miles of coastline, and streams. Regional coastline boundaries extend from Cape Newenham in the southwest and around all of western, northwestern, and northern Alaska to the Canadian border on the Arctic Ocean. Region III as a whole is very sparsely populated, with the most densely populated center located in the Tanana River Valley. Fairbanks (population about 32,000; the greater Fairbanks North Star Borough has a population of about 99,000) is the largest community.

For administrative purposes, the Division of Sport Fish has divided Region III into 5 fisheries management areas (Figure 1):

- Northwestern/North Slope Management Area (Norton Sound, Seward Peninsula, Kotzebue Sound, and North Slope drainages);
- Yukon Management Area (the Yukon River drainage except for the Tanana River drainage);
- Upper Copper/Upper Susitna Management Area (the Copper River drainage upstream of Canyon Creek and Haley Creek, and the Susitna River drainage above the Oshetna River);
- Tanana River Management Area (the entire Tanana River drainage); and,
- Kuskokwim-Goodnews Management Area (the entire Kuskokwim River drainage and Kuskokwim Bay drainages).

Area management biologists for the 5 areas are located in Nome/Fairbanks, Fairbanks, Glennallen, Fairbanks/Delta Junction, and Bethel/Fairbanks, respectively.

## **ALASKA BOARD OF FISHERIES**

The BOF is a 7-member board that sets fishery regulations and harvest levels, allocates fishery resources, and approves or mandates fishery conservation plans for the State of Alaska. BOF members are appointed by the governor for 3-year terms and must be confirmed by the legislature.

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

## **ADVISORY COMMITTEES**

Local 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 ADF&G 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 BOF and ACs. During 2013, ADF&G had direct support responsibilities for 82 ACs in the state.

Within the KGMA, there are 6 ACs: Lower Kuskokwim, Central Bering Sea, Central Kuskokwim, Stony-Holitna, Bethel, and McGrath. In addition, Lower Yukon and Togiak ACs often comment on proposals concerning fisheries in the KGMA.

## **RECENT BOARD OF FISHERIES ACTIONS**

The BOF meets annually but deliberates on each individual regulatory area on a 3-year cycle, most recently for the KGMA in January 2013 in Anchorage. At this meeting, several proposals were considered that would have restricted sport fishing in the Lower Kuskokwim and Kuskokwim Bay drainages, but these proposals were not adopted (see Chythlook 2012 for a description of the fishery proposals). The *Kuskokwim Salmon Rebuilding Management Plan* (5 AAC 07.365) was revisited, with changes adopted specific to the very large subsistence fishery and relatively small commercial fishery and clarification on when actions will be taken in the sport fishery. The plan was renamed the *Kuskokwim Salmon Management Plan* at this time.

In 2014, three Kuskokwim Area agenda change requests were deliberated on. One included a request for Tier II designation for Chinook salmon *Oncorhynchus tshawytscha*, which ultimately was changed to a proposal to allow restricting gill net length and other allowable gear. Two proposals dealt with changes to legal gear in the subsistence fishery. The request for Tier II resulted in various public meetings, and a stakeholder meeting in Bethel, with no resolution and no Tier II designation.

## **ADF&G EMERGENCY ORDER AUTHORITY**

ADF&G 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 BOF. EOs issued under this authority for the KGMA during 2013 and 2014 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 (this designation 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 2014 in Bethel. At this meeting, no federal fisheries proposals for the Kuskokwim–Goodnews Area were addressed, although subsistence fishing and restrictions for Chinook salmon were discussed at length.

## **REGION III DIVISION OF SPORT FISH RESEARCH AND MANAGEMENT STAFFING**

The Region III Division of Sport Fish staff biologists are organized into a research group and a management group. The management group consists of a management supervisor, a regional management biologist, an area biologist for each of the 5 management areas, 1 or more assistant area management biologists, and 2 stocked water biologists. Area biologists evaluate fisheries and propose and implement management strategies through plans and regulation in order to meet divisional goals. A critical part of these positions consists of interaction with the BOF, ACs, and the general public. Stocked waters biologists plan and implement the regional stocking program for recreational fisheries. The regional management biologist assigned to the Region III headquarters office in Fairbanks also administers the regional fishing and boating access program.

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

## **STATEWIDE HARVEST SURVEY**

Sport fishing effort and harvest of sport fish species in Alaska have been estimated and reported annually since 1977 using a mail survey (<http://www.adfg.alaska.gov/sf/sportfishingsurvey/>). 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 toward 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 1 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 2012 were available fall 2013. 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, the KGMA is designated as 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 BOF adopted statewide sport fishing guide regulations (5 AAC 75.075) that required all sport fishing guides and businesses to register annually with ADF&G. At this time, the BOF 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 BOF, for allocation and management decisions specific to Chinook 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, which 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 provide 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 2009–2013).

## **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 2 sections: the Kuskokwim River and Kuskokwim Bay (Figure 2).

The KGMA includes substantial parts of 2 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 (Lafferty 2001; Chythlook 2006 and 2009). It was during this time period that sport fisheries in this area were first captured in the SWHS. Largely, sport fisheries of the KGMA were small and isolated, so they received little effort and, therefore, low catch and harvest (Tables 1–4).

Angling effort in the KGMA is third in ranking of the angling effort in the AYK region<sup>1</sup>. 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 the difficulty and expense involved 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 26,000 in recent years, suggesting a fairly stable amount of fishing effort in this area. Effort was about 21,000 angler-days in 2013 (Table 4). This 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: the Kanektok, Aniak, and Goodnews rivers (Tables 3, 4; Figure 2). These 3 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 4; 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 it does not see 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 4).

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 Chinook salmon is the most important, regularly reaching 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). Recent poor returns of Chinook salmon have resulted in restrictions and subsequent reduced harvests in the subsistence fishery to as little as an estimated 22,500 in 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 fisheries directed toward chum salmon *O. keta* fisheries have been irregular in prosecution since the late 1990s due to factors including poor markets, limited processing capacity, and conservation of Chinook 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. The majority of effort occurs in the Kuskokwim Bay area, focusing mainly on the Kanektok River. Fishing effort on the Kanektok River averages about 6,000 angler-days annually (Table 3). Rainbow trout are the species most desired 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 River tributaries: the Kisaralik, Kasigluk, Kwethluk, and Aniak rivers. Fishing for the 5 Pacific salmon species occurs throughout much of the Kuskokwim River and Kuskokwim Bay

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<sup>1</sup> Alaska Sport Fishing Survey database [Intranet]. 2000–2013. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish. Available from: [https://intra.sf.adfg.state.ak.us/swhs\\_est/](https://intra.sf.adfg.state.ak.us/swhs_est/)

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 4).

## **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), 5 AAC 77.001 through 5 AAC 77.035, 5 AAC 77.200 through 5 AAC 77.240 (personal use), 5 AAC 01.250 through 5 AAC 01.295 (subsistence fishing), and 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. These include the following:

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 human 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 affect 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. Consequently, 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 2 salmon management plans that guide subsistence, commercial, and sport fishing management in the KGMA, including streams in Kuskokwim Bay:

1. *Kuskokwim River Salmon 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* (5 AAC 07.365) 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*, including continuation of the Chinook salmon season from May 1 to July 25, with a bag limit of 2 Chinook salmon 20 inches or greater and an annual limit of 2 Chinook 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 BOF action in 2007. A correction of the *Kuskokwim River Salmon Rebuilding Management Plan* at the 2010 AYK BOF meeting reflected continuation of the same action. In 2013, changes in the *Kuskokwim River Salmon Rebuilding Management Plan* resulted in the inclusion of a drainage-wide escapement goal range for the Kuskokwim River, as well as reduced goals for many of the rivers that have salmon escapement goal projects.

## **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. These areas, 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 ADF&G 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 ADF&G 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 *Wild Arctic Grayling Management Plan* (5 AAC 71.055) directs ADF&G 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 ADF&G 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 ADF&G, the public, and/or BOF 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 ADF&G 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. ADF&G 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 no retention, 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 BOF included rod-and-reel gear as a legal subsistence fishing method for harvest during the open-water season in the Association of Village Council Presidents’ area of the Lower Yukon and Kuskokwim rivers. In 2001, in response to a petition to the BOF from Nikolai Native Village and the Western Interior RAC, rod-and-reel subsistence fishing was extended upstream by emergency regulation to include the remainder of the Kuskokwim River drainage. 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. Because all Alaskans qualify for subsistence, resident anglers could choose to fish with rod and reel 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 was not BLM's to convey.

## **ACCESS PROGRAMS**

The Wallop-Breaux Amendment to the 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, restrooms, 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 at the *Fishing* and *Sport* links at the ADF&G 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 2 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 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 and fishing regulations; maintain the regional web page; and coordinate the Fairbanks Outdoor Show booth, Kids' 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 responses to the SWHS since 1977 and reported under the headings of the *Kuskokwim River/Kuskokwim Bay drainages* (Area V) (<http://www.adfg.alaska.gov/sf/sportfishingsurvey/>). Estimates of angling effort in the KGMA averaged more than 21,000 angler-days during the last 5- (2008–2012) and 10-year (2003–2012) periods (Table 4).

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 3 and 4). Some sport fishing effort takes place in the Holitna River, but considering the size of this drainage, effort remains exceptionally low.

Fishing effort in the KGMA has remained stable overall. A drop in travel to the area was anticipated in late 2008 due to difficult nationwide economic conditions, but effort remained relatively stable comparable to that prior to 2008 (Tables 3 and 4). There has been considerable speculation about this stability, as high energy costs continue to increase. The 2013 and recent years' data show a relatively stable fishery, though slightly decreased likely due to lack of opportunity to catch Chinook salmon in the sport fishery because of conservation concerns (Tables 3 and 4).

Coho salmon is the primary sport fish species that is harvested in the KGMA (Table 1). 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.

## **SECTION II: FISHERIES**

This section provides a summary of significant sport fisheries by species in the KGMA in 2013 and 2014. Discussion of each fishery will address the following: 1) historical perspective; 2) recent fishery performance (stock status); 3) fishery objectives and management; 4) current issues; 5) recent actions by the BOF; and, 6) ongoing and recommended management and research activities. Recent fishery performance will focus on data from 2013. Information regarding the 2014 season will be included when it is available, but estimates of sport effort and harvest are not yet available for the 2014 season.

### **SALMON FISHERIES**

#### **Chinook salmon**

##### ***Background and Historical Perspective***

Chinook 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 Chinook 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 3 and 4). Very few Chinook 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 Chinook 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 Chinook salmon are estimated through the SWHS and are summarized in previous fishery management reports (FMRs) (Lafferty 2001, 2003; Chythlook 2006, 2009, 2011, 2012, 2014). 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 Chinook salmon spawning in the Kanektok River (Lisac and MacDonald 1995; MacDonald 1996; M. Lisac, Fisheries Biologist, USFWS, Dillingham, personal communication).

Sport harvests of Chinook salmon are minor in comparison to the commercial and subsistence harvests of the area (Tables 5–7). However, there is angler desire to participate in the Chinook 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 3), which is about half the KGMA total annual effort (Table 4).

Historically, approximately 14% of Chinook salmon caught in the KGMA sport fishery were harvested annually from 1992–2012 (Tables 8 and 9). Catch and harvest numbers in the Kuskokwim River and Kuskokwim Bay tributaries have been low in the last few years due to harvest restrictions, up to and including complete closures of the fisheries in 2014. Catches in the Kuskokwim Bay area peaked at 21,000 Chinook salmon in 2005; and from 2008 through 2011, catches ranged from 3,000 to 9,000 Chinook salmon. In 2013, catches in Kuskokwim Bay decreased to approximately 4,700. Most anglers participate in the KGMA Chinook 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 at 10% or less (Bendock and Alexandersdottir 1992), overall fishing mortality (harvest plus delayed mortality) may account for a minimal number of fish removed from the populations. The estimated harvest of Chinook salmon in the Kuskokwim River drainage sport fisheries has remained low (< 1,000 in recent years, and estimated at zero in 2012 and 2013) (Table 8). This is due in part to recent restrictions and care taken by anglers to not retain sport-caught Chinook salmon in the Kuskokwim River because of perceptions regarding the sport fishery.

### ***Recent Fishery Performance***

In 2013, the Chinook 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 and commercial closures on the Kwethluk, Kisaralik, George, Aniak, and Tuluksak rivers, as well as Kuskokuak Slough. An EO (3-KS-02-13) was issued to close the Kwethluk, Kisaralik, George, Aniak, and Tuluksak rivers and Kuskokuak Slough to sport fishing for Chinook salmon. This

EO was issued May 24, prior to the majority of the Chinook salmon season, in cooperation with conservation measures taken by the Division of Commercial Fisheries and USFWS.

Because the 2013 Chinook salmon run showed up below expectations, additional inseason subsistence restrictions were instituted. As the subsistence fishery was put onto “rolling closures” or gear restrictions, an EO was issued on June 25 (3-KS-05-13) to close the mainstem Kuskokwim and associated drainages to sport fishing for Chinook salmon from the mouth of the river to Chuathbaluk (Appendix A). Subsequent EOs were issued to reduce the bag limit to 1 fish in all Kuskokwim Bay tributaries effective May 27 and then to no retention effective July 10 (3-KS-03-13 and 3-KS-07-13; Appendix A). Chinook salmon sport fisheries were characterized as below average from 2010 through 2012 and were virtually non-existent in much of the KGMA area during 2013 due to restrictions and low escapements.

The 2013 projection for the Chinook salmon run was moderate and included room for subsistence harvest and spawning escapement of Chinook salmon, with a modest remainder for commercial and sport harvest. However, the 2013 Chinook salmon run was well below average (T. Elison, Commercial Fisheries Biologist, ADF&G, Anchorage, 2013, personal communication). Some subsistence users characterized the subsistence fishery as average to poor, even with 2013 being a notable exception due to lack of early season restrictions in the lower river. (T. Elison, Commercial Fisheries Biologist, ADF&G, Anchorage, 2013, personal communication). Division of Commercial Fisheries considered 2013 escapements as below average at all escapement projects. Emergency closures for subsistence and sport fisheries were implemented when the Chinook salmon run did not materialize inseason. Chinook salmon escapements were estimated to be drastically low at the Kuskokwim River weir projects (including the Kwethluk and Tuluksak rivers) in 2013, and were well below established escapement goals. Enumeration projects were largely hampered by high water in 2013 making Chinook salmon counting difficult, but expansion estimates suggest very low escapement numbers (T. Elison, Commercial Fisheries Biologist, ADF&G, Anchorage, 2013, personal communication).

In 2014, in expectation of low Chinook salmon numbers, commercial fishing was curtailed through the Chinook salmon season, and the sport fishery for Chinook salmon remained closed the entire season (Appendix A). The subsistence fishery remained restricted to 4-inch mesh or less for much of the season, with restrictions rolling upriver with the run timing of Chinook salmon.

In 2014, Chinook salmon escapements at the Kogrukluk and Kwethluk rivers were below their SEGs, while the George River Chinook salmon SEG was achieved. Seven tributaries have aerial survey SEGs, all of which were within their SEG ranges. The drainagewide goal for Chinook salmon (65,000-120,000) was likely achieved but as of December 2014 was still under analysis.

### **Kuskokwim Bay Tributaries**

In 2013, Chinook salmon returns were low, with 3,568 estimated past the Kanektok River weir (A. Poetter, Commercial Fisheries Biologist, ADF&G, Anchorage, 2014, personal communication). The Kanektok aerial survey range was not achieved in 2013, with 2,346 fish observed out of a range of 3,500 to 8,000. An estimated 1,168 Chinook salmon passed the Goodnews River weir, which did not meet the BEG of 1,500 to 1,900 fish.

In 2014, Chinook salmon returns at the Kanektok River weir and Goodnews River weir were even poorer despite the delay of the commercial fishery and the closure of the sport fishery. The Kanektok River weir passed 1,871 Chinook salmon, and the Goodnews River weir passed just 750 Chinook salmon (A. Poetter, Commercial Fisheries Biologist, ADF&G, Anchorage, 2014, personal communication).

### ***Fishery Objectives and Management***

ADF&G has assessed Chinook 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 Chinook salmon escapement programs in the Kuskokwim River drainage are aerial surveys and the Kogruklu River weir. Recent new weirs at the Salmon river (a tributary of the Aniak River) and now on the Pitka Fork of the Kuskokwim River near the headwaters may contribute to a better understanding of Kuskokwim River drainage escapements (Schaberg et al. 2012).

Most Kuskokwim River Chinook 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 Chinook salmon production. Therefore, ADF&G 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 operation and maintenance. Many of the larger tributaries and the larger stocks of Chinook salmon, such as the Aniak and Holitna rivers (Schaberg et al. 2012), are not completely assessed but are assessed with sporadic aerial surveys of Chinook 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.

### ***Current Issues and Fishery Outlook***

#### **Kuskokwim River and Tributaries**

Abundance of Chinook salmon in the Kuskokwim River over the past 6 years has encompassed some of the lowest known escapements (Table 10). 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 Chinook salmon. These low counts mean that extensive restrictions to the subsistence fishery will probably occur in 2015, and with them closures of the sport fishery and delay of the commercial chum and sockeye salmon fishery until after the bulk of the Chinook salmon run has passed the lower river.

### ***Recent Board of Fisheries Actions***

There were several proposals regarding closing Chinook salmon harvest in the sport fishery or closing sport fishing in general at the January 2013 BOF meeting. These proposals were specific to the Eek, Kwethluk, Kanektok, and Arolik rivers. None of these proposals was adopted (Chythlook 2012). Agenda change requests in 2014 were largely directed at subsistence fisheries gear types and allocations.

### ***Current or Recommended Research and Management Activities***

In recent years, weirs have been used to enumerate Chinook salmon escapements on the Kwethluk, Tuluksak, George, Kogruklu, 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 Chinook salmon in that system (Wuttig and Evenson 2002; Chythlook and Evenson 2003; Stroka and Brase 2004; Stroka and Reed 2005). 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 Chinook salmon radiotelemetry project on the mainstem Kuskokwim from 2002 through 2006 (Stuby 2007). Division of Commercial Fisheries continued this project in 2007. Aerial surveys conducted by Division of Commercial Fisheries remain an important component of Chinook salmon assessment in the Kuskokwim–Goodnews area (Table 10).

In the Kuskokwim Bay drainages (Goodnews and Kanektok rivers), it has been suggested that the weir is too far upstream from the mouth of the river to accurately assess the Chinook salmon run. This difficulty is partially mitigated by the aerial surveys that are conducted. It may be important to estimate the percentage of Chinook salmon that spawn below the weir, thereby allowing extrapolation of the number of Chinook 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 Chinook salmon radiotelemetry project in 1 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 and Kuskokwim Bay. 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 11–13). The recent commercial harvest has averaged approximately 93,000 coho salmon in the Kuskokwim River for the 5-year average and 165,000 for the 10-year average (Table 10; T. Elison, Commercial Fisheries Biologist, ADF&G, Anchorage, 2013, personal communication). The Kuskokwim River itself is characterized by broad channels and turbid water, thereby limiting sport fishing largely to clearwater tributaries of the Kuskokwim River and Kuskokwim Bay. The largest coho salmon sport fisheries are located in the Kanektok, Goodnews, and Aniak rivers (Tables 13 and 14).

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 information on and commercial, subsistence, and sport harvest of coho salmon in the area (Table 11). 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–



2013). Additionally, USFWS staff from the TNWR 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 and 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 BOF 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 indicated 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 harvests in the area (Tables 10–12). However, angler desire to participate in coho salmon fisheries is high. In the KGMA, the recent 5-year average (2008–2012) indicates that approximately 4,600 coho salmon were harvested, while approximately 32,000 coho salmon were caught and released (Tables 1-2). 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 2013 and 2014, coho salmon escapements were characterized as average to below average at most of the 7 tributary weirs (Elison et al. 2012; Aaron Poetter, Fishery Biologist, ADF&G, Anchorage, 2014, personal communication); however, efforts to count coho salmon were often hampered by extended high water events. In 2013, sport fish catches for coho salmon were above average throughout Kuskokwim Bay and below average for the Kuskokwim River (Tables 14 and 15). This result is probably a reflection of the desire to catch more coho salmon since the Chinook salmon sport fishery has been largely restricted or closed. Sport harvest for the entire management area at the end of the 2013 season was slightly above average (Table 1).

### ***Fishery Objectives and Management***

ADF&G 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 Kogruklu River weir. An escapement goal for coho salmon was established for the Kwethluk River in 2010 with a lower-bound sustainable escapement goal of  $\geq 19,000$  fish; however, counts thus far remain incomplete due to persistent high water events or operational periods that do not encompass the entire coho salmon run. The Bethel test fishery in the lower mainstem Kuskokwim River only provides relative abundance and run timing at Bethel.

### ***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 (Bavilla et. al. 2010). Coho salmon return to the Kuskokwim River drainage primarily at 4 years of age; the 2010 brood was the main parent year for the 2014 return. Preliminary estimates for all escapement enumeration projects in the Kuskokwim River weir were above average for 2014, and the returns to the Kwethluk and Kogrukuk rivers exceeded their established escapement goals (Aaron Poetter, Commercial Fishery Biologist, ADF&G, Anchorage, 2014, personal communication). For Kuskokwim Bay streams, weirs were not operated far enough into the coho salmon return to enumerate total escapement (A. Tiernan, Commercial Fishery Biologist, ADF&G, Anchorage, 2014, personal communication). The outlook for coho salmon returning in 2015 is likely to be above average.

### ***Recent Board of Fisheries Actions***

Several proposals were presented at the January 2013 BOF meeting regarding closing the coho sport fishery or closing sport fishing in general. These proposals were specific to the Eek, Kwethluk, Kanektok, and Arolik rivers (Chythlook 2014). None of these proposals was adopted.

### ***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 (Stubby 2007; Sara Gilk Commercial Fisheries Biologist, ADF&G, Anchorage, personal communication; Pawluk et al. 2006; Schaberg et al. 2012). Studies that evaluate mortality related to non-retention (Stubby 2002) in KGMA sport fisheries may be useful in interpreting total fishing mortality. Such studies may answer questions brought about by the general public regarding mortality related to non-retention.

## **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 communities. Chum salmon were documented as being used for subsistence as early as 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). Commercial harvests declined to less than 100,000 in the late-1990s and more recently have ranged broadly from 1,000 to 118,000 (Table 15). 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 gear restrictions and delayed openings in effort to conserve Chinook salmon. 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 15). According to the 10-year average, approximately 300 chum salmon were harvested and 13,000 to 35,000 chum salmon released annually from 2003 to 2012 (Tables 1 and 2). It is assumed that very little hooking mortality occurs 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 mortality of chum salmon is approximately 2,000 fish per year from sport fishing of the KGMA.

### ***Fishery Objectives and Management***

ADF&G 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.

Restrictions to the subsistence and commercial fisheries aimed at curbing Chinook salmon harvests in 2011–2014 likely increased chum salmon escapement but probably had little influence on the chum salmon run overall.

### ***Current Issues and Fishery Outlook***

Recent trends in chum salmon production have provided surpluses for commercial and sport fisheries in the past 6 years. The commercial fishery for chum salmon will probably be affected by conservation measures in place to conserve Chinook salmon in 2015. Chum salmon will probably remain as a species of minimal catch and harvest in the sport fishery in 2015.

### ***Recent Board of Fisheries Actions***

There were several proposals regarding closing the salmon sport fishery or closing sport fishing in general at the January 2013 BOF meeting. These proposals were specific to the Eek, Kwethluk, Kanektok, and Arolik rivers (Chythlook 2014). None of these proposals was adopted.

### ***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 more plentiful in Kuskokwim Bay tributaries. The sockeye salmon stocks of the Kanektok and Goodnews rivers are the largest in the KGMA. Sockeye salmon 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 (Sara Gilk, Commercial Fisheries Biologist, ADF&G, Anchorage, 2009, personal communication). Most anglers venturing to Western Alaska are interested in Chinook salmon and rainbow trout opportunities; however, sockeye and

coho salmon opportunities have become 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 Chinook 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 18). Commercial fisheries of Kuskokwim Bay target sockeye salmon in July. Sockeye salmon commercial harvests were below average in 2013 in Kuskokwim Bay as a whole, with about 26,000 fish taken in the commercial fishery in the Quinhagak District and about 24,500 fish taken in the Goodnews Bay District (A. Tiernan, Commercial Fishery Biologist, ADF&G, Anchorage, 2014, personal communication). Harvests in 2014 were well above average at about 59,000 fish for the Quinhagak District and near average at about 20,500 fish for the Goodnews Bay District (A. Tiernan, 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 19). In 2013, the numbers were near average, at about 4,500 caught. Recreational sockeye salmon catches in the Kanektok and Goodnews rivers have averaged almost 4,000 and 1,300 fish per year for 2008–2012 (Table 19). Harvest in Kuskokwim Bay rivers has not increased as much as catch, with most anglers practicing non-retention. In general, less than 1 sockeye salmon is harvested per 10 caught for the Goodnews and Kanektok rivers (Table 20). 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 6,000 fish, with 2006 being a standout year with over 16,000 sockeye salmon caught (Table 21). The 2013 sport fish catch of sockeye salmon in Lower Kuskokwim River tributaries was just under 1,200 with a harvest of 85 fish (Table 21).

### ***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 have 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 where the commercial fishery occurs, and it 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 survey sustainable escapement goal for sockeye salmon is 14,000 to 34,000 fish. Aerial surveys have historically been used to count sockeye salmon escapement in the Kanektok and Goodnews rivers, 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 method has worked to provide sustained yields.

### ***Current Issues and Fishery Outlook***

In 2013, the sockeye salmon run to the Kuskokwim River drainage and Kuskokwim Bay was characterized as below average. In 2013, 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 2013 indicate sockeye salmon numbers were well into the range of the Goodnews River escapement goal, with just under 24,500 salmon. The Kanektok River aerial survey goal for sockeye salmon (14,000–34,000 fish) was exceeded with an escapement of just over 64,800 sockeye salmon. The 2013 estimates of sockeye salmon escapements in the Kuskokwim River mainstem drainages suggest that most were below average, but the Kogruluk River weir has the only established sockeye salmon escapement goal and the escapement was within the SEG at 7,558, with a goal range of 4,400–17,000 (Travis Elison, fisheries biologist, ADF&G Commercial Fisheries Division, personal communication).

In 2014, efforts to conserve Chinook salmon, of which the run largely overlaps that of sockeye salmon, resulted in vastly decreased harvests in the commercial and subsistence fisheries and subsequently greater escapements in Kuskokwim Bay. The upper bound of the aerial survey SEG was exceeded in the Kanektok River with the highest escapement on record with 148,800 sockeye salmon. In the Goodnews River, the sockeye salmon BEG was exceeded with an estimated escapement of 41,496 fish (SEG 18,000–40,000; A. Tiernan, fisheries biologist, ADF&G Commercial Fisheries Division, personal communication).

In the Kuskokwim River in 2014, sockeye salmon escapement was characterized as below average overall, but the Kogruluk River escapement was within the SEG range at 6,407 (A. Poetter, fisheries biologist, ADF&G Commercial Fisheries Division, personal communication).

### ***Recent Board of Fisheries Actions***

There were several proposals regarding closing the salmon sport fishery or closing sport fishing in general at the January 2013 BOF meeting. These proposals were specific to the Eek, Kwethluk, Kanektok, and Arolik rivers (Chythlook 2014). None of these proposals was adopted (Chythlook 2012).

### ***Current or Recommended Research and Management Activities***

Division of Commercial Fisheries has undertaken sockeye salmon radiotelemetry projects and sampling for genetics (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 recently completed mark–recapture study, a genetic mark–recapture study, and a weir at Telaquana Lake operated with volunteers and in cooperation with the National Park Service (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 drainages 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, grow slowly, mature at older ages, and are found in low densities. As with any population on the edge of its distribution, these stocks are more sensitive to changes in climate and food availability. The *Southwest Alaska Rainbow Trout Management Plan* (SWAKRTMP; ADF&G 1990) 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 these data to management is limited because estimates are based on communities of harvest rather than drainage. 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 about 80 rainbow trout (Table 21) in the Kuskokwim River drainages and about 75 in the Kuskokwim Bay drainages (Table 22).

In 2013, catches were above average, probably due to anglers fishing for rainbow trout rather than Chinook salmon. Rainbow trout catches were reported to be good at most Kuskokwim Bay/Kuskokwim River locations when water conditions permitted. The 2013 catch for the Lower Kuskokwim River drainages was over 20,000 rainbow trout (Table 22). Although catch rates were characterized as above average, nearly all sport-caught rainbow trout caught in the entire Kuskokwim–Goodnews area were released (Tables 22 and 23).

#### ***Fishery Objectives and Management***

During the mid-1980s, bag limits were adopted in the KGMA to eliminate excessive harvests. Bag limits at that 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 special management area above its confluence; and the Doestock River with unbaited, single-hook, artificial-lure restrictions, and no retention allowed.

During 1997, upper sections of the Kisaralik and Kwethluk rivers and the entire length of the Kasigluk River were recognized as special rainbow trout waters under the guidelines of the SWAKRTMP, resulting in regulations allowing only unbaited, single-hook, artificial lures. Portions 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, which are strong indicators of healthy fish populations. Local anglers and the sport fishing guide industry continue to provide positive comments on rainbow trout stocks. Some guides and individuals have raised concerns about rainbow trout stocks on the Aniak and Kanektok rivers, generally involving 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 of their distribution range.

In March 2003, the BOF adopted the *Statewide Management Standards for Wild Trout* (5 AAC 75.220, 2003), which 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 SWAKRTMP and fall under the statewide standard bag limit of 2 fish with only 1 fish 20 inches or greater in length and an annual limit of 2 fish that are 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 2014 season and beyond.

### ***Recent Board of Fisheries Actions***

Several proposals were presented at the January 2013 BOF meeting regarding closing the salmon sport fishery or closing sport fishing in general. These proposals were specific to the Eek, Kwethluk, Kanektok, and Arolik rivers (Chythlook 2012). None of these proposals was adopted.

### ***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). These surveys emphasized 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 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 probably 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 (Schwanke *in prep*).

In addition, work on the Kisaralik River was conducted in 2011. This cooperative project (including Yukon Delta National Wildlife Refuge, Kenai Fisheries Resource Office, and ADF&G Division of Sport Fish staff) involved a mark-recapture study on the Kisaralik River drainage. This project updated the 1997 Kisaralik River study done by the USFWS to assess changes in the more than 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 (Schwanke *in prep*).

## **Dolly Varden/Arctic Char**

### ***Background and Historical Perspective***

Dolly Varden/Arctic char (DV/AC) are found throughout the KGMA. 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 clearwater 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 (Menard 1998).

### ***Recent Fishery Performance***

In 2013, 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, about 28,500 fish in the Kuskokwim River (Table 23). Although 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 probably be attributed to additional protection from the SWAKRTMP, resulting in conservative methods and means (no bait, single-hook regulations) and changing attitudes of anglers regarding the harvest of DV/AC (Table 23).

### ***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. ADF&G 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 2015 season.

### ***Recent Board of Fisheries Actions***

At its 2004 meeting, the BOF 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 DV/AC, as does the entire Holitna River drainage. Upper Kuskokwim River drainages upstream of the Holitna River are governed by the general regulation for DV/AC 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 with 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.

Several proposals were presented at the January 2013 BOF meeting regarding closing the salmon sport fishery or closing sport fishing in general. These proposals were specific to the Eek, Kwethluk, Kanektok, and Arolik rivers. None of these proposals was adopted.

### ***Current or Recommended Research and Management Activities***

No major activities are planned or recommended for DV/AC in the near future. However, in conjunction with other studies, incidentally caught DV/AC should be measured and finclipped. 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 clearwater 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 2,000 fish (Table 1). Recent sport catches range between 11,000 and 36,000 Arctic grayling (Table 2). The Aniak River supports the largest Arctic grayling harvest by the sport fishery in the area, averaging 143 fish per year for 2008–2012 (Table 24) with the Kisaralik, Kwethluk, and other Lower Kuskokwim tributaries contributing to harvests to a lesser extent.

### ***Recent Fishery Performance***

In 2013, Arctic grayling catches in Kuskokwim River drainages were reported to be above average at most locations (Tables 2 and 24). Nearly all sport-caught Arctic grayling caught in the entire KGMA were released. Although 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 near 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 1, 2, and 24), as well as development of more stringent regulations regarding non-retention 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 2015 season.

### ***Recent Board of Fisheries Actions***

There have been no BOF actions for the past 2 cycles.

## **ACKNOWLEDGEMENTS**

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## **TABLES AND FIGURES**

Table 1.–Kuskokwim-Goodnews Management Area (including Kuskokwim Bay drainages) sport fishing harvest by species, 1993–2013.

Year	Chinook salmon	Coho Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	Rainbow Trout	Lake Trout	Dolly Varden/Arctic char	Arctic Grayling	Northern Pike	Whitefish	Burbot	Sheefish
1993	1,674	2,056	715	27	731	486	218	1,499	739	995	253	214	54
1994	2,148	2,978	894	126	1,626	299	40	1,398	850	828	183	20	390
1995	1,328	2,771	277	16	455	429	215	1,260	845	655	0	0	272
1996	2542	4,756	687	486	761	567	126	1,743	663	344	20	0	20
1997	3,345	5,430	1,181	75	384	1,336	404	3,337	1,292	408	614	0	589
1998	3,401	4,023	1,627	122	596	523	131	1,581	3,469	1,430	1,220	136	119
1999	1,440	3,974	1,154	0	520	510	128	2,038	1,290	548	9	228	268
2000	1,181	3,294	822	10	359	106	152	1,612	361	531	214	588	250
2001	1,384	4,474	422	11	176	17	63	1,698	807	474	20	50	124
2002	1,397	4,265	267	143	598	76	134	2,026	1,464	443	54	15	81
2003	734	5,297	289	46	67	204	244	2,710	1,259	783	89	87	45
2004	1,197	7,096	512	416	117	457	497	2,539	1,953	1,543	975	111	182
2005	1,092	5,591	792	66	608	141	233	2,135	1,287	3,749	209	75	1,079
2006	1,277	3,793	864	187	158	107	83	1,937	637	406	58	0	173
2007	2,543	3,802	876	0	439	232	42	1,492	827	346	342	0	435
2008	1,037	6,344	1,109	32	262	219	22	2,038	713	165	96	0	191
2009	1,399	4,724	394	337	351	197	29	2,176	1,307	981	664	0	161
2010	906	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
2012	632	4,972	639	136	406	137	39	2,301	1,096	837	1,216	1,857	60
2013	132	5,946	471	39	351	377	14	2,032	1,002	321	1,482	597	74
Average 2003–2012	1,255	4,886	660	130	300	181	122	2,012	1,032	997	377	222	251
Average 2008–2012	1,141	4,656	653	117	322	134	25	1,862	872	628	420	390	119

Source: Alaska Sport Fishing Survey database [Internet]. 2003–2013. Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited February 16, 2015). Available from: <http://www.adfg.alaska.gov/sf/sportfishingsurvey/>



Table 2.–Kuskokwim-Goodnews Management Area sport fishing catch by species, 1993–2013.

Year	Chinook salmon	Coho Salmon	Sockeye Salmon	Pink Salmon	Chum Salmon	Rainbow Trout	Lake Trout	Dolly Varden/Arctic char	Arctic Grayling	Northern Pike	Whitefish	Burbot	Sheefish
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
2012	6,885	36,540	4,802	10,950	17,247	26,511	971	79,406	30,625	2,292	1,270	2,076	388
2013	5,357	43,413	5,734	1,299	17,001	40,530	450	90,132	42,005	2,954	1,560	607	358
Average 2003–2012	11,184	39,808	7,611	7,758	18,796	32,636	1,763	62,063	26,665	5,112	761	258	1,069
Average 2008–2012	8,861	33,302	6,384	8,776	17,818	40,688	826	68,185	31,818	3,583	770	460	815

Table 3.—Sport fishing effort (angler-days) in the Kuskokwim Bay drainages, 1993–2013.

Year	Kuskokwim Bay			Total
	Kanektok	Goodnews	Other	
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	12,731
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	11,730
2012	7,790	5,658	1,165	14,613
2013	8,792	4,517	0	13,309
Average				
2003–				
2012	6,436	3,187	760	10,465
Average				
2008–				
2012	6,325	3,386	1,138	9,426

Table 4.—Sport fishing effort (angler-days) in select Kuskokwim River tributaries, 1993–2013.

Year	Kuskokwim River					KGMA Area Total
	Aniak	Kisaralik	Kwethluk	Other	Holitna	
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	1,511	2,891	747	16,420
1997	4,778	1,578	642	1,445	1,678	27,318
1998	5,548	1,021	1,498	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
2012	2,315	1,420	1,152	1,539	386	23,477
2013	2,189	1,871	1,117	1,341	166	21,642
Average 2003–2012	3,025	1,886	1,513	1,646	1,049	22,154
Average 2008–2012	2,822	2,141	1,091	1,153	1,015	21,745

*Note:* Cells without a number indicate years without enough Statewide Harvest Survey respondents, so estimates for that year may be in the “Other” category.

Table 5.–Harvest of Chinook salmon in the commercial, subsistence, test, and sport fisheries of the Kuskokwim River, 1993–2013.

Year	Harvest				Total
	Commercial <sup>a</sup>	Subsistence <sup>b</sup>	Test Fishery	Sport <sup>c</sup>	
1993	8,735	87,674	2,483	444	99,336
1994	16,211	103,343	1,937	977	122,468
1995	30,846	102,110	1,421	506	134,883
1996	7,419	96,415	247	1,643	105,724
1997	10,441	79,382	332	1,627	91,782
1998	17,359	81,219	210	1,384	100,172
1999	4,705	72,775	98	351	77,929
2000	444	70,833	874	105	72,256
2001	90	78,009	86	290	78,475
2002	72	80,983	288	319	81,662
2003	158	67,228	409	401	68,196
2004	2,305	97,110	691	857	100,963
2005	4,784	85,097	608	572	91,061
2006	2,777	90,094	352	444	93,677
2007	179	96,139	503	1,683	98,504
2008	8,865	98,099	420	739	108,123
2009	6,664	78,225	470	917	86,276
2010	2,731	66,053	292	354	69,430
2011	748	62,368	337	757	64,210
2012	14	22,527	321	0	22,862
2013	1	47,113	201	0	47,315
Average					
2003–2012	2,923	76,294	440	672	80,329
Average					
2008–2012	3,804	65,454	368	553	70,180

<sup>a</sup> Districts 1 and 2.

<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed. 2010 and 2013 estimates are preliminary. Methodology changed starting in 2008.

<sup>c</sup> Statewide Harvest Survey (1991–2013).

Table 6.–Harvest of Chinook salmon in the commercial, subsistence, and sport fisheries in the Goodnews River, 1993–2013.

Year	Harvest			Total
	Commercial <sup>a</sup>	Subsistence <sup>b</sup>	Sport	
1993	2,117	590	81	2,788
1994	2,570	672	163	3,405
1995	2,922	789	41	3,752
1996	1,375	392	171	1,938
1997	2,039	441	86	2,566
1998	3,675	735	431	4,841
1999	1,888	759	223	2,870
2000	4,442	564	243	5,249
2001	1,519	863	147	2,529
2002	979	723	224	1,926
2003	1,412	807	10	2,229
2004	2,565	863	100	3,528
2005	2,035	869	0	2,904
2006	2,892	713	79	3,684
2007	3,126	647	177	3,950
2008	1,281	1,012	78	2,371
2009	1,509	585	31	2,125
2010	1,752	480	0	2,232
2011	2,092	784	51	2,977
2012	1,531	389	41	1,961
2013	495	413	102	1,010
Average				
2003–2012	2,165	662	107	3,138
Average				
2008–2012	1,633	660	31	3,347

<sup>a</sup> Goodnews District commercial harvest (T. Elison, Commercial Fisheries biologist, ADF&G, Anchorage, personal communication)

<sup>b</sup> Subsistence harvest by the community of Goodnews (C. Shelden, Commercial Fisheries biologist, ADF&G, Anchorage, personal communication)

Table 7.—Harvest of Chinook salmon in the commercial, subsistence, and sport fisheries in the Kanektok River, 1993–2013.

Year	Harvest			
	Commercial <sup>a</sup>	Subsistence <sup>b</sup>	Sport	Total
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
2012	6,675	2,396	591	9,662
2013	2,054	3,143	30	5,227
Average 2003–2012	16,689	3,464	544	20,642
Average 2008–2012	12,805	2,833	609	16,124

<sup>a</sup> Kanektok District commercial harvest (A. Tiernan, Commercial Fisheries biologist, ADF&G, Anchorage, personal communication)

<sup>b</sup> Subsistence harvest by the community of Quinhagak (C. Shelden, Commercial Fisheries biologist, ADF&G, Anchorage, personal communication)

Table 8.—Sport fishing harvest and catch of Chinook salmon in the Aniak, Kisaralik, Kwethluk, and other Kuskokwim rivers, 1993–2013.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	641	4,531	21	491	64	299	256	662	1,506	11,540
1997	801	13,069	49	679	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	431	10	343	20	172	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	552	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	65	385	180	470	572	2,652
2006	29	1,201	86	359	183	493	16	173	444	3,480
2007	162	5,380	446	1,096	93	733	86	171	1,683	11,224
2008	26	3,614	148	1,583	149	845	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
2012	0	135	0	97	0	86	0	0	0	415
2013	0	328	0	0	0	211	0	0	0	647
Average										
2003–2012	87	1,667	92	801	92	526	95	572	654	4,660
Average										
2008–2012	17	1,503	43	709	65	403	96	860	518	3,760

Table 9.—Peak aerial survey index counts of Chinook salmon in tributaries of the Lower Kuskokwim River, 1993–2013.

Year	Eek River	Kwethluk River	Kisaralik River	Tuluksak River	Aniak River	Kipchuk River <sup>a</sup>	Salmon River <sup>c</sup>
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	-	534	-	-	116	79
2012	-	-	610	-	-	193	49
2013	240	-	597	83	754	261	154

SEG

Aerial survey index goal	580–1,800	400–1,200	1,200–2,300	600
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*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.

<sup>a</sup> Tributaries of Aniak River.

<sup>b</sup> Lower Kuskokwim drainages not surveyed in 2009 due to poor weather conditions.



Table 10.—Sport fishing harvest and catch of Chinook salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1993–2013.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	728	6,757	157	1,136	0	53	899	7,946
1997	1,632	13,374	86	1,578	0	0	718	14,952
1998	1,475	9,528	431	3,171	107	376	2,017	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	36	333	4,222
2004	228	2,758	100	1,754	12	1,074	340	5,586
2005	520	10,116	0	375	0	0	520	10,491
2006	754	7,292	79	2,243	0	399	833	9,934
2007	633	6,331	177	1,461	50	1,997	860	9,789
2008	78	2,490	78	367	0	69	298	2,931
2009	400	2,522	31	561	51	210	482	3,293
2010	552	2,619	0	547	0	82	552	3,248
2011	891	6,911	51	1,000	34	1,288	976	9,199
2012	591	4,322	41	1,674	0	444	632	6,440
2013	30	3,215	102	1,480	0	0	132	4,695
Average 2003–2012	511	4,885	57	1,068	15	560	627	6,458
Average 2008–2012	531	3,774	40	830	17	419	634	5,692

Table 11.—Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Kuskokwim River, 1993–2013.

Year	Harvest			Total
	Commercial	Subsistence <sup>a,b</sup>	Sport <sup>c</sup>	
1993	610,739	28,485	980	640,204
1994	724,689	36,609	1,925	763,223
1995	471,461	36,828	1,497	509,876
1996	937,299	43,199	3,423	983,921
1997	130,803	29,817	2,408	163,028
1998	210,841	24,623	2,419	235,723
1999	23,593	27,409	1,998	53,000
2000	261,379	45,911	1,689	308,979
2001	192,998	31,089	1,204	225,291
2002	83,463	42,617	2,030	128,110
2003	284,064	33,291	3,459	320,814
2004	435,407	48,898	4,996	489,301
2005	142,319	33,351	3,539	176,261
2006	185,598	41,272	1,474	228,344
2007	141,049	35,212	2,504	176,261
2008	142,862	46,461	3,893	193,216
2009	104,546	29,559	3,526	137,631
2010	58,031	32,094	1,549	91,854
2011	74,108	32,172	1,693	107,973
2012	86,389	28,294	1,752	116,435
2013	114,069	26,409	1,239	141,717
Average				
2003–2012	165,437	36,060	1,723	204,104
Average				
2008–2012	93,187	33,716	1,693	141,387

<sup>a</sup> Estimated subsistence harvest expanded from villages surveyed.

<sup>b</sup> 2011–2013 are preliminary estimates (C. Sheldon, Commercial Fisheries biologist, ADF&G, Anchorage, personal communication).

<sup>c</sup> Statewide Harvest Survey (1991–2013).

Table 12.—Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Kanektok River, 1993–2013.

Year	Harvest			Total
	Commercial <sup>a</sup>	Subsistence <sup>a</sup>	Sport <sup>b</sup>	
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	1,280	16,517
2011	30,457	1,369	981	32,799
2012	31,214	1,380	2,533	35,127
2013	58,079	1,631	2,509	62,219
Average 2003–2012	46,329	1,594	1,377	49,162
Average 2008–2012	43,547	1,643	1,442	46,632

<sup>a</sup> Estimated subsistence harvest expanded from villages surveyed.

<sup>b</sup> Statewide Harvest Survey (1991–2013).

Table 13.—Harvest of coho salmon in the commercial, subsistence, and sport fisheries in the Goodnews River, 1993–2013.

Year	Harvest			Total
	Commercial <sup>a</sup>	Subsistence <sup>b</sup>	Sport	
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
2012	25,515	506	624	26,645
2013	21,581	382	2,152	24,115
Average				
2003–2012	15,501	857	530	16,356
Average				
2008–2012	15,345	589	459	16,409

<sup>a</sup> Goodnews Bay (District 5) commercial harvest.

<sup>b</sup> Subsistence harvests by the communities of Goodnews Bay and Platinum.

Table 14.—Sport fishing harvest and catch of coho salmon in Kuskokwim Bay drainages, 1993–2013.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	285	1,317	4,988
1996	875	5,084	443	1,375	0	1,153	1,318	16,264
1997	1,220	14,366	855	2,915	223	279	2,298	17,689
1998	751	15,017	574	7,852	74	737	1,399	23,606
1999	1,091	13,677	789	12,185	23	781	1,903	26,738
2000	799	13,043	795	9,045	0	0	1,594	22,088
2001	2,448	21,941	822	8,431	0	783	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	65	3,656	2,049	38,486
2005	1006	13,279	1,046	11,541	0	2,397	2,052	27,217
2006	1,742	12,282	553	7,091	0	243	2,295	19,640
2007	1,087	12,768	211	3,528	0	625	1,298	16,921
2008	1,541	18,086	220	5,425	552	949	2,313	24,460
2009	876	6,896	284	2,805	38	2,252	1,198	11,953
2010	1,280	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
2012	2,533	16,998	624	9,234	63	2,918	3,220	29,150
2013	2,509	17,062	2,152	16,597	46	1,559	4,661	33,569
Average								
2003–2012	1,348	13,901	543	8,737	118	1,416	2,024	24,859
Average								
2008–2012	1,442	10,920	492	7,412	212	1,398	2,146	18,207

Table 15.—Sport fishing harvest and catch of coho salmon in Kuskokwim Bay drainages, 1993–2013.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	285	1,317	4,988
1996	875	5,084	443	1,375	0	1,153	1,318	16,264
1997	1,220	14,366	855	2,915	223	279	2,298	17,689
1998	751	15,017	574	7,852	74	737	1,399	23,606
1999	1,091	13,677	789	12,185	23	781	1,903	26,738
2000	799	13,043	795	9,045	0	0	1,594	22,088
2001	2,448	21,941	822	8,431	0	783	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	65	3,656	2,049	38,486
2005	1006	13,279	1,046	11,541	0	2,397	2,052	27,217
2006	1,742	12,282	553	7,091	0	243	2,295	19,640
2007	1,087	12,768	211	3,528	0	625	1,298	16,921
2008	1,541	18,086	220	5,425	552	949	2,313	24,460
2009	876	6,896	284	2,805	38	2,252	1,198	11,953
2010	1,280	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
2012	2,533	16,998	624	9,234	63	2,918	3,220	29,150
2013	2,509	17,062	2,152	16,597	46	1,559	4,661	33,569
Average 2003–2012	1,348	13,901	543	8,737	118	1,416	2,024	24,859
Average 2008–2012	1,442	10,920	492	7,412	212	1,398	2,146	18,207

Table 16.—Harvest of chum salmon in the commercial, subsistence, test, and sport fisheries in the Kuskokwim River, 1993–2013.

Year	Harvest				Total <sup>d</sup>
	Commercial <sup>a</sup>	Subsistence <sup>b,c</sup>	Test Fishery	Sport	
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	496	312,137
1997	17,026	37,366	790	148	55,330
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	53	45,747
2004	20,429	64,899	1,810	84	86,943
2005	69,139	58,020	4,459	500	132,118
2006	44,070	89,500	3,547	13	137,130
2007	10,763	73,561	3,237	403	87,964
2008	30,798	68,678	2,954	121	102,269
2009	78,205	43,621	2,204	285	124,315
2010	93,148	46,143	2,872	85	142,248
2011	118,316	49,717	2,289	83	170,405
2012	65,171	79,513	2,730	106	147,520
2013	114,069	53,627	1,767	31	169,494
Average					
2003–2012	58,083	61,487	2,782	173	117,524
Average					
2008–2012	76,788	57,534	2,610	136	137,068

<sup>a</sup> Districts 1 and 2 only; no chum harvests reported in District 3.

<sup>b</sup> Estimated subsistence harvest expanded from villages surveyed.

<sup>c</sup> 2010–2012 estimates are preliminary (C. Shelden, Commercial Fisheries biologist, ADF&G, Anchorage, personal communication).

<sup>d</sup> Total does not include test fish. No test fishing data are available.

Table 17.—Sport fishing harvest and catch of chum salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1993–2013.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1993	183	4,849	156	924	129	1,135	468	6,908
1994	156	6,386	15	381	496	1,186	667	7,953
1995	213	5,049	0	315	5	82	218	5,446
1996	221	8,155	0	351	0	352	221	8,858
1997	212	11,041	24	1,111	0	560	236	12,712
1998	213	11,560	50	2,955	0	192	263	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	136	64	8,781
2002	446	10,779	99	4,059	0	695	545	15,533
2003	14	7,138	0	3,195	0	3,195	14	13,528
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	27,094
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	0	859	271	13,162
2012	127	11,397	51	2,730	7	686	300	15,467
2013	320	10,330	0	2,067	0	0	320	12,397
Average								
2003–2012	108	9,486	11	2,662	7	1,050	126	12,785
Average								
2008–2012	152	8,854	20	2,319	13	726	186	11,899



Table 18.—Sport fishing harvest and catch of chum salmon in the Aniak, Kisaralik, Kwethluk, and Holitna rivers, 1993–2013.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1993	101	2,412	ND	ND	0	2,669	208	881	501	5,962
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	298	4,691	0	1,849	55	931	0	230	308	11,367
1997	86	2,387	0	9	0	53	33	116	86	3,212
1998	101	2,664	0	163	8	296	0	25	322	5,355
1999	139	4,055	0	456	41	176	0	135	180	5,459
2000	0	3,914	13	2,091	0	85	0	0	116	6,409
2001	0	1,899	0	106	71	425	73	222	112	3,656
2002	0	2,096	0	745	34	455	53	331	53	4,486
2003	0	2,347	28	450	0	50	48	209	39	5,073
2004	0	1,602	0	606	70	308	136	426	84	4,380
2005	0	788	0	247	0	414	180	1,638	500	4,633
2006	0	2,135	0	80	0	918	0	802	13	8,188
2007	0	3,191	0	140	0	21	0	0	40	7,204
2008	45	2,427	31	2,446	0	961	45	408	121	7,312
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	804	0	928	83	4,085
2012	0	5,268	0	584	18	144	0	123	93	6,361
2013	31	3,220	0	762	0	268	0	17	31	4,382
Average 2003–2012	22	2,178	11	810	15	536	34	511	173	5,836
Average 2008–2012	43	2,344	15	1,316	16	730	9	407	136	5,777

Table 19.—Harvest of sockeye salmon in the commercial, subsistence, test, and sport fisheries in the Kuskokwim River, 1993–2013.

Year	Harvest				Total
	Commercial	Subsistence <sup>a</sup>	Test Fishery <sup>b</sup>	Sport <sup>c</sup>	
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	503	54	64,390
2000	4,130	48,766	413	46	53,355
2001	84	53,245	510	231	54,070
2002	84	32,272	228	26	32,610
2003	282	32,237	646	289	32,808
2004	8,532	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	48,845
2008	15,601	58,732	584	273	75,190
2009	25,673	34,943	515	631	61,762
2010	22,428	38,130	495	419	61,472
2011	13,497	43,251	380	98	57,226
2012	2,857	47,231	861	196	51,145
2013	768	39,382	462	85	40,697
Average 2003–2012	12,984	42,686	565	378	56,612
Average 2008–2012	16,011	44,457	567	323	61,359

<sup>a</sup> Estimated subsistence harvest expanded from villages surveyed.<sup>b</sup> Test fishery sockeye harvests not available.<sup>c</sup> Statewide Harvest Survey (1992–2012).<sup>d</sup> Test fishery sockeye harvests not available-5 year average shown.

Table 20.—Sport fishing harvest and catch of sockeye salmon in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1993–2013.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	371	5,247	87	749	120	68	436	6,064
1997	607	2,836	61	1,705	10	148	668	4,710
1998	830	3,987	502	3,402	60	113	1,281	7,543
1999	496	4,537	561	1,999	0	0	1,057	6,536
2000	694	5,700	82	997	0	0	787	6,708
2001	83	1,415	108	1,128	0	68	191	2,901
2002	73	1,423	149	3,080	3	161	225	4,830
2003	107	5,082	42	1,128	0	60	149	6,644
2004	112	1,330	0	891	0	226	112	2,552
2005	156	5,692	0	683	0	0	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	6,776	104	1,186	78	485	836	6,331
2009	75	768	111	1,205	46	623	232	2,596
2010	404	4,872	15	1,134	0	438	419	6,555
2011	429	5,193	135	1,126	0	250	564	6,667
2012	146	2,262	286	1,752	11	100	443	4,343
2013	159	2,616	227	1,835	0	0	386	4,451
Average 2003–2012	299	4,691	88	1,281	15	246	401	6,101
Average 2008–2012	342	3,974	130	1,281	27	379	499	5,298

Table 21.—Sport fishing harvest and catch of sockeye salmon in the Aniak, Kisaralik, Kwethluk, and Holitna rivers, 1993–2013.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	51	115	0	335	0	1021	0	0	251	3,262
1997	391	567	10	10	0	0	21	64	513	1,114
1998	130	254	0	0	16	35	0	84	346	643
1999	21	407	0	4	0	0	0	0	97	824
2000	23	251	0	117	0	0	0	42	35	657
2001	24	210	34	156	0	37	48	927	220	2201
2002	26	54	0	16	0	67	16	0	42	256
2003	0	390	74	74	42	42	0	105	140	883
2004	119	185	22	45	65	218	124	259	400	870
2005	0	606	22	22	0	112	345	467	636	1436
2006	16	1,042	67	160	0	0	136	431	231	2075
2007	0	118	0	179	0	25	0	81	407	2160
2008	102	450	171	410	0	188	0	42	273	3,493
2009	0	203	10	82	12	130	20	91	162	999
2010	0	577	0	312	0	0	0	71	40	1,091
2011	0	171	14	759	0	0	26	319	98	1,634
2012	11	219	0	0	121	154	22	22	196	459
2013	0	616	64	290	21	150	0	0	85	1,283
Average 2003–2012	25	396	31	204	24	87	67	189	258	1,510
Average 2008–2012	23	324	39	313	27	94	14	109	154	1,535

Table 22.—Sport fishing harvest and catch of rainbow trout in the Aniak, Kisaralik, and Kwethluk Rivers 1993–2013.

Year	Aniak River		Kisaralik River		Kwethluk River		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1993	10	1,144	ND	ND	58	333	140	3,011
1994	8	656	124	1,226	ND	ND	176	2,208
1995	0	1,581	ND	ND	ND	ND	178	4,899
1996	24	3,457	211	2470	ND	ND	393	8,089
1997	53	12,368	218	7,067	227	334	604	22,532
1998	349	4,989	0	1,289	69	980	418	10,514
1999	175	4,659	0	1,877	117	269	292	6,964
2000	24	3,568	47	3,076	24	1,054	95	9,072
2001	0	819	0	1,010	17	896	17	3,605
2002	0	2,942	29	5,520	0	3,398	44	13,677
2003	0	2,422	21	1,241	ND	ND	160	4,689
2004	0	1,908	99	3,134	117	1,027	309	6,731
2005	0	1,077	78	3,378	ND	ND	141	5,542
2006	0	4,772	0	4,339	0	5,990	40	16,104
2007	0	7,243	21	1,457	31	3,277	76	12,523
2008	0	13,081	136	9,237	26	6,688	162	32,657
2009	0	10,767	0	10,006	26	6,615	59	28,943
2010	0	5,452	0	9,490	55	4,037	55	29,897
2011	0	8,519	0	4,162	0	362	0	16,170
2012	0	2,775	34	2,777	103	2,329	137	8,045
2013	0	5,056	0	8,503	0	6,953	187	20,843
Average 2003–2012	0	5,802	39	4,922	43	3,122	114	16,148
Average 2008–2012	0	8,119	34	7,134	42	4,006	83	23,142

Table 23.—Sport fishing harvest and catch of rainbow trout in the Kanektok, Goodnews, Arolik, and other Kuskokwim Bay rivers, 1993–2013.

Year	Kanektok River		Goodnews River		Arolik/Other Rivers		Kuskokwim Bay Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1993	130	4,106	145	3,994	71	1,535	346	9,635
1994	59	4,779	19	945	45	326	123	6,050
1995	198	3,046	43	1,263	10	1,324	251	5,633
1996	133	6,704	24	1,450	11	580	174	8,734
1997	231	27,518	433	9,703	44	1,813	732	39,034
1998	0	13,567	97	5,738	0	631	105	19,936
1999	73	11,151	133	5,926	0	2,070	218	19,290
2000	0	6,019	0	2,446	0	24	11	8,599
2001	0	7,984	0	2,312	0	0	0	10,889
2002	0	8,846	32	2,827	0	2,160	32	14,493
2003	0	8,455	44	2,913	0	453	44	12,033
2004	68	8,525	68	2,540	12	2,503	148	16,248
2005	0	7,070	0	2,125	0	1,645	0	11,586
2006	0	11,793	67	3,446	0	5,244	67	20,651
2007	11	11,538	105	2,451	40	2,638	156	16,627
2008	0	16,375	21	2,203	10	1,696	57	22,220
2009	0	12,670	108	1,556	30	6,209	138	20,591
2010	17	10,263	34	1,370	0	3,543	51	15,573
2011	13	17,642	0	3,036	0	2,888	13	20,879
2012	0	12,219	0	2,494	0	3,753	0	18,466
2013	149	15,632	41	2,592	0	325	190	19,687
2003–2012								
Average	11	11,655	45	2,413	9	3,057	67	17,487
2008–2012								
Average	2	13,698	54	2,123	16	3,395	83	19,178

Table 24.—Sport fishing harvest and catch of Dolly Varden/Arctic char in the Aniak, Kisaralik, Kwethluk, and Holitna rivers, 1992–2012.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
1993	260	9,340	ND	ND	97	349			572	13,616
1994	496	3,115	117	1,013	ND	ND			836	4,863
1995	481	3,454	ND	ND	ND	ND			795	7,826
1996	195	6,096	293	1,655	268	1106	61	364	911	12,013
1997	295	11,945	414	4,717	243	243	64	968	2,554	23,549
1998	319	20,765	92	599	14	188	25	305	753	24,110
1999	114	5,909	181	3,875	0	44	112	589	452	10,664
2000	40	4,134	367	3,664	47	95	0	0	525	9,591
2001	87	1,222	320	2,454	33	142	66	1,644	693	7,548
2002	212	6,288	345	4,494	53	2,223	17	558	768	15,954
2003	168	3,924	432	2,693	77	1,196	549	3,256	1,698	13,990
2004	288	6,496	114	4,343	230	2,376	220	3,071	1,101	31,029
2005	296	4,633	246	2,300	106	237	203	313	1,176	9,479
2006	150	7,064	14	3,655	76	365	122	1,218	865	16,360
2007	291	7,193	147	1,311	0	1,586	138	1,581	865	12,791
2008	948	16,771	113	6,627	36	1,874	163	4,065	1,539	37,286
2009	510	9,696	232	4,949	129	5,418	238	966	1,466	23,851
2010	400	8,875	125	6,542	133	2,174	109	699	865	18,925
2011	72	8,404	128	4,479	19	1393	108	3,612	448	17,750
2012	146	14,088	312	7,688	17	1,399	0	863	729	24,800
2013	332	13,222	239	10,802	17	3,890	0	0	642	29,642
Average										
2003–2012	327	8,717	206	4,353	82	1,682	185	1,964	1,132	20,626
Average										
2008–2012	415	11,567	182	6,057	67	2,212	124	2,041	1,009	24,522

Table 25.—Sport fishing harvest and catch of Arctic grayling in the Aniak, Kisaralik, Kwethluk, and Holitna rivers, 1993–2013.

Year	Aniak River		Kisaralik River		Kwethluk River		Holitna		Kuskokwim River Total	
	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch
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	398	5,095	123	1,535	36	1,376	121	615	663	16,403
1997	162	15,194	303	3,753	257	500	101	1,803	1,292	34,586
1998	715	11,930	58	984	8	1,408	124	8,303	3,554	38,856
1999	437	8,659	63	3,641	0	226	74	958	1,290	23,975
2000	42	5,950	29	3,605	38	995	38	381	361	19,215
2001	77	3,300	64	3,287	77	3,058	106	3,321	807	22,813
2002	172	11,518	507	8,184	226	3,000	84	814	1,464	34,740
2003	58	6,787	280	3,188	23	515	259	5,492	1,259	26,782
2004	0	3,844	45	4,669	23	697	342	6,725	1,953	31,680
2005	108	2,149	346	2,822	83	337	403	1,218	1,287	11,599
2006	58	2,357	83	1,845	97	2,701	43	704	637	16,493
2007	38	4,242	38	1,255	0	3,440	152	2,793	631	20,907
2008	253	5,794	121	9,911	42	2,828	13	1,352	713	35,486
2009	416	8,055	90	5,269	114	4,144	50	618	1,307	35,693
2010	26	5,502	0	8,814	114	3,355	58	849	516	19,524
2011	7	1,753	0	3,117	20	214	159	11,711	704	19,037
2012	14	5,492	122	3,921	28	1,733	0	931	860	15,264
2013	146	3,121	321	18,146	223	6,518	0	0	756	28,386
Average 2002–2012	98	4,602	113	4,907	54	1,996	148	3,239	987	23,247
Average 2007–2011	143	5,319	67	5,673	64	2,455	56	3,092	820	25,001



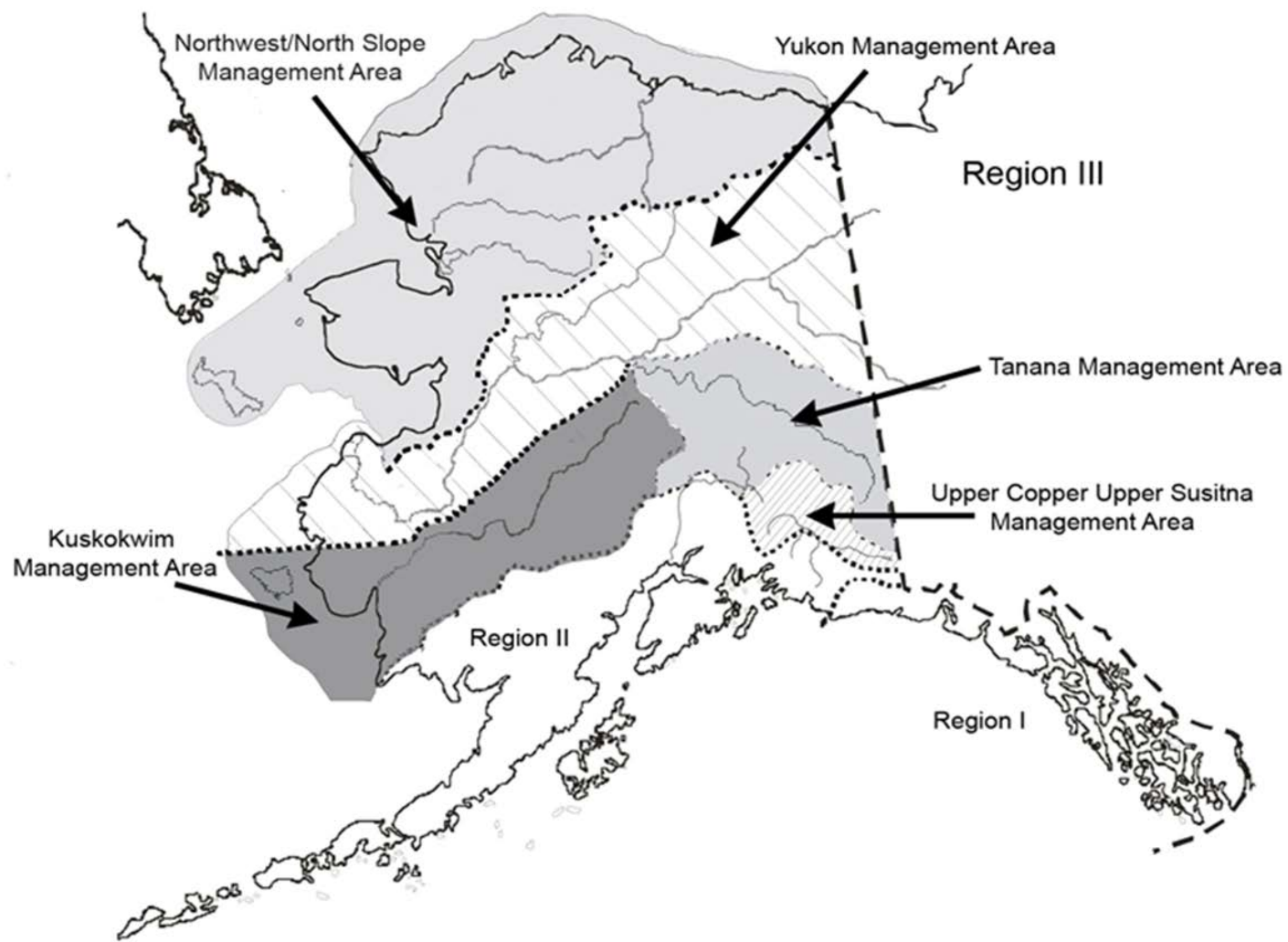


Figure 1.—Map of the sport fish regions in Alaska and the 5 Region III management areas.

# Kuskokwim-Goodnews Drainages

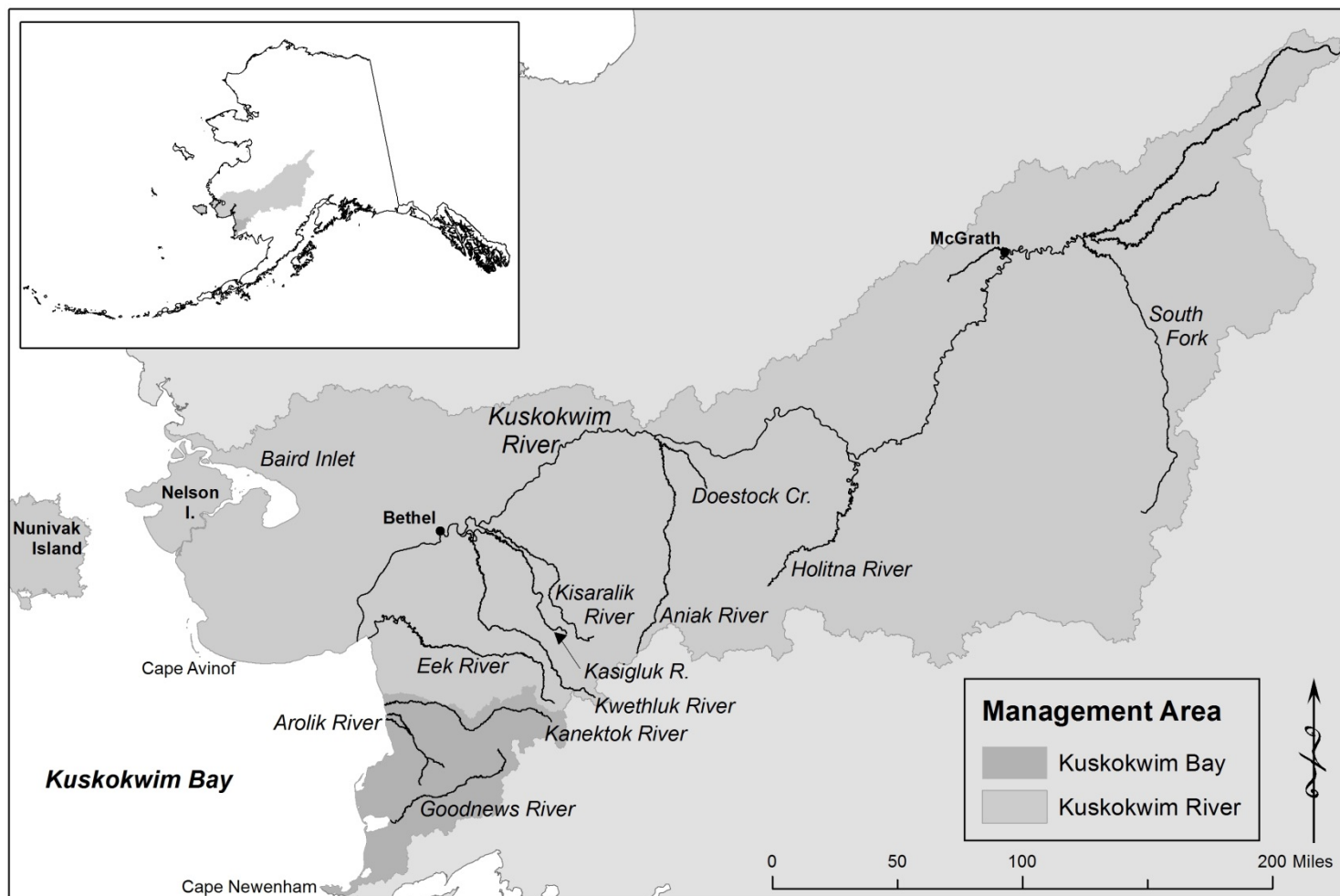


Figure 2.—Kuskokwim-Goodnews Management Area.

**APPENDIX A: EMERGENCY ORDERS ISSUED FOR KGMA  
SPORT FISHERIES FOR 2013 AND 2014**

Appendix A1.–Emergency orders issued for KGMA sport fisheries for 2013 and 2014.

Year	E. O. Number	Explanation
2013	3-KS-02-13	This EO closed the following waters to sport fishing for Chinook salmon: the waters of Kuskokuak Slough between 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 approximately 1 mile to an ADF&G marker; and the Aniak River drainage. This closure is effective 12:01 a.m. Saturday, June 1, 2013 and prohibits all sport fishing for Chinook salmon, including catch-and-release fishing. Any Chinook salmon caught unintentionally while fishing for other species may not be removed from the water and must be released immediately.
2013	3-KS-03-13	This emergency order reduces the sport fishing bag and possession limit for Chinook salmon to 1 fish in all tributaries of Kuskokwim Bay effective 12:01 a.m., Monday, May 27, 2013.
2013	3-KS-05-13	The Division of Sport Fish closed the mainstem Kuskokwim River from the mouth of the river to a line between ADF&G regulatory markers located at the downstream edge of Chuathbaluk, effective 12:01 a.m. Saturday, June 29, 2013
2013	3-KS-07-13	This emergency order supersedes Emergency Order No. 3-KS-03-13. This emergency order prohibits the retention of Chinook salmon in all tributaries of Kuskokwim Bay effective 12:01 a.m., Wednesday, July 10, 2013.
2014	3-KS-01-14	The Division of Sport Fish closed the entire Kuskokwim River drainage and Kuskokwim Bay tributaries to sport fishing for Chinook salmon, effective 12:01 a.m. Thursday, May 1, 2014. All Chinook salmon caught while fishing for other species may not be removed from the water and must be released immediately. In addition, anglers may use only one unbaited, single-hook, artificial lure in the entire Kuskokwim–Goodnews Area. These restrictions will remain in effect through 11:59 p.m. Friday, July 25, 2014.