Fishery Management Report No. 15-46

2013 Kuskokwim Area Management Report

by

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and

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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)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

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

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

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

General

Alaska Administrative Code	AAC
all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.
all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat or long
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	*E*
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
variance	
population	Var
sample	var

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

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ABSTRACT

The *2013 Kuskokwim Area Management Report* is an annual volume reporting on management activities of the Alaska Department of Fish and Game, Division of Commercial Fisheries staff in the Kuskokwim River and Bay, as well as regulation changes by the Alaska Board of Fisheries in January 2013. The report emphasizes a descriptive account of the information, decisions, and rationale used to manage the Kuskokwim River and Bay subsistence and commercial salmon (Chinook *Oncorhynchus tshawytscha*, chum *O. keta*, sockeye *O. nerka*, and coho *O. kisutch*) and Pacific herring *Clupea pallasii* fisheries. We have included all information deemed necessary to fully explain the rationale behind management decisions in 2013. All narrative and data tabulations in this volume are combined in 4 sections (salmon, subsistence, herring, and miscellaneous fisheries) to aid in the use of the document as a reference source. The extensive set of tables has been updated to record previously unlisted data for easy reference. Fisheries data in this report supersede information in previous reports. Corrections or comments should be directed to the Anchorage office: Attention Editor, Aaron Tiernan, Kuskokwim Assistant Area Management Biologist, 333 Raspberry Road, Anchorage, Alaska, 99518.

Keywords: Pacific salmon *Oncorhynchus* spp., Chinook salmon, *Oncorhynchus tshawytscha*, chum salmon *O. keta*, sockeye salmon *O. nerka*, coho salmon *O. kisutch*, Pacific herring *Clupea pallasii*, subsistence fisheries, commercial fisheries, subsistence, Annual Management Report (AMR), Kuskokwim River, Kuskokwim Bay.

INTRODUCTION

MANAGEMENT AREA DESCRIPTION

The Kuskokwim Management Area (KMA) includes the Kuskokwim River drainage, all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula, and Nunivak and St. Matthew Islands (Figure 1).

There are 38 communities consisting of approximately 4,800 households within the KMA. Of those households, approximately 75% are situated within the drainage of the Kuskokwim River (Shelden et al. 2014). Much of the salmon fishing effort occurs within the mainstem of the Kuskokwim River; however, fishing also occurs in many of the tributaries that contain salmon. Residents of Quinhagak, Goodnews Bay, and Platinum, located along the south shore of Kuskokwim Bay, harvest salmon stocks primarily from the Kanektok, Arolik, and Goodnews River systems. Residents of Kipnuk, Kwigillingok, and Kongiganak, located on the north Kuskokwim Bay, harvest salmon from within the Kuskokwim River drainage and from local drainages that empty into Kuskokwim Bay. Residents of Toksook Bay, Nightmute, Tununak, Newtok, Chefornak, and Mekoryuk, which are situated near the Bering Sea Coast, harvest salmon from coastal waters and local streams.

There are currently 4 commercial salmon fishing districts in the KMA: 1, 2, 4, and 5 (5 AAC 07.200). Districts 1, 2, 3, and 4 were established in 1960; however District 3, Upper Kuskokwim River, was removed from regulation in 1966 due to lack of landings. District 5, Goodnews Bay, was established in 1968 (Appendix A1). District 1, Lower Kuskokwim River, consists of the Kuskokwim River from a line between Apokak Slough and the southernmost tip of Eek Island and Popokamiut upstream to a line between the Alaska Department of Fish and Game (ADF&G) regulatory markers located at Bogus Creek, about 9 miles upstream of the Tuluksak River (Figure 2). District 1 was divided into 2 subdistricts in 2000. Subdistrict 1-A consists of that portion of District 1 upstream from a line between regulatory markers located at the downstream end of Steamboat Slough and includes Statistical Areas 335-13 and 335-14. Subdistrict 1-B consists of that portion of District 1 downstream from regulatory markers at Steamboat Slough and includes Statistical Areas 335-11 and 335-12. District 2, Middle Kuskokwim River, consists

of Kuskokwim River from ADF&G regulatory markers located at the upstream entrance to the second slough on the west bank downstream from Kalskag to the regulatory markers at Chuathbaluk (Figure 3). The most recent commercial fishing periods occurred in District 2 in 2000. District 4, Quinhagak, consists of the waters of Kuskokwim Bay from the northern-most edge of the mouth of Weelung Creek to the southern-most tip of the south mouth of Arolik River and extending for 3 miles from the coast (Figure 4). District 5 consists of that portion of Goodnews Bay east of a line from ADF&G regulatory markers located approximately 2 miles south and 2 miles north on the seaward side of the entrance of Goodnews Bay, and west of a line between mouth of Ukfigag Creek to the mouth of the Tunulik River (Figure 5).

MANAGEMENT

Background

The overall goal of Kuskokwim Area management programs is to manage salmon runs for sustained yield by policies set forth by the Alaska Board of Fisheries (BOF), including the *Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222) and *Policy for Statewide Salmon Escapement Goal*s (5 AAC 39.223). For all statewide fisheries, the Alaska State Legislature has designated subsistence fishing as the highest priority among beneficial uses of the resource (AS 16.05.258 *Subsistence Use and Allocation of Fish and Game*).

The large size of the Kuskokwim River drainage and the distances between the fisheries, and the escapement monitoring projects throughout the drainage, adds complexity to the management of Kuskokwim River. Chinook salmon *Oncorhynchus tshawytscha* begin entry into the Kuskokwim River in late May, whereas sockeye *O. nerka* and chum salmon *O. keta* begin their entry in mid-June. Chinook and sockeye salmon runs fall off in early July, whereas the chum salmon run begins to fall off in late July when coho salmon *O. kisutch* run entry begins. Coho salmon entry to the river falls off in late August to early September. Fishery management information on run size and timing by species is limited until the salmon are distributed throughout the drainage and on the spawning grounds hundreds of miles from and months after the lower river fishery has been initiated.

Kuskokwim Bay salmon have similar run timing into the Kanektok, Goodnews, and Arolik rivers. These are small drainages in comparison to Kuskokwim River. Although evaluation of run size and timing in Kuskokwim Bay Rivers is not immediate, it is much timelier than that of the Kuskokwim River. Many of the factors that make Kuskokwim River fisheries management difficult are not present in Kuskokwim Bay fisheries.

Small numbers of Chinook salmon are harvested in salmon directed commercial fisheries during late June and July under a guideline harvest range of 0–50,000 fish. Directed Chinook salmon fisheries do occur in Districts 4 and 5 when abundance is adequate to allow for a commercial fishery. The harvest of sockeye salmon was considered incidental to chum salmon harvest in Kuskokwim River from 1987 to 2003; however in 2004, a guideline harvest level of 0–50,000 sockeye salmon was established. Districts 4 and 5 commercial fisheries target sockeye and chum salmon. Coho salmon are targeted in all 3 commercial fishing districts with those fisheries occurring in late July through early September.

The KMA commercial fishery was relatively stable from 1987 to 1996, with the harvests ranging from 740,000 to 2.3 million fish (Appendix A2). Effort ranged from 714 to 824 permits fished, and the exvessel value of the fishery ranged from $2.9 million to $12.7 million (Appendix A3).

Beginning in 1997, the value of salmon, particularly chum salmon (Appendix A4), began to decline which led to a decreasing trend in fishing effort, number of fish harvested, and the exvessel value of the fishery. From 1997 through 2002, commercial salmon harvests in the area ranged from 185,000 fish in 2002 to 758,000 fish in 1998. Effort ranged from 407 permits in 2002 to 707 permits in 1998, and the exvessel value of the fishery ranged from $324,000 in 2002 to $1.6 million in 1998. Poor Chinook and chum salmon returns during 1999 through 2001 resulted in the Kuskokwim River having limited commercial salmon fishing opportunity in June and July.

As Kuskokwim River Chinook and chum salmon abundances rebounded in the mid-2000s, poor market conditions for chum salmon, and limited processing capacity, continued to limit commercial salmon fishing opportunity in District 1. The same factors limited commercial fishing opportunity during July in both Districts 4 and 5, and led to registered buyers imposing harvest limits on fishermen (Appendix A3). Since 2004, commercial salmon harvests in the area have ranged from 393,700 fish to 687,800 fish (Appendix A2). Effort ranged from 434 permit holders to 530 permit holders, and the exvessel value of salmon ranging from $1.1 million to $2.9 million (Appendix A3). A fish processing plant located in Platinum began operation in 2009 and has improved processing capacity in the area. Also, there were recent improvements in the chum salmon market. Both factors in part led to increased fishing opportunity since 2009.

Kuskokwim River Chinook salmon are harvested primarily for subsistence use. In addition, there has been below historic average commercial harvests since 1996 (Appendix B1). Since 2000, Chinook salmon harvests have contributed between 0 and 13% of the exvessel value of the total District 1 commercial salmon fishery (Appendix B2). Chinook salmon run reconstruction information indicates an exploitation rate of Chinook salmon of approximately 40% since 2000, with the majority of the harvest, 96%, attributed to the subsistence fishery (Kevin Schaberg, Commercial Fisheries Biologist, ADF&G, Anchorage; personal communication).

Kuskokwim River sockeye salmon are primarily harvested in the subsistence fishery, but they are also harvested in District 1 commercial fisheries (Appendix B4). Kuskokwim River commercial sockeye salmon harvests make up approximately 15% of the District 1 total exvessel value (Appendix B2). Sockeye salmon exploitation and total run estimates are unknown.

Kuskokwim River chum salmon, though an important subsistence species, have been primarily targeted for commercial use (Appendix B6). From 1996 to 2010, commercial chum salmon harvests contributed less than 20% of the total exvessel value of the District 1 commercial salmon fishery. Beginning in 2011, chum salmon harvests have contributed over 40% of the total exvessel value in District 1 (Appendix B2). Chum salmon exploitation rates are unavailable as total run estimates are unknown.

Kuskokwim River coho salmon are harvested primarily in the commercial fishery (Appendix B5). Kuskokwim River coho salmon commercial fishing in recent years has accounted for the largest number of salmon harvested and the greatest value, accounting for over half of the District 1 exvessel value (Appendix B2).

In Kuskokwim Bay commercial fisheries, the greatest harvest has been sockeye salmon followed by coho, chum, and Chinook salmon (Appendices C2 and D2). Sockeye salmon have historically had the greatest exvessel value in District 4, but chum salmon exceeded the exvessel value of sockeye salmon since 2011 (Appendix C3). Sockeye salmon have the highest exvessel value in District 5 (Appendix D3).

Salmon Stock Status

Salmon returns to the majority of Western Alaska rivers (including Kuskokwim River) were generally below average from 1997 to 2001. However, these declines were not as evident in Kuskokwim Bay rivers. The KMA was declared an economic disaster area by the State of Alaska in 1997, 1998, 2000, and 2001 because of the extremely low chum and Chinook salmon commercial harvests and exvessel values (Appendix A2). In 2001, Kuskokwim River Chinook and chum salmon were both designated stocks of yield concern by the BOF (Burkey et al. 2000).

In 2002, Chinook and chum salmon returns to the Kuskokwim River began to rebound and reached near record abundances from 2004 through 2007 (Linderman and Bergstrom 2006; Estensen et al. 2009). This led to the BOF discontinuing stock of concern status for both species in winter 2007. Since 2007, Chinook salmon abundance has decreased with 2 of the lowest total runs occurring in 2012 (Elison et al. 2012) and 2013. The Kuskokwim River was declared a fisheries disaster by the State of Alaska for low Chinook salmon runs in 2011 and 2012. The Department of Commerce determined that a commercial fisheries disaster occurred under the Magnuson-Stevens Fishery Conservation and Management Act of 1976. Chum salmon have returned to near average to above average levels, but sockeye salmon abundance has varied from average to above average. Coho salmon abundance has been below average 4 out of the last 5 years.

Run Reconstruction

During the most recent BOF meeting in January of 2013, a Kuskokwim River drainagewide Chinook salmon escapement goal was established. The total run of Chinook salmon to the Kuskokwim River from 1976 to 2011 was estimated using a model developed for data-limited situations (Bue et al. 2012). Subsistence harvest, commercial harvest and effort, sport fish harvest, test fishery harvest and catch per unit of effort (CPUE) at Bethel, mark–recapture estimates of inriver abundance, and counts of salmon at 6 weirs, and peak aerial survey counts from 14 drainages throughout the Kuskokwim river drainage were simultaneously combined to inform the model. The estimates that were generated were then combined with available age structure of the stock information, to reconstruct the total return by age and ultimately develop a brood table. The run reconstruction and brood table were used to conduct a spawner-recruit analysis and develop escapement goal recommendations for Kuskokwim River Chinook salmon (Hamazaki 2011; Hamazaki et al. 2012). Subsequently, in 2013 ADF&G established a new Kuskokwim River drainagewide sustainable escapement goal (SEG) of 65,000–120,000 Chinook salmon and revised SEG for 3 individual rivers with weir assessment projects as follows: 4,100–7,500 for Kwethluk, 4,800–8,800 for Kogrukluk, and 1,800–3,300 for George rivers.

2013 Management Plan

In January of 2013, the BOF adopted a new *Kuskokwim River Salmon Management Plan* (5 AAC 07.365) after thorough public input. Within the management plan it states that ADF&G shall use inseason run projections and test fishing indices to asses run abundance. This information would be evaluated inseason using the Bethel test fishery (BTF) CPUE and subsistence harvest reports. The new *Kuskokwim River Salmon Management Plan* provides guidelines for managing the Kuskokwim River salmon fishery to meet escapement goals and subsistence use priority. Subsistence-fishing closures are scheduled by emergency order prior to, during, and after commercial fishing periods to assure salmon harvested during open subsistence fishing periods do not reach the commercial market. Additionally, the BOF removed the

regulation allowing up to 8.0 in mesh size gillnets to be used in the Kuskokwim River commercial fishery by emergency order. This regulatory option had not been used and now only gillnets of 6.0 in or smaller mesh size may be used in the commercial fishery.

The Quinhagak (District 4) fishery targets salmon bound for the Kanektok and Arolik rivers and is managed according to the *District 4 Management Plan* (5 AAC 07.367). The objective of this plan is to maintain a level of sustained yield that will provide for subsistence needs, long-term economic health of commercial and sport fishing industries, and recreational opportunities of all freshwater systems flowing into the district. Regulations provide for subsistence fishing closures prior to, during, and after commercial fishing periods. There is no specific management plan for the Goodnews Bay fishery (District 5); however, the fishery is managed similar to District 4 except that commercial fishing is delayed until late June to provide for Chinook salmon escapement.

Subsistence

The subsistence salmon fishery in the Kuskokwim Area is one of the largest and most important in the state and supports one of the largest subsistence salmon fisheries in North America. Many households throughout the region are involved in harvesting, processing, and preserving salmon for subsistence use. The movement of families from permanent winter communities to summer fish camps, situated along rivers and sloughs, is a significant element of annual subsistence harvest efforts. Approximately 2,400 households in the Kuskokwim Area annually harvest salmon for subsistence use (Shelden et al. 2014). Many other households, which are not directly involved in catching salmon, participate by assisting family and friends with cutting, drying, smoking, and associated preservation activities (salting, canning, and freezing). Studies conducted by the Division of Subsistence indicate that fish contribute as much as 85% of the total pounds of fish and wildlife harvested in a community annually, and salmon as much as 53% of the total annual harvest (Coffing 1991). Harvest of salmon for subsistence use is as much as 650 pounds per capita in some Kuskokwim River communities (Coffing et al. 2001).

Alaska Statute Title 16.05.258, *Subsistence Use and Allocation of Fish and Game*, establishes the subsistence use priority for reasonable harvest opportunity consistent with sustained yield, when resources are not abundant enough to provide for all consumptive uses. In 1993, the BOF made a positive finding for customary and traditional use for all salmon in the entire Kuskokwim Area (Appendix A1). In 2001, ADF&G recommended that the BOF amend 5 AAC 01.286 to include a finding of the amounts reasonably necessary for subsistence (ANS) for the Kuskokwim Area using subsistence harvest data through 1999. During the 2013 BOF meeting the ANS ranges for the Kuskokwim Area were revised to 67,200–109,800 Chinook salmon; 41,200–116,400 chum salmon; 32,200–58,700 sockeye salmon; 27,400–57,600 coho; and 500–2,000 pink salmon *O. gorbuscha*, based on data from 1990 to 2011. The ANS range for District 4 (Quinhagak) and District 5 (Goodnews Bay) is 6,900–17,000 salmon, and the remainder of the Kuskokwim Area is 12,500–14,400 salmon.

The subsistence salmon fishing season is open unless a subsistence fishing closure is needed for conservation purposes (5 AAC 07.365), or when closures to the fishery are implemented by emergency order prior to, during and after commercial fishing periods (5 AAC 01.260). Salmon may be taken for subsistence purposes by gillnet, beach seine, hook and line attached to a rod or pole, hand line, or fish wheels subject to restrictions (5 AAC 01.270). Additionally, salmon may be taken by spear in the Holitna, Kanektok, Arolik, and Goodnews Bay drainages. The aggregate

length of set or drift gillnets in use by any individual for the taking of salmon for subsistence purposes may not exceed 50 fathoms. The maximum depth of gillnets with 6.0 in or smaller mesh is 45 meshes in depth but gillnets with greater than 6.0 in mesh may not be more than 35 meshes in depth.

Cooperative Management Process

The Kuskokwim River Salmon Management Working Group (Working Group) was formed in 1988 by the BOF in response to requests from stakeholders in the Kuskokwim River that sought a more active role in the management of salmon fishery resources (Francisco et al. 1989). The Working Group has become the forum through which inseason management decisions are made regarding Kuskokwim River subsistence, commercial, and sport salmon fisheries. Working Group representative participation in meetings in Bethel and outside the Kuskokwim River drainage allows for an exchange of information between members and fishery assessment project leaders and research planners. Representatives are also able to testify at regulatory meetings in support of Working Group positions. The relationship among Working Group members, project leaders, research planners, and policy makers continues to be fostered, and these interactions are critical to the Working Group process. This relationship ensures that stakeholders remain up-to-date on new information and maintain their direct involvement in the management of the fishery.

The Working Group met 12 times in 2013. During these meetings, fishery management information was presented by Working Group members, State and Federal staff, Tribal organizations, fishery partners, and the public (Bailey and Shelden 2014). The Working Group discussed subsistence and commercial fishing reports from members and the public, the lower Kuskokwim River inseason subsistence harvest report (Chavez and Shelden 2014), test fishery project summaries, and reports from weir, tagging, sonar, and aerial survey programs.

FEDERAL SUBSISTENCE PROGRAM

The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 provides a priority for rural Alaska residents for taking fish and wildlife on Federal public lands and called for creation of regional advisory councils (RAC) to provide rural residents' input into the Federal Subsistence Program. On October 1, 1999, the Secretaries of Interior and Agriculture published regulations to expand Federal involvement in subsistence fisheries to waters in which the Federal government claims a federal reserved water right (applicable waters). The Secretary of Interior and the Secretary of Agriculture delegated their authority in Alaska to the Federal Subsistence Board (FSB) to ensure rural residents receive a priority for subsistence taking on Federal public lands and applicable waters. Federal subsistence fishing regulations are adopted by the FSB. RACs provide recommendations and information to the FSB, review policies and management plans, provide a public forum and deal with other matters relating to subsistence uses. The FSB may close fishing for other uses on Federal public lands and applicable waters if necessary to ensure a priority for federally qualified rural subsistence users.

Federal subsistence fishing schedules, openings, closings, and fishing methods are established in regulation (Department of Interior 36 CFR Part 242 and 50 CFR Part 100). In general, these regulations are the same as those issued for the subsistence taking of fish under Alaska Administrative Code; however, differences in regulations do exist in some cases. For example, subsistence fishing is closed for a set amount of time before, during, and after commercial fishing periods under Federal regulations, but it is handled by emergency order under State regulations.

SUBSISTENCE SURVEY

ADF&G conducts annual household surveys to collect information about the harvest and use of salmon in the Kuskokwim Area (Appendices A6–A9). ADF&G has developed methods to estimate total subsistence harvest annually and collaborates with local tribal organizations including the ONC in Bethel and KNA in Aniak to complete the annual postseason harvest surveys (Shelden et al. 2014). Subsistence surveys have been aimed at primarily gathering data on the harvest and use of Chinook, chum, sockeye, and coho salmon. Pink salmon are harvested in the Kuskokwim Area; however, they are generally available only during even-numbered years. Data for subsistence pink salmon harvests have not been consistently collected during the annual fall survey efforts. Data collected on pink salmon since 2008 are provided in annual subsistence reports (Shelden et al. 2014).

RUN STRENGTH INDICATORS

Salmon managers require timely inseason assessment of salmon run abundance. In the Kuskokwim River, escapement projects provide limited utility in this regard because of the great distances between the areas of harvest and the project locations (Appendix A5). Consequently, managers rely on the Bethel test fishery, commercial catch statistics, and informal reports from subsistence and sport fishermen to augment escapement data.

In the Kuskokwim Bay, escapement monitoring projects are much closer to the commercial fishing districts, so escapement data can be more effectively used for inseason management of the subsistence and commercial fisheries. Managers also make use of commercial catch statistics and information from subsistence and sport fishermen. Catch statistics are especially important in District 4 where reliable escapement monitoring has been historically lacking.

Bethel Test Fishery

Daily inseason assessment of Kuskokwim River relative salmon run strength and timing is available from a drift gillnet test fishery operated near Bethel. The BTF is located at river mile 80 of the Kuskokwim River, which is the midpoint of District 1 (Figure 2). The project began in 1984 and the methodology has remained largely unchanged (Bue and Brazil 2012). From early June through late August the test fish crew conducts 3 or 4 systematic gillnet drifts beginning 1 hour after high tide. The drifts are done at 3 stations distributed across the width of the channel. Each drift is 20 minutes in duration. Two 50-fathom gillnets are used, 1 net is hung with 5.375 in mesh web and the other with 8 in mesh. The 2 gillnets are rotated between the 3 stations following a systematic schedule. Both mesh sizes are operated from early June through about July 15 when Chinook, sockeye, and chum salmon all occur in relatively high abundance. The 8.0 in mesh is discontinued after July 15 when Chinook salmon abundance diminishes. Test fishing with the 5.375 in mesh continues until August 24. Historical harvest information from BTF can be found in Appendix B9.

Beginning in 2012, the BTF was used as a platform for a sockeye salmon mark and recapture genetics project. This project included the use of a 50-fathom gillnet hung with 4.0 in mesh web. This net was fished after the other 2 gillnets within the test fishery. Sockeye salmon that were captured in the 4.0 in mesh gillnet were then kept separate from all the other catch and sampled as their own group. Results of this project are not yet available.

The test fishery catch from each tide is tallied by species and distributed to charities or sold to a local fish buyer. Catch statistics for Chinook, sockeye, chum, and coho salmon are presented as daily CPUE data. Comparisons are made with test fishery results from previous years and relationship to escapement projects to assess relative abundance and run timing. The comparisons are subjective in that managers need to consider variables such as water level, fishing patterns, and changing river morphology when comparing data from between years, and even within years.

Historically, other test fisheries have been attempted in the Kuskokwim River: Kwegooyuk test fishery, 1966–1983 (Baxter 1970; Huttunen 1984); Eek test fishery, 1988–1994; Kuskokwim River subsistence test fishery, 1988–1990 (Kuskokwim Fishermen's Cooperative, 1991); Aniak test fishery, 1992–1995; Chuathbaluk test fishery, 1992–1993; and the Lower Kuskokwim River test fishery, 1995. Most of these projects were initiated at the prompting of groups other than ADF&G. They were all eventually discontinued for a variety of reasons including lack of funding, consistency problems, difficulties with catch disposition, and ambiguous results.

Inseason Subsistence Catch Monitoring

Inseason interviews of subsistence fishermen have been conducted in the Bethel area by Orutsararmiut Native Council (ONC) technicians, in cooperation with ADF&G since 2001. The Fisheries Information Services (FIS) Division of the U.S. Fish and Wildlife Service (USFWS) Office of Subsistence Management (OSM) provides funding for this cooperative program under the *Kuskokwim River Salmon Inseason Subsistence Catch Monitoring* project (FIS 10-354; Chavez and Shelden 2014). Information from the interviews, in combination with other fisheries information, is used to assess salmon run timing and relative abundance. Additionally, this program provides timely insight into the progress of the subsistence fishery, a relative index of catches based on those interviewed, and allows an avenue for local user input into the management process. Summaries of interview responses are presented to the Working Group, throughout the subsistence fishing season (Bailey and Shelden 2014). Fishery managers and the Working Group use these summaries in the decision-making process for the Kuskokwim River subsistence and commercial salmon fisheries.

2013 COMMERCIAL SALMON FISHERY

A total of 333,974 salmon were commercially harvested in the Kuskokwim Area (Table 1). A total of 469 individual permit holders (each making at least 1 recorded landing) participated in area fisheries, which had an estimated exvessel value of $2,399,035. The exvessel value was approximately 49% above the most recent 10-year average value (Table 1).

Kuskokwim River

The District 1 commercial fishing season began on July 16 and ended on August 23 with a total of 11 commercial fishing periods (Tables 2 and 3). The initiation of the commercial fishery was delayed until the majority of the Chinook salmon run had passed through the district to ensure ongoing Chinook salmon conservation. As a result, commercial fishing occurred after the peak of the sockeye and chum salmon runs had passed through the district, resulting in below average catches. Only Subdistrict 1-B was open to commercial salmon fishing. On average 226 permit holders participated in each commercial fishing opening. Chinook salmon catches were low because commercial fishing was delayed to minimize incidental harvest. Coho salmon catch rates ranged from below average to above average throughout the commercial fishing season.

The District 1 commercial harvest was 1 Chinook, 768 sockeye, 52,235 chum, and 114,069 coho salmon (Tables 1 and 3). An additional 173 Chinook salmon were harvested during the commercial fishery and reported on fish tickets as retained for personal use because the buyers agreed not to purchase Chinook salmon due to the poor run. These fish are included in subsistence harvest through the postseason subsistence harvest survey methodology. Chum salmon harvest was similar to the most recent 10-year average (2003–2012). Chinook, sockeye, and coho salmon harvests were below the most recent 10-year average. Total exvessel value of the fishery was $1,184,847; approximately 101% above the most recent 10-year average value (Table 1; Appendix B2). A total of 378 individual permit holders recorded landings in District 1 during the 2013 season (Table 3), which is similar to the most recent 10-year average of 383 permit holders (Appendix A3).

Kuskokwim Ba y

The District 4 (Figure 4) commercial salmon fishing season opened July 2 and ended on August 23. There were 18 commercial fishing periods within that time frame (Table 4). The commercial fishing season was delayed from the normal start of June 15 due to concerns for Chinook salmon abundance and subsistence fishing reports of late run timing. On July 2, sockeye salmon harvest greatly exceeded Chinook salmon harvest and by regulation management was directed towards sockeye salmon, which allows for 3 periods per week. However, fishing periods were reduced from 3 periods per week to 2 periods per week during the first 2 weeks of July for Chinook salmon conservation. Additionally, fishing periods were again reduced to 2 periods per week during the first 2 weeks of August because of below-average catches and catch rates of coho salmon in the commercial fishery. Subsistence fishing was closed 8 hours before, during, and 4 hours after commercial fishing periods.

A total of 2,054 Chinook, 26,393 sockeye, 21,126 chum, and 58,079 coho salmon were commercially harvested in District 4 (Table 4). Chinook, sockeye, and coho salmon catch rates were below average. Catch rates for chum salmon were average. Chum salmon harvest was approximately 2% below the most recent 10-year average (2003–2012). Chinook, sockeye, and coho salmon harvests were below the most recent 10-year averages (86%, 64%, and 54% respectively; Appendix C2). The Chinook salmon harvest was the lowest since 1967. Chinook, sockeye, chum, and coho salmon were all purchased for $1.00 per pound. Total exvessel value of the fishery was $761,537; approximately 1% below the most recent 10-year average value (Table 1). A total of 197 individual permit holders (making at least 1 recorded landing) participated in the commercial fishery.

The District 5 commercial fishing season began on June 29 and ended on August 23. There were 21 commercial fishing periods. Subsistence fishing was closed 8 hours before, during, and 4 hours after commercial fishing periods. The District 5 open waters were reduced during the early part of the 2013 commercial fishing season to aid in the conservation of Chinook salmon. Analysis of harvest patterns the previous 2 years indicated a higher harvest of Chinook salmon in the eastern portion of the district, closer to the mouth of Goodnews River, compared to the western portion of the district near the entrance to the bay. A temporary boundary line was put in place from approximately Big Beluga on the north side of the bay to Little Beluga on the south side, with that portion of the district east of this line closed to commercial fishing (Figure 5). During the first 4 commercial fishing periods, when the reduced waters were in effect, the Chinook salmon harvest and catch rates were very low. For the next 2 commercial periods, ADF&G reopened the full district and the Chinook salmon harvest and catch rates were

substantially higher than the first 4 periods. With this information and a low Chinook salmon escapement at the Middle Fork Goodnews River weir, ADF&G reduced the open waters again for the next 2 commercial fishing periods (Table 5). This management action was effective for the conservation of Chinook salmon and still allowing for harvest of sockeye and chum salmon.

A total of 495 Chinook, 24,521 sockeye, 12,651 chum, and 21,582 coho salmon were commercially harvested in District 5 (Table 5). Chinook and sockeye salmon catch rates were below average. Catch rates for chum salmon were average and coho salmon catch rates were above average. Coho salmon harvest was approximately 42% above the most recent 10-year (2003–2012) average. Chinook and sockeye salmon harvests were below the most recent 10-year averages (75% and 24% respectively; Appendix D2). The Chinook salmon harvest was the lowest since 1972. Chum salmon harvest was similar to the most recent 10-year average. Chinook, sockeye, chum, and coho salmon were all purchased for $1.00 per pound. Total exvessel value of the fishery was $452,651; which is approximately 68% above the most recent 10-year average value (Table 1). A strong return of coho salmon to District 5 resulted in the highest exvessel value for that species, since 1994. Chinook salmon exvessel value was the lowest since 2002 (Appendix D3). A total of 71 individual permit holders (making at least 1 recorded landing) participated in the fishery.

2013 SUBSISTENCE SALMON FISHERY

The 2013 preseason Chinook salmon forecast was 160,000–240,000 fish, which was below the average total run of 260,000 fish. The drainagewide SEG is 65,000–120,000 Chinook salmon. Average subsistence harvest is approximately 84,000 Chinook salmon. If the run came back as forecast, then there would have been enough Chinook salmon to provide for escapement and subsistence uses. Therefore, subsistence fishing in the mainstem of the Kuskokwim River was allowed with no restrictions at the start of the season.

However, in 2012, the Kuskokwim River experienced the lowest estimated total run on record of 99,800 fish. In 2010, the Kuskokwim River experienced the lowest estimated spawning escapement of Chinook salmon on record, 49,000. In 2011, the Kwethluk and Tuluksak rivers did not meet Chinook salmon SEGs for the fourth and fifth consecutive years, respectively. The George River had not met its SEG in 3 of the past 4 years. In 2011, aerial survey indices on Aniak River tributaries, Kipchuk, and Salmon rivers were among the lowest on record. Based upon recent low runs of Chinook salmon, conservation measures were warranted in tributaries with specific conservation concerns in an effort to meet escapement goals in 2013.

The following preseason management actions were jointly recommended by the ADF&G and the USFWS. These actions were effective from June 1 to July 25 in an effort to achieve Chinook salmon escapement goals. The Working Group voted unanimously to support the joint recommendation.

Subsistence Chinook salmon fishing with hook and line gear was closed and subsistence fishing was restricted to the use of gillnets with 4.0 in or less mesh not to exceed 60 ft in the following waters of the Kuskokwim River drainage:

- The Kwethluk River drainage including its confluence with Kuskokuak Slough and downstream to ADF&G regulatory markers located at the downstream mouth of the slough.

- The Kasigluk and Kisaralik river drainages including Old Kuskokuak Slough to ADF&G markers at the confluence of Old Kuskokuak Slough with Kuskokuak Slough.
- The Tuluksak River drainage including its confluence with the Kuskokwim River and downstream approximately 1 mile to ADF&G regulatory markers.
- The Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River.

Under the management plan, during subsistence salmon fishing closures, 4.0 in or less mesh size gillnets not to exceed 60 ft in length are allowed to harvest non-salmon species such as whitefish, northern pike, and burbot (lush).

During the June 11 Working Group meeting a joint recommendation, from ADF&G and the Federal Inseason Manager and supported unanimously by the Working Group, to maintain the existing subsistence salmon fishing restrictions on the tributaries and keep subsistence salmon fishing open in the mainstem to all gear types and unrestricted gillnet mesh size. BTF CPUE of Chinook salmon indicated late run timing. The first Chinook salmon was caught at BTF on June 8 and catches continued each day through June 10. Subsistence fishermen in the lower Kuskokwim River were reporting good catches.

During the June 19 Working Group meeting a joint recommendation from ADF&G and the Federal Inseason Manager was to maintain the existing subsistence salmon fishing restrictions on the tributaries and to keep subsistence salmon fishing open in the mainstem to all gear types and unrestricted gillnet mesh size. Data from BTF indicated that Chinook salmon escapement goals would probably be met. The cumulative index to date was in excess of the threshold (Appendix B8). Preseason, the BTF cumulative CPUE season total threshold was set at 276 or more, which equates to exceeding the lower bound of the escapement goal. The Working Group voted unanimously to support the recommendation.

During the June 26 Working Group meeting, ADF&G and the Federal Inseason Manager presented a recommendation to restrict gillnet mesh size to 6.0 in or less mesh size and close hook and line Chinook salmon fishing from the mouth of the Kuskokwim River to Tuluksak for a 6 day period (June 28 through July 3) and from Tuluksak to Chuathbaluk for a 4-day period (July 3 through July 6). ADF&G and USFWS also recommended maintaining subsistence salmon fishing restrictions on Kuskokwim River tributaries. Data from BTF indicated that Chinook salmon escapement goals would probably be met; however, projections were near the lower end of the drainagewide SEG. BTF indicated increasing abundance of sockeye and chum salmon at that time. Given the uncertainty of inseason run assessment, it was warranted to restrict gillnet mesh size to 6.0 in or less to conserve Chinook salmon and provide harvest opportunity on more abundant sockeye and chum salmon. The Working Group voted unanimously to support the recommendation.

During the July 2 Working Group meeting ADF&G, USFWS, and the Working Group discussed several different options for extending the restrictions. At the end of the meeting, an agreement was reached to extend gillnet mesh size restrictions and Chinook salmon hook and line closures for 6 additional days (July 3–July 9) from the mouth of the Kuskokwim River to Tuluksak and 8 additional days (July 6–July 14) from Tuluksak to Chuathbaluk. Subsistence salmon fishing restrictions on the tributaries were maintained. Data from BTF indicated that Chinook salmon escapement goals would probably be met; however projections were near the lower end of the drainagewide SEG. BTF indicated high abundances of sockeye and chum salmon. Given the uncertainty of inseason run assessment, it was warranted to extend restrictions to gillnet mesh

size to 6.0 in or less to conserve Chinook salmon and provide harvest opportunity on more abundant sockeye and chum salmon.

The Chinook salmon run ended earlier than expected as shown by BTF cumulative CPUE information (Appendix B7). The BTF cumulative CPUE was the lowest among the comparable years 2008–2013 (Appendix B8). Postseason run reconstruction of escapement and harvest data estimated the 2013 run to be the lowest run on record. In retrospect, the BTF threshold developed to achieve the minimum drainagewide escapement goal was much too low. Fishermen were informed after the season that the 2014 Chinook salmon run would be managed more conservatively at the start of the run and there would be discussions about specific restrictions and management options at meetings prior to the next fishing season. Except for closures around commercial fishing periods, subsistence salmon fishing was open with unrestricted gillnet mesh size and all other legal gear types from July 15 through the remainder of the salmon fishing season, except for specific tributary fishing closures and gear restrictions initiated on June 1 through July 25 noted above. Subsistence salmon fishing was closed by emergency order 6 hours before, during, and 3 hours after commercial fishing periods. In 2013, all commercial fishing periods occurred in Subdistrict 1-B (below Bethel); therefore subsistence salmon fishing closures were in effect from the upper end of Straight Slough downstream to the mouth of the Kuskokwim River.

SUBSISTENCE HARVEST

Subsistence harvests of salmon remained relatively stable from 1990 to 2011 (Table 6); however, the 2012 Chinook salmon harvest declined as a result of a poor run and subsistence salmon fishing restrictions (Appendices A6–A9 and B3). The 2013 total subsistence salmon harvest estimates for the Kuskokwim Area were 50,708 Chinook, 42,834 sockeye, 55,828 chum, and 28,295 coho salmon (Table 7; Appendices A6–A9; Shelden et al. 2014). The Chinook salmon subsistence harvest was 36% below the most recent 10-year (2003–2012) average. The majority of the reduced harvest occurred in the middle and upper Kuskokwim River as the result of a poor run and substantial subsistence fishing restrictions. The sockeye harvest was average, with the coho and chum salmon harvests being 25% and 12% below the recent 10-year average, respectively. Residents of communities in the lower Kuskokwim River (from Tuluksak downstream to Eek), took 80% of the subsistence salmon harvest. The lower river communities are relatively densely populated, with approximately 76% of the total number of households in the Kuskokwim Area.

ESCAPEMENT

The large size, remoteness, and geomorphic diversity of the Kuskokwim Area present challenges to monitoring salmon escapements and assessing salmon run abundance. For the past 2 decades, efforts have been taken to expand coverage and apply new technologies toward the goal of improving estimation of salmon run timing and run strength monitoring by comparison of current year to historic information. Aerial spawning ground surveys have been the most cost-effective means of monitoring salmon escapements. The more thorough projects such as weirs, counting towers, and sonar have been operated in only a few locations because of costs and limited budgets. Since 2000, the number of escapement projects in the Kuskokwim Area has increased through cooperative partnerships with federal agencies and local organizations (Appendix A5). These cooperative efforts have added substantially to our ability to monitor salmon escapements and to evaluate the effectiveness of management actions postseason.

There are currently 25 established escapement goals on tributaries of the Kuskokwim River: 14 Chinook, 3 chum, 3 coho, and 4 sockeye salmon goals (Appendices B10–B14, C9, and D8–D9). Comprehensive reviews of escapement data for most Kuskokwim Area goals are conducted in unison with the Kuskokwim Area BOF cycle. The most recent review was done in the later part of 2012 for the 2013 BOF meeting (Conitz et al. 2012). A new drainagewide SEG for Kuskokwim River Chinook salmon of 65,000–120,000 fish was established. There were 3 revisions to existing weir-based escapement goals. The George River Chinook salmon SEG was revised from 3,100–7,900 fish to 1,800–3,300 fish. The Kogrukluk River Chinook salmon SEG was revised from 5,300–14,000 fish to 4,800–8,800 fish. The Kwethluk River Chinook salmon SEG was revised from 6,000–11,000 fish to 4,100–7,500 fish. These revisions were constructed in concert with the spawner-recruit analysis used to establish the drainagewide SEG for Chinook salmon. In addition, the Tuluksak River weir Chinook salmon SEG and the Kanektok River aerial survey chum salmon SEG were discontinued.

Throughout the Kuskokwim Management Area in 2013, chum salmon escapement was average whereas sockeye and coho salmon escapements were below average and Chinook salmon escapement was poor. Sockeye, chum, and coho salmon escapements goals were achieved in all systems with established goals. Chinook salmon escapements at tributary weirs were the lowest on record at all projects. Chinook salmon escapements were below the escapement goals in all 3 systems with weir based escapement goals and only 2 of 9 aerial survey escapement goals were achieved. However, operational difficulties at Kwethluk River weir resulted in an estimated passage count. The newly established drainagewide escapement goal was also not achieved (Kevin Schaberg, Commercial Fisheries Biologist, ADF&G, Anchorage; personal communication).

2013 ESCAPEMENT ASSESSMENT

Numerous escapement assessment projects exist throughout the Kuskokwim River drainage and Kuskokwim Bay drainages (Figure 6). Below is a summary of salmon escapement at each project for 2013. Please refer to Hansen and Blain (2014) for specifics such as methods, daily passage counts, climate and hydrological information, and escapement age, sex, and length (ASL) information. The *AYK Database Management System* contains historical as well as current ASL information from the various escapement monitoring projects (past and present), as well information from the area commercial and subsistence harvests: (http://www.adfg.alaska.gov/CommFishR3/WebSite/AYKDBMSWebsite/Default.aspx).

Kuskokwim River

Kwethluk River weir

The Kwethluk River weir experienced some operational difficulties. Estimates of escapements provided by USFWS are 844 Chinook, 746 sockeye, and 22,380 chum salmon. The operational period for the weir was June 25–August 16. Escapement estimates for coho salmon are incomplete because the project did not operate through the entire coho salmon run. (Appendices B10 and B12–B14; Miller and Harper 2014a).

Tuluksak River weir

Tuluksak River weir salmon escapements included 193 Chinook, 394 sockeye, 12,911 chum, and 6,490 coho salmon during the June 24–September 10 operational period (Appendices B10 and B12–B14; Miller and Harper 2014b).

Salmon River weir

Salmon River weir salmon escapements included 625 Chinook, 966 sockeye, 7,723 chum, and 2,797 coho salmon during the June 15–September 20 operational period (Appendices B10 and B12–B14; Hansen and Blain 2014). The Chinook, sockeye, chum, and coho salmon escapements were all below average.

George River weir

George River weir salmon escapements included 1,292 Chinook, 150 sockeye, 37,879 chum, and 15,308 coho salmon during the June 15–September 20 operational period (Appendices B10 and B12–B14; Hansen and Blain 2014). The Chinook salmon escapement in 2013 was below the SEG range of 3,100–7,900 fish.

Kogrukluk River weir

Kogrukluk River weir escapements included 1,819 Chinook, 7,808 sockeye, 65,644 chum, and 21,207 coho salmon during the June 26–September 20 operational period (Appendices B10 and B12–B14; Hansen and Blain 2014). The Chinook salmon escapement was the lowest on record since the project was initiated in 1976 and the goal of 4,800–8,800 was not met. The escapement goals for sockeye and coho salmon were achieved, and the escapement goal for chum salmon was exceeded.

Tatlawiksuk River weir

Tatlawiksuk River weir escapements included 495 Chinook, 32,249 chum, and 12,764 coho salmon during the June 15–September 20 operational period (Appendices B10 and B12–B14; Hansen and Blain 2014). The chum salmon escapement was below average, and coho salmon escapement was above average. The Chinook salmon escapement was the lowest on record.

Takotna River weir

Takotna River weir escapements included 97 Chinook, 6,465 chum, and 4,026 coho salmon during the June 24–September 20 operational period (Appendices B10, B13, and B14; Hansen and Blain 2014). The chum salmon escapement was above average, and the Chinook and coho salmon escapements were below average.

Telaquana River weir

Telaquana River sockeye salmon escapement was 28,050 sockeye during the July 3–August 26 operational period (Appendix B12; Hansen and Blain 2014). This was the fourth year of operation for this project.

Kuskokwim Bay

Kanektok River weir

The Kanektok River weir escapements included 3,569 Chinook, 128,761 sockeye, and 43,040 chum salmon during the June 25–August 15 operational period (Appendix C8; Taylor 2014b). Escapement estimates for coho and pink salmon are incomplete because the project does not operate through the entire coho and pink salmon runs. No formal escapement goals for any species have been established at the weir. The escapements for Chinook, sockeye, and chum salmon were below average.

Middle Fork Goodnews River weir

The Middle Fork Goodnews River weir escapements included 1,168 Chinook, 23,029 sockeye, and 27,673 chum salmon during the June 25–September 18 operational period (Appendix D8; Taylor 2014a). The Middle Fork Goodnews River weir was plagued by high water in the later part of the 2013 season and a large portion of the coho salmon escapement was missed. Chinook salmon escapement was below the biological escapement goal (BEG) of 1,500–2,900 fish, and escapements of sockeye, chum, and coho salmon achieved their respective escapement goals.

AERIAL SURVEYS

Aerial survey based escapement goals do not represent the entire spawning populations in the respective streams. The surveys are conducted 1 time each season during a window of time when the maximum numbers of fish are expected to be on the spawning grounds. The escapement goals developed from these surveys are based on the raw, unexpanded counts; therefore, each count serves as an index of abundance rather than a complete census.

Aerial surveys are generally conducted on clear water streams, lakes, and coastal streams throughout the KMA. Tributaries in the middle and upper Kuskokwim River are often stained from organics or clouded by glacier runoff, both of which markedly reduce the visibility of fish. Aerial surveys are best directed at indexing spawning populations of Chinook and sockeye salmon because these fish are typically more visible than chum and coho salmon.

Kuskokwim River

Lower Kuskokwim River

Aerial surveys for Chinook salmon were conducted on lower river tributaries (Figure 7) in 2013. Weather and stream conditions in the lower river were generally rated as fair to good with all 4 tributaries having quality survey data. An SEG range of 400–1,200 Chinook salmon has been established for the Kisarolik River and the 2013 survey was within the range with 597 fish (Appendix B11).

Middle Kuskokwim River

Aerial surveys for Chinook salmon were conducted on the Aniak, Kipchuck, Salmon, Holokuk, Holitna and Oskawalik rivers in 2013 (Figure 7; Appendix B11). Escapement goals have been established for Aniak, Salmon, and Holitna rivers. Good survey conditions allowed staff to fly all of the systems in this section of the drainage. Index estimates from the Middle Kuskokwim River tributaries were well below average and the established SEGs were not met in the Aniak (754 fish observed), Salmon (154 fish observed), and Holitna Rivers (670 fish observed; Appendix B11).

Upper Kuskokwim River

Aerial surveys were conducted on the Gagarayah, Cheeneetnuk, and Salmon (Pitka Fork) rivers in 2013 (Figure 7; Appendix B11). Aerial survey SEGs have been established for Gagarayah, Cheeneetnuk, and Salmon rivers. Both the Gagarayah and Cheeneetnuk rivers were below their respective SEGs with 74 and 138 fish observed, respectively. The Salmon River aerial survey SEG was met with 475 fish observed (Appendix B11).

Kuskokwim Bay

Kuskokwim Bay

An aerial survey was flown on the Kanektok River (Figure 8) on July 30, 2013. The Kanektok River aerial Chinook salmon survey SEG range of 3,500–8,000 was not achieved with 2,346 fish observed, and the sockeye salmon SEG range of 14,000–34,000 was exceeded with 64,802 fish observed (Appendix C9). An aerial survey was not flown on the North Fork Goodnews River (Figure 9) in 2013, due to adverse weather conditions. Historical aerial survey counts can be found in Appendix D9.

KUSKOKWIM HERRING FISHERY

MANAGEMENT AREA

The Kuskokwim Management Area includes all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula (lat 60°58.17′N, long 165°11′W) to 3 miles seaward as well as the waters surrounding Nunivak and St. Matthew Islands to 3 miles seaward (5 AAC 27.870) (Figure 10). This area supports 5 Pacific herring *Clupea pallasii* commercial gillnet sac roe districts and a significant subsistence herring fishery.

The Security Cove District includes all waters between the latitude of Cape Newenham and the latitude of the Salmon River (lat 58°51.83′N).

The Goodnews Bay District includes the waters of Goodnews Bay east of a line between the north spit (lat 59°03.58′N, long 161°49.17′W.) and south spit (lat 59°02.92′N, long 161°49.08′W) at the mouth and west of a line between Ukfigag Creek (lat 59°04.17′N, long 161°36′W) and Tunulik River (lat 59°00.08′N, long 161°00.37′W).

The Cape Avinof District consists of all waters landward of Kikegtek, Pingurbek and Kwigluk Islands from the longitude of Ishkowik River (long 162°44′W) to the latitude of the Tern Mountain (lat 60°42′N).

The Nelson Island District consists of all waters north of Chinigyak Cape (lat 60°27′N) and east of Atrnak Point (long 165°15′W), and all waters north of Talurarevuk Point (lat 60°35′N) and south of the southernmost tip of Chinit Point (lat 60°36′N) and east of long 165°30′W and all waters north of the northernmost tip of Chinit Point (lat 60°37′N) and south of Kigigak Island (lat 60°49′N) and east of long 165°30′W.

The Nunivak Island District includes all waters extending 3 miles seaward of mean low water along the northern, eastern, and southern sides of Nunivak Island from Kikoojit Rocks (lat 60°20′N, long 166°40′W) to Cape Mendenhall (lat 59°45.17′N, long 166°07′W) (5 AAC 27.875).

FISHERY MANAGEMENT

The *Bering Sea Herring Fishery Management Plan* (5 AAC 27.060) requires minimum spawning biomass thresholds for each district before commercial fishing. The thresholds are as follows: Security Cove, 1,200 tons; Goodnews Bay, 1,200 tons; Cape Avinof, 500 tons; Nelson Island, 3,000 tons; and Nunivak Island, 1,500 tons. This plan sets the maximum exploitation rate at 20% of the estimated spawning biomass for Security Cove, Goodnews Bay, Nunivak Island, and Nelson Island. Other regulations further reduce the maximum allowable exploitation rate in the Cape Avinof District to 15% of the estimated available biomass and directs management in

the Nelson Island District to include 200 tons of the 20% exploitation rate for subsistence (5 AAC 27.895).

All commercial herring fisheries are opened and closed by emergency order for an orderly fishery and to allow periodic assessment of herring biomass. ADF&G attempts to harvest stocks in good condition (large volume, increasing abundance, good recruitment) at the upper end of the exploitation range (15–20%). Stocks in poor condition (small volume, decreasing abundance, poor recruitment) are exploited at lower than maximum rates (0–15%).

Commercial Fishery Overview

The Kuskokwim Area commercial herring fishery was initiated in 1977 in Security Cove and Goodnews Bay districts with the first documented deliveries in 1978 in Security Cove District and 1979 in Goodnews Bay District. In 1978 purse seines were allowed in Security Cove District, however, since that time the fishery has been limited to gillnet. Spawn-on-kelp fisheries were prohibited in 1978 before fisheries were established. Initially these fisheries were managed through open seasons and guideline harvest levels. In 1981, emergency order authority was established to provide for an orderly fishery and periodic assessments of herring biomass. A minimum threshold herring abundance of 800 to 1,000 metric tons or spawning activity was established before implementation of the fishery and the guideline harvest levels were established not to exceed 20% of estimated herring biomass. The length of gillnet was established at 100 fathoms. In 1986, the northern boundary of Security Cove was moved from Carter Spit south to the latitude of Salmon River (lat 58°52′N) to provide spatial separation between Security Cove and Goodnews Bay districts. By 1987 the minimum inseason biomass threshold was established at 1,200 tons and the Goodnews Bay District was designated a superexclusive use area by BOF limiting permit holder and vessel participation in the commercial fishery. In 1997, a moratorium on entry into the Goodnews Bay fishery was initiated limiting participation in the fishery to 182 permits. The Goodnews Bay superexclusive use area designation was later repealed by the BOF in 2004.

In 1985, commercial herring fishing was initiated in Nelson and Nunivak Island districts. Emergency order authority was established to open and close these fisheries to provide for an adequate subsistence harvest, and orderly commercial fishery, and to allow for periodic re-assessments of herring biomass. A minimum threshold herring abundance of 1,100–1,700 tons or spawning activity was established before implementation of the fishery with a guideline harvest level set at 10% of estimated returning biomass to provide protection for the subsistence fisheries. Gillnet length was limited to 100 fathoms. In 1986, the waters within Nelson Island District from Atranak Point and Talurarevuk Point, and the waters between the southern and northern edges of Chinit Point were closed by emergency order at the request of local governing groups to prevent interference with the subsistence fishery. By 1988, these waters were closed to commercial herring fishing by regulation. Beginning in 1987, mechanical shakers were eliminated in Nelson and Nunivak Island fisheries and vessel length was limited to 30 ft. Both districts were designated as combined superexclusive use areas. Implementation of the superexclusive use designation with vessel length restrictions and prohibition of mechanical shakers was in response to requests from fishermen living in communities adjacent to the fisheries. These fishermen believed it would be in the best interest of the fisheries to standardize equipment to help prevent over investment and to limit participation by allowing fishermen to only participate in 1 herring fishery (Whitmore et al. 2005).

The combined superexclusive use designation allows for fishermen holding permits for both Nunivak and Nelson Island fisheries to participate in commercial herring fisheries in both districts during the same season. In 1987, the minimum inseason biomass threshold was increased to 2,500 tons, and the commercial guideline harvest level was increased from 10% to a maximum of 15% of estimated biomass in both districts. In December 1997, the BOF adopted a proposal that raised the Nelson Island District harvest level to 20% of the available biomass minus 200 tons allocated for subsistence use and increased the commercial guideline harvest level to 20% of the estimated biomass for the Nunivak Island District. In 1987, the Commercial Fisheries Entry Commission (CFEC) initiated the first steps toward limited entry status in the Nelson Island and Nunivak Island districts and both districts were given limited entry status in 1990. In the winter of 2000, the BOF adopted regulations to allow for development of a cooperative herring purse seine fishery in Nunivak Island District and made the regulation permanent in 2001. In 2006, the Alaska Supreme Court determined that authorizing cooperative fisheries of any sort was beyond the BOF authority. Consequently, the management plan for gillnet and cooperative purse seine fishery in the Nunivak Island District was repealed by the BOF in 2006 (5 AAC 27.894).

In 1988, commercial herring fishing was initiated in the Cape Avinof District. A minimum threshold herring abundance of 500 tons or spawning activity was established before implementation of the fishery and a guideline harvest level was established not to exceed 15% of the estimated biomass. The commercial herring fishery established the use of gillnets up to 100 fathoms in length, mechanical shakers were prohibited, vessel length was limited to 30 ft, and a superexclusive use designation was established.

Kuskokwim Area herring fisheries developed rapidly in response to the relative strong market for herring sac roe. During 1981 to 1984, an average of 206 fishermen harvested 1,400 tons of herring with an average value of $477,000 in Security Cove and Goodnews Bay districts. Addition of Nelson and Nunivak Island fisheries in 1985 and the Cape Avinof fishery in 1988 resulted in an average of 442 fishermen harvesting an average of 2,200 tons of herring with an average value of $1.33 million during 1985 to 1989. During the 1990 and 1991 seasons, fishermen participation, harvest levels and values decreased in response to a decline in herring abundance caused by a lack of recruitment of younger age herring into the fishery. Additional year classes of herring began recruiting to the fishery in 1992. The fishery peaked in 1996 when 802 fishermen harvested over 5,000 tons of herring valued at $3.5 million. Although harvest levels remained high during 1997 to 1999 seasons, value declined. The trend in declining markets was followed by an annual reduction in effort and harvest levels which continued through the 2006 season, during which 32 fishermen harvested 390 tons of herring valued at $70,000. The decline in markets for herring sac roe continued with no commercial fishing occurring from 2007 through 2012.

2013 Commercial Herring Fishery

In 2013, there was a small market for Kuskokwim Area herring. Commercial fisheries were conducted in the Goodnews Bay, Cape Avinof, and Nelson Island districts. Typically the commercial herring fishery is conducted to achieve maximum roe content in the catch, but during the 2013 fishing season, roe content was not a factor in management. Over the course of 588 hours of fishing time, a total of 28 permit holders harvested approximately 646 tons of herring in the Goodnews Bay, Cape Avinof, and Nelson Island districts (Appendix E1). The

value of the catch ranged from approximately $53,000 in the Nelson Island district to $5,400 in the Cape Avinof district.

Subsistence Fishery

Subsistence fishing for Pacific herring in the northeastern Bering Sea is very important in villages of the Yukon-Kuskokwim River delta. Primarily residents of the coastal villages of Kwigillingok, Kongiganak, Kipnuk, Chefornak, Toksook Bay, Nightmute, Tununak, and Newtok participate in the subsistence fishery. Herring stocks utilized by the subsistence fishery are the same stocks targeted by the commercial fishery.

Subsistence harvest surveys occurred sporadically in Kuskokwim delta villages during 1975 to 1996 with surveys conducted annually in Nelson Island villages from 1985 to 1996. Subsistence survey results reflect harvest trends and reported catches represent minimum figures because not all area villages were surveyed and not all fishermen were contacted in those communities. No subsistence herring surveys have been conducted in the Nelson Island District since 1996 or in the Nunivak Island District since 1993. Available data suggest that Nelson Island villages harvest approximately 110 tons of herring annually (Burkey et al. 1998).

STOCK ASSESSMENT

The remoteness of the Kuskokwim Area herring fishing districts present challenges in assessing abundance, implementing fisheries, and monitoring escapement toward sustained yield fishery management. Although the fisheries typically occur in a northward progression, herring fishery and spawn timing is quite similar.

When the market conditions were strong and the Kuskokwim herring fishery was active, there was an intensive aerial survey program that included contracting a survey aircraft for the duration of the season. The pilot and observer would station out of field camps at the herring districts. Starting around 2004 this effort was reduced to flying opportunistic surveys with chartered aircraft from Bethel. Due to a lack of market interests in recent years, funding for herring assessment and management was reallocated to other programs. As a result surveys were not flown during the 2011 and 2012 seasons in any of the herring districts. In 2013, Coastal Villages Seafood's provided the necessary funding needed to conduct aerial surveys and test fishing within the Kuskokwim area.

As a result of the declining interest in the commercial sac roe herring market, the ADF&G test fishing program has been reduced from as many as 6 field camp projects in the 1990s to only 2 test fishing projects in 2010, and no test fishing projects were operated in 2011 or 2012.

If the herring market rebounds, aerial survey data collection methods will be similar to those used since 1978. Standard conversions of 1.52 tons/538 ft^2 (water depths less than 16 ft), 2.58 tons/538 ft^2 (water depths between 16 and 26 ft), and 2.83 tons/538 ft^2 (water depths greater than 26 ft) were used to convert estimated herring school surface areas to biomass.

Test fishing with variable mesh gillnets (VMG) is used to collect samples of herring to determine age, sex, size, and sexual maturity (ASL) of the run, and to note occurrence of other schooling fishes. This sampling program was important for determining herring stock status and for making biomass projections. The last year of data collection from the Goodnews Bay and Nelson Island Districts occurred in 2010. The last year of data collection from Security Cove District was in 2003, from the Cape Avinof District in 2001, and from the Nunivak Island District in 1999. If the

catch sampling program is reinstated in the future, in the absence of data from the Security Cove District, VMG data from Goodnews Bay is used to estimate the metrics for the Security Cove District. VMG data from Nelson Island has been used to estimate the metrics for the Nunivak Island and Cape Avinof districts.

2013 STOCK ASSESSMENT

GOODNEWS BAY DISTRICT

Aerial surveys of the Goodnews Bay District began May 14 with herring observed on the first flight. The largest observed biomass of herring was on May 15, with 4,054 tons (Table 8). The second highest biomass was observed on May 28, with 3,890 tons. With information from the May 15 aerial survey, the guideline harvest level (GHL) was set at 800 tons.

A total of 495 commercially caught herring were collected and sampled for AWL determination. Based on age-by-scale analysis, 87% of the fish were ages 7 years and older. Test fishing using VMG was also conducted in Goodnews Bay with 499 samples being collected. Minimum to maximum ranges of lengths and weights within age class of the herring sampled is presented in Appendix E4. Of those samples collected, approximately 70% were between the ages of 6 and 8 years old (Appendix E3). For a total age break out in comparison to the total estimated biomass, refer to Appendix E2.

CAPE AVINOF DISTRICT

Aerial surveys of the Cape Avinof District occurred on May 25 and June 6; however, survey conditions were poor and a biomass estimate was not obtainable.

NELSON ISLAND DISTRICT

Aerial surveys of the Nelson Island District began May 25 with no herring observed. The largest observed biomass of herring was on June 6 with 4,893 tons (Table 8).

A total of 484 commercial caught herring were collected and sampled for (AWL) determination. Based on age-by-scale analysis, 90% of the fish were ages 8 years and older. Test fishing using VMG was also conducted in Toksook Bay (Nelson Island District) with 157 samples being collected. Minimum to maximum ranges of lengths and weights within age class of the herring sampled is presented in Appendix E4. Approximately 56% of the herring sampled were between the ages of 6 and 8 years old (Appendix E3). For a total age break out in comparison to the total estimated biomass, refer to Appendix E2.

MISCELLANEOUS FISHERIES

Several species other than salmon, herring and halibut are used for commercial, subsistence, and recreation purposes in the Kuskokwim Management Area. They are inconnu or sheefish *Stenodus leucichthys*, whitefish *Coregonus* and *Prosopium*, char *Salvelinus*, burbot *Lota lota*, Arctic grayling *Thymallus arcticus*, northern pike *Esox lucius*, Arctic lamprey *Lampetra japonica*, rainbow smelt *Osmerus mordax* blackfish *Dallia pectoralis*, rainbow trout *Oncorhynchus mykiss*, lake trout *Salvelinus namaycush*, three-spine stickleback *Gasterosteus aculeatus*, nine-spine stickleback *Pungitius pungitius*, longnose sucker *Catostomus catostomus*, and Saffron or Tomcod *Eleginus gracilus*.

FRESHWATER COMMERCIAL

The commercial fishery has been sporadic, primarily harvesting whitefish and burbot for local markets. Some of the whitefish harvest occurs under the ice in the winter.

A permit from the CFEC is required. A permit from ADF&G to conduct commercial fisheries on whitefish, pike, smelt, burbot, and lamprey is also required. Those species may also be taken incidentally to commercial salmon fishing. There were no freshwater permits issued by the Bethel ADF&G office in 2013 for the Kuskokwim Area.

Stock Status

Limited ADF&G observations, advisory committee recommendations, and fishermen interviews give no indication of declining populations in most drainages. However, residents of Kasigluk, Atmautluak, and Nunapitchuk have expressed concerns that subsistence fishermen are overexploiting the whitefish stocks in Nunavakpak Lake (near Kasigluk).

SALTWATER COMMERCIAL

A poorly documented commercial fishery on Saffron or "Tomcod" *Eleginus gracilus* has occurred in the Kuskokwim Area for some time. These fish were surplus to subsistence needs and fishermen and local stores were, and often still are, unaware of the regulatory requirements. ADF&G has been trying to inform buyers and sellers of these requirements. Since 1988, ADF&G has had information on the sale of fish exported from the coastal villages to Bethel. Sales within the villages remain undocumented. No commercial landings were documented in 2013.

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TABLES AND FIGURES

Table 1.–Commercial salmon harvest and exvessel value by district, Kuskokwim Management Area, 2013.

	Chinook	Sockeye	Chum	Pink	Coho	Total
Lower Kuskokwim River, District W-1						
Fish	1	768	52,236	0	114,069	167,074
Pounds	6	5,226	346,288	0	833,327	1,184,847
Price	$1.00	$1.00	$1.00	$0.00	$1.00	
Value	$6	$5,226	$346,288	$0	$833,327	$1,184,847
Recent 10-yr Average 2003–2012						
Fish	2,853	12,982	53,077	2	165,437	234,351
Value	$24,371	$59,804	$90,407	$0	$409,836	$584,418
Quinhagak, District W-4						
Fish	2,054	26,393	58,079	0	21,126	107,652
Pounds	35,126	154,135	399,537	0	172,739	761,537
Price	$1.00	$1.00	$1.00	$0.00	$1.00	
Value	$35,126	$154,135	$399,537	$0	$172,739	$761,537
Recent 10-yr Average 2002–2011						
Fish	16,689	74,951	58,850	2	46,329	196,819
Value	$152,765	$324,978	$135,693	$0	$151,380	$944,947
Goodnews Bay, District W-5						
Fish	495	24,521	12,651	0	21,581	59,248
Pounds	8,546	169,318	89,455	0	185,332	452,651
Price	$1.00	$1.00	$1.00	$0.00	$1.00	
Value	$8,546	$169,318	$89,455	$0	$185,332	$617,766
Recent 10-yr Average 2002–2011						
Fish	2,020	32,356	12,553	1	15,134	62,064
Value	$19,044	$149,493	$31,270	$0	$59,473	$319,324
Kuskokwim Area Total						
Fish	2,550	51,682	122,966	0	156,776	333,974
Pounds	43,678	328,679	835,280	0	1,191,398	2,399,035
Price	$1.00	$1.00	$1.00	$0.00	$1.00	
Value	$43,678	$328,679	$835,280	$0	$642,091	$1,849,728
Recent 10-yr Average 2002–2011						
Fish	21,560	120,451	124,512	4	226,693	493,221
Value	$196,180	$534,275	$257,667	$1	$620,688	$1,848,986

Table 2.–Commercial and subsistence salmon fishing emergency order summary, Kuskokwim Management Area, 2013.

Kuskokwim River salmon					
EO number	Effective time	Effective date	Expiration time	Expiration date	EO description
3-S-WR-01-13	6:00 a.m	6/1/2013	6:00 p.m. Wednesday, July 25, 2013	7/25/2013	Tributary subsistence closures
3-S-WR-02-13	1:00 a.m	6/28/2013	11:00 p.m. Wednesday, July 3, 2013	7/3/2013	Section 1 & 2, subsistence restricted to 6-inch or less mesh size
3-S-WR-03-13	1:00 a.m	7/3/2013	11:00 p.m	7/6/2013	Section 3, subsistence restricted to 6-inch or less mesh size
3-S-WR-04-13	11:00 p.m	7/3/2013	11:00 p.m.	7/9/2013	Section 1 & 2, subsistence restricted to 6-inch or less mesh size
3-S-WR-05-13	11:00 p.m.	7/6/2013	11:00 p.m.	7/14/2013	Section 3, subsistence restricted to 6-inch or less mesh size
3-S-WR-06-13	12:00 a.m.	7/16/2013	11:59 p.m.	9/1/2013	Open commercial fishing
3-S-WR-07-13	6:00 a.m.	7/16/2013	11:59 p.m.	9/1/2013	Subsistence fishing closure during commercial fishing periods
3-S-WR-08-13	10:00 a.m.	7/16/2013	6:00 p.m.	9/8/2013	Commercial fishing period, W1-B 6 hrs with lower section extended 2 hrs
3-S-WR-09-13	10:00 a.m.	7/19/2013	4:00 p.m.	7/16/2013	Commercial fishing period, W1-B 4 hrs with lower section extended 2 hrs
3-S-WR-10-13	10:00 a.m.	7/23/2013	4:00 p.m.	7/23/2013	Commercial fishing period, W1-B 4 hrs with lower section extended 2 hrs
3-S-WR-11-13	10:00 a.m.	7/26/2013	4:00 p.m.	7/26/2013	Commercial fishing period, W1-B 4 hrs with lower section extended 2 hrs
3-S-WR-12-13	10:00 a.m.	7/30/2013	4:00 p.m.	7/30/2013	Commercial fishing period, W1-B 4 hrs with lower section extended 2 hrs
3-S-WR-13-13	10:00 a.m.	8/6/2013	4:00 p.m.	8/6/2103	Commercial fishing period, W1-B 4 hrs with lower section extended 2 hrs
3-S-WR-14-13	10:00 a.m.	8/10/2013	4:00 p.m.	8/10/2013	Commercial fishing period, W1-B 4 hrs
3-S-WR-15-13	10:00 a.m.	8/13/2013	4:00 p.m.	8/13/2013	Commercial fishing period, W1-B 4 hrs with lower section extended 2 hrs
3-S-WR-16-13	10:00 a.m.	8/17/2013	4:00 p.m.	8/17/2013	Commercial fishing period, W1-B 4 hrs with lower section extended 2 hrs
3-S-WR-17-13	10:00 a.m.	8/20/2013	4:00 p.m.	8/20/2013	Commercial fishing period, W1-B 4 hrs
3-S-WR-18-13	10:00 a.m.	8/23/2013	4:00 p.m.	8/23/2013	Commercial fishing period, W1-B 4 hrs

-continued-

Table 2.–Page 2 of 2.

Kuskokwim Bay salmon					
EO number	Effective time	Effective date	Effective time	Expiration date	EO description
3-S-WB-01-13	9:00 a.m.	6/29/13	9:00 p.m.	9/8/2013	Establish commercial season; reduce subsistence closers during commercial periods
3-S-WB-02-13	9:00 a.m.	6/29/2013	9:00 p.m.	7/2/2013	W4 & W5 commercial periods with reduced area in district W5
3-S-WB-03-13	9:00 a.m.	7/2/2013	9:00 p.m.	7/2/2013	W5 commercial period with reduced district
3-S-WB-04-13		7/6/2013		9/8/2013	Subsistence fishing closure during commercial fishing periods
3-S-WB-05-13	9:00 a.m.	7/6/2013	9:00 p.m.	7/6/2013	W4 & W5 commercial periods with reduced area in district W5
3-S-WB-06-13	9:00 a.m.	7/10/2013	9:00 p.m.	7/10/2013	W4 & W5 commercial periods with reduced area in district W5
3-S-WB-07-13	9:00 a.m.	7/12/2013	9:00 p.m.	7/12/2013	W4 & W5 commercial periods
3-S-WB-08-13	9:00 a.m.	7/15/2013	9:00 p.m.	7/15/2013	W4 & W5 commercial periods
3-S-WB-09-13	9:00 a.m.	7/17/2013	9:00 p.m.	7/17/2013	W4 & W5 commercial periods with reduced area in district W5
3-S-WB-10-13	9:00 a.m.	7/19/2013	9:00 p.m.	7/19/2013	W4 & W5 commercial periods with reduced area in district W5
3-S-WB-11-13	9:00 a.m.	7/22/2013	9:00 p.m.	7/24/2013	W4 & W5 commercial periods
3-S-WB-12-13	9:00 a.m.	7/26/2013	9:00 p.m.	7/29/2013	W4 & W5 commercial periods
3-S-WB-13-13	9:00 a.m.	8/5/2013	9:00 p.m.	8/5/2013	W4 & W5 commercial periods
3-S-WB-14-13	9:00 a.m.	8/7/2013	9:00 p.m.	8/7/2013	W4 & W5 commercial periods
3-S-WB-15-13	9:00 a.m.	8/9/2013	9:00 p.m.	8/9/2013	W5 commercial period
3-S-WB-16-13	9:00 a.m.	8/12/2013	9:00 p.m.	8/12/2013	W4 & W5 commercial periods
3-S-WB-17-13	9:00 a.m.	8/14/2013	9:00 p.m.	8/14/2013	W5 commercial period
3-S-WB-18-13	9:00 a.m.	8/16/2013	9:00 p.m.	8/16/2013	W4 & W5 commercial periods
3-S-WB-19-13	9:00 a.m.	8/19/2013	9:00 p.m.	8/19/2013	W4 & W5 commercial periods
3-S-WB-20-13	9:00 a.m.	8/21/2013	9:00 p.m.	8/23/2013	W4 & W5 commercial periods

Table 3.–Commercial salmon harvest by period, District W-1, Kuskokwim River, Kuskokwim Management Area, 2013.

Period	Date	Permits fished	Hours fished	Permit hours	Chinook Catch	Chinook CPUE	Sockeye Catch	Sockeye CPUE	Chum Catch	Chum CPUE	Coho Catch	Coho CPUE
1	Jul 16 [b]	189	6 [d]	1,134	133	0.1	373	0.3	24,823	21.9	1,894	1.7
2	Jul 19 [b]	221	4 [d]	884	6	0.0	78	0.1	15,413	17.4	2,097	2.4
3	Jul 23 [b]	218	4 [d]	872	20	0.0	47	0.1	5,771	6.6	2,960	3.4
4	Jul 26 [b]	171	4 [d]	684	1	0.0	45	0.1	3,121	4.6	5,785	8.5
5	Jul 30 [b]	227	4 [d]	908	5	0.0	35	0.0	1,712	1.9	8,968	9.9
6	Aug 6 [b]	274	4 [d]	1,096	2	0.0	20	0.0	709	0.6	23,461	21.4
7	Aug 10 [b]	289	6	1,734	4	0.0	168	0.1	474	0.3	30,972	17.9
8	Aug 13 [b]	247	4 [d]	988	1	0.0	2	0.0	79	0.1	8,077	8.2
9	Aug 17 [b]	226	4 [d]	904	0	0.0	0	0.0	50	0.1	12,778	14.1
10	Aug 20 [b]	236	6	1,416	1	0.0	0	0.0	68	0.0	11,630	8.2
11	Aug 23 [b]	187	6	1,122	1	0.0	0	0.0	16	0.0	5,447	4.9
Total		378	52	11,742	174		768		52,236		114,069	

[a] Subdistrict W-1A (above Bethel) opening

[b] Subdistrict W-1B (below Bethel) opening

[c] Subdistricts W-1A and W-1B.

[d] Two hours of additional fishing time was allowed in Lower Section of W1-B.

[e] Number of individual permit holders participating for the season.

Table 4.–Commercial salmon harvest by period, District 4, Quinhagak, Kuskokwim Bay, 2013.

		Permits	Hours	Permit	Chinook		Sockeye		Chum		Coho	
Period	Date	fished	fished	hours	Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1	Jul 2	68	12	816	325	0.4	3,161	3.9	2,698	3.3	0	0.0
2	Jul 6	122	12	1,464	670	0.5	8,736	6.0	16,281	11.1	0	0.0
3	Jul 10	138	12	1,656	367	0.2	3,595	2.2	10,103	6.1	0	0.0
4	Jul 12	138	12	1,656	190	0.1	3,557	2.1	7,886	4.8	1	0.0
5	Jul 15	77	12	924	101	0.1	1,293	1.4	3,442	3.7	8	0.0
6	Jul 17	90	12	1,080	177	0.2	2,012	1.9	8,167	7.6	34	0.0
7	Jul 19	71	12	852	119	0.1	1,506	1.8	4,025	4.7	121	0.1
8	Jul 22	78	12	936	30	0.0	1,170	1.3	1,993	2.1	104	0.1
9	Jul 24	46	12	552	28	0.1	589	1.1	1,106	2.0	147	0.3
10	Jul 26	29	12	348	12	0.0	303	0.9	705	2.0	64	0.2
11	Jul 29	37	12	444	12	0.0	205	0.5	608	1.4	513	1.2
12	Aug 5	50	12	600	8	0.0	109	0.2	421	0.7	1,993	3.3
13	Aug 7	51	12	612	3	0.0	64	0.1	204	0.3	1,996	3.3
14	Aug 12	65	12	780	4	0.0	30	0.0	305	0.4	3,362	4.3
15	Aug 16	69	12	828	4	0.0	26	0.0	36	0.0	3,430	4.1
16	Aug 19	57	12	684	3	0.0	17	0.0	34	0.0	4,611	6.7
17	Aug 21	60	12	720	0	0.0	12	0.0	45	0.1	3,370	4.7
18	Aug 23	53	12	636	1	0.0	8	0.0	20	0.0	1,372	2.2
Total			216	15,588	2,054		26,393		58,079		21,126	

Table 5.–Commercial salmon harvest by period, District W-5 Goodnews Bay, Kuskokwim Bay, 2013.

Period	Date	Permits fished	Hours fished	Permit hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1	Jun 29 [a]	20	12	240	19	0.1	1,868	7.8	960	4.0	0	0.0
2	Jul 2 [a]	25	12	300	43	0.1	3,047	10.2	1,475	4.9	0	0.0
3	Jul 6 [a]	53	12	636	60	0.1	3,740	5.9	2,336	3.7	0	0.0
4	Jul 10 [a]	52	12	624	30	0.0	3,921	6.3	1,691	2.7	0	0.0
5	Jul 12	52	12	624	120	0.2	3,697	5.9	1,838	2.9	4	0.0
6	Jul 15	46	12	552	133	0.2	1,904	3.4	1,860	3.4	3	0.0
7	Jul 17 [a]	37	12	444	21	0.0	1,231	2.8	807	1.8	2	0.0
8	Jul 19 [a]	31	12	372	8	0.0	1,114	3.0	455	1.2	10	0.0
9	Jul 22	27	12	324	11	0.0	1,261	3.9	514	1.6	36	0.1
10	Jul 24	25	12	300	18	0.1	739	2.5	314	1.0	23	0.1
11	Jul 26	15	12	180	7	0.0	545	3.0	122	0.7	70	0.4
12	Jul 29	17	12	204	3	0.0	281	1.4	84	0.4	122	0.6
13	Aug 5	22	12	264	3	0.0	209	0.8	94	0.4	794	3.0
14	Aug 7	17	12	204	3	0.0	127	0.6	27	0.1	732	3.6
15	Aug 9	21	12	252	1	0.0	152	0.6	18	0.1	1,204	4.8
16	Aug 12	23	12	276	5	0.0	149	0.5	16	0.1	3,138	11.4
17	Aug 14	26	12	312	5	0.0	138	0.4	12	0.0	2,816	9.0
18	Aug 16	31	12	372	3	0.0	144	0.4	12	0.0	3,709	10.0
19	Aug 19	28	12	336	1	0.0	97	0.3	9	0.0	3,149	9.4
20	Aug 21	23	12	276	1	0.0	77	0.3	4	0.0	2,611	9.5
21	Aug 23	27	12	324	0	0.0	80	0.2	3	0.0	3,159	9.8
Total			252	7,416	495		24,521		12,651		21,582	

[a] District 5 open waters were reduced to aid in the conservation of Chinook salmon.

Table 6.–Subsistence salmon harvest estimates, Kuskokwim Management Area, 1990–2013.

	Households		Estimated salmon harvest[a]				
Year	Total	Surveyed	Chinook	Sockeye	Coho	Chum	Total
1990	3,317	1,448	114,219	48,752	63,084	157,335	314,513
1991	3,340	2,033	79,445	50,383	44,222	89,008	298,561
1992	3,308	1,308	87,663	46,493	57,551	120,126	246,914
1993	3,269	1,786	91,973	53,631	31,971	64,551	240,103
1994	3,169	1,801	110,922	46,127	40,815	89,553	251,111
1995	3,638	1,907	105,787	31,736	39,582	71,789	236,885
1996	3,630	1,524	100,352	41,532	45,279	102,079	241,572
1997	3,501	1,919	83,022	39,827	31,324	38,073	198,466
1998	3,497	1,940	85,781	38,228	27,435	72,860	218,595
1999	4,165	2,512	79,752	50,988	30,184	51,200	202,413
2000	3,317	1,448	75,299	53,468	49,469	72,851	204,714
2001	4,469	2,215	82,106	55,290	33,474	57,060	212,338
2002	4,804	2,687	84,512	34,331	44,588	94,998	205,599
2003	4,513	2,292	70,579	33,821	36,953	46,666	194,474
2004	4,638	2,398	103,183	43,425	53,186	68,068	214,959
2005	4,603	1,593	89,538	44,637	35,793	59,220	186,762
2006	4,671	1,439	96,857	49,467	43,880	96,021	286,226
2007	4,620	1,279	101,554	50,092	37,481	76,187	265,315
2008	4,734	992	103,080	63,802	49,755	71,177	287,814
2009	4,810	1,699	81,853	37,779	31,613	45,101	196,345
2010	4,215	2,247	69,242	41,042	34,169	47,885	192,338
2011	4,232	2,149	61,687	42,146	30,682	50,702	185,217
2012	4,294	1,569	2,535	50,781	30,086	82,030	165,432
2013	4,314	1,832	50,708	46,049	27,841	55,828	180,426
Avg 2003–2012	4,533	1,766	78,011	45,699	38,360	64,306	217,488

[a] Subsistence salmon harvest estimates from 1990 to 2009 are reconstructed.

Table 7.–Estimated subsistence salmon harvest by species and community for the Kuskokwim Area, 2013.

	Households (HH)			Chinook			Chum		
Community	Total *N*	total *N*	% survey	avg harvest/hh	Est. total	CI (95%)	avg	Est. total	CI (95%)
Kongiganak	90	0	0%	7.1	641	200	15.5	1,397	180
N. Kuskokwim Bay	90	0	0%	7.1	641	200	15.5	1,397	180
Tuntutuliak	90	61	68%	27.2	2,448	398	24.2	2,180	335
Eek	88	53	60%	13.5	1,188	285	14.0	1,232	439
Kasigluk	104	54	52%	28.1	2,919	616	21.1	2,197	521
Nunapitchuk	118	77	65%	21.7	2,563	370	25.2	2,977	376
Atmautluak	63	38	60%	25.3	1,592	298	38.2	2,409	473
Napakiak	97	55	57%	16.4	1,588	642	12.2	1,185	280
Napaskiak	103	64	62%	28.5	2,939	710	25.1	2,589	699
Oscarville	15	13	87%	39.0	585	149	32.7	490	168
Bethel	2,126	538	25%	8.1	17,246	3,450	5.9	12,506	2,232
Kwethluk	166	98	59%	19.2	3,192	489	23.0	3,825	667
Akiachak	157	100	64%	22.8	3,585	610	21.8	3,417	518
Akiak	83	49	59%	17.5	1,449	396	26.7	2,212	858
Tuluksak	93	63	68%	7.9	732	142	32.9	3,062	686
Lower Kuskokwim	3,303	1,263	38%	12.7	42,026	3,804	12.2	40,281	2,905
Lower Kalskag	75	47	63%	9.9	744	258	16.2	1,214	329
Upper Kalskag	58	29	50%	22.7	1,317	407	26.4	1,534	533
Aniak	191	173	91%	7.5	1,440	200	15.1	2,880	556
Chuathbaluk	33	28	85%	4.7	155	47	28.3	935	261
Middle Kuskokwim	357	277	78%	10.2	3,656	524	18.4	6,563	877
Crooked Creek	37	0	0%	3.9	145	82	48.7	1,803	190
Red Devil	15	11	73%	5.1	77	24	65.4	981	849
Sleetmute	39	33	85%	2.5	96	19	13.9	542	35
Stony River	15	11	73%	3.4	51	36	1.8	27	16
Lime Village [a]	14	0	0%	3.0	43	61	64.9	909	103
McGrath	129	64	50%	0.7	95	82	4.6	598	500
Takotna [b]	23	0	0%	0.0	0	102	0.0	12	101
Nikolai	35	32	91%	8.1	283	94	14.7	513	147
Telida	2	–	–	–	–	–	–	–	–
Upper Kuskokwim	309	151	49%	2.6	790	197	17.4	5,386	1,025
Kuskokwim River Total	4,059	1,691	42%	11.6	47,113	3,851	13.2	53,627	3,208
Quinhagak	165	86	52%	19.0	3,143	743	11.9	1,958	454
Goodnews Bay	70	36	51%	5.9	413	193	2.2	153	51
Platinum	20	19	95%	2.0	39	11	4.5	90	29
S. Kuskokwim Bay	255	141	55%	14.1	3,595	768	8.6	2,201	458
Total	4,314	1,832	42%	11.8	50,708	3,926	12.9	55,828	3,241

-continued-

Table 7.–Page 2 of 2.

Community	Sockeye			Coho			Pink		
	avg hh	Total harvest	CI (95%)	avg hh	Total harvest	CI (95%)	avg hh	Total harvest	CI (95%)
Kongiganak	11.5	1,031	184	4.6	412	186	–	–	–
N. Kuskokwim Bay	11.5	1,031	184	4.6	412	186	0.0	0	0
Tuntutuliak	17.6	1,183	267	5.0	450	114	0.0	3	0
Eek	11.9	1,319	300	5.5	483	165	0.2	18	22
Kasigluk	12.3	1,470	362	4.0	418	241	0.1	14	21
Nunapitchuk	18.0	1,806	247	1.9	226	54	0.2	20	7
Atmautluak	16.0	1,316	250	3.2	203	99	0.7	47	45
Napakiak	12.0	1,105	243	6.5	634	227	0.0	3	2
Napaskiak	19.1	2,069	527	7.5	772	249	0.0	0	0
Oscarville	24.1	347	119	2.5	37	13	0.0	0	0
Bethel	6.9	12,616	1,951	6.0	12,662	2,513	0.1	207	150
Kwethluk	18.2	2,705	495	9.4	1,555	366	0.6	95	87
Akiachak	19.5	2,594	461	7.0	1,106	216	0.3	51	31
Akiak	23.4	1,731	597	5.5	454	199	1.3	110	117
Tuluksak	20.2	1,541	688	5.1	473	174	0.1	10	7
Lower Kuskokwim	10.6	31,802	2,421	5.9	19,473	2,606	0.2	578	219
Lower Kalskag	13.0	977	648	7.1	529	263	0.1	9	8
Upper Kalskag	11.4	662	141	11.0	636	297	0.0	0	0
Aniak	7.7	1,466	186	16.2	3,102	787	0.1	22	10
Chuathbaluk	14.5	480	172	9.7	319	81	0.0	0	0
Middle Kuskokwim	10.0	3,585	710	12.8	4,586	885	0.1	31	13
Crooked Creek	13.9	514	60	6.9	255	135	-	–	–
Red Devil	18.0	270	120	21.2	318	226	0.0	0	0
Sleetmute	9.3	362	56	5.6	219	46	0.0	1	0
Stony River	29.8	447	283	8.0	120	76	2.2	33	25
Lime Village [a]	59	831	43	27	384	63	–	–	–
McGrath	4.2	538	384	4.1	523	383	0.1	7	10
Takotna [b]	0.0	2	120	0.0	0	74	-	–	–
Nikolai	0.0	0	0	3.4	119	40	0.0	0	0
Telida	–	–	–	-	–	–	-	–	–
Upper Kuskokwim	9.6	2,964	515	6.3	1,938	485	0.1	41	27
Kuskokwim River Total	10.5	42,597	2,581	6.5	26,409	2,801	0.2	650	221
Quinhagak	13.1	2,158	456	6.6	1,380	232	0.4	73	66
Goodnews Bay	15.9	1,113	446	4.2	382	176	0.0	13	7
Platinum	9.1	181	62	2.5	124	18	0.3	5	3
S. Kuskokwim Bay	13.5	3,452	641	5.6	1,886	292	0.4	91	66
Total	10.7	42,834	2,660	6.5	28,295	2,816	0.2	741	230

Note: *N* is the total number of households , *n* is the number of households surveyed ; Kuskokwim River total includes Lower, Middle and Upper Kuskokwim areas and North Kuskokwim Bay. Data are unavailable for cells with dashes, Bayesian estimation method is not possible for these communities, nor pink salmon because there is little or no historical data.

[a] These villages were not surveyed, therefore the total harvest is estimated using historical average household harvest expanded by the number of households.

[b] Takotna is not surveyed, but harvest is estimated to be zero based on harvest practices.

Table 8.–Projections of Pacific herring spawning biomass and harvest levels for the 2013 season, Kuskokwim Bay, 2013.

District	2012 Observed biomass (st)	2013 Projected biomass (st)	2013 Guideline harvest (st)	2013 Observed biomass (st)	Exploitation rate (%)	Threshold [a]
Security Cove	20,000	17,542	3,508	9,313	20	1,200
Goodnews Bay	33,008	28,236	5,647	4,054	20	1,200
Cape Avinof	2,095	1,773	266	1,415	15	500
Nelson Island [b]	4,703	3,906	581	4,893	16[b]	3,000
Nunivak Island	2,879	2,420	484	2,420	20	1,500
Kuskokwim Bay total	62,685	53,877	10,486	22,095		

[a] Threshold biomass needed to allow commercial fishery (5 AAC 27.060)

[b] Nelson Island exploitation rate is 20% of projected biomass minus 200 st (short tons) for subsistence harvest.

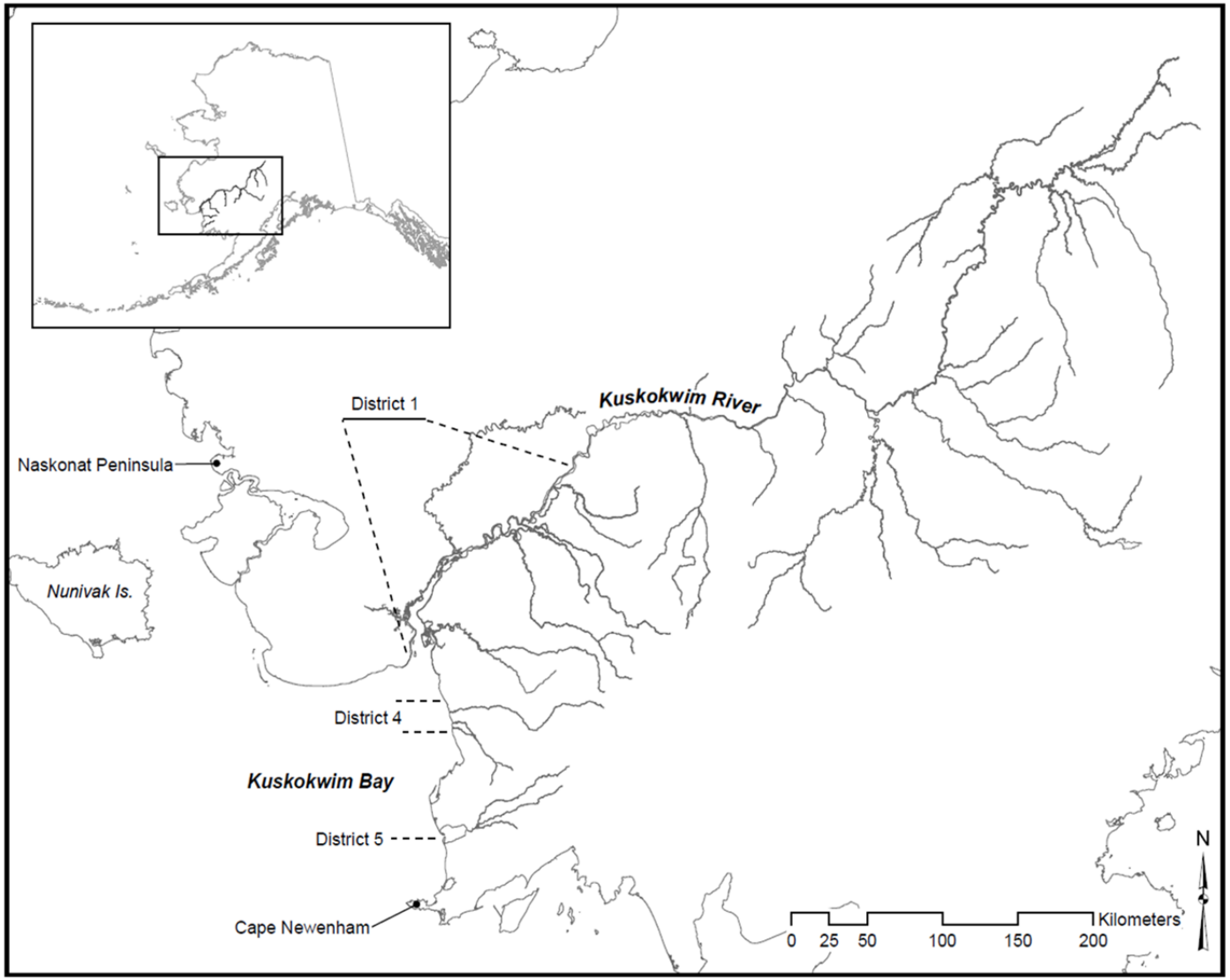

Figure 1.–The Kuskokwim Management Area, including Kuskokwim Bay, the Kuskokwim River, and all commercial fishing districts.

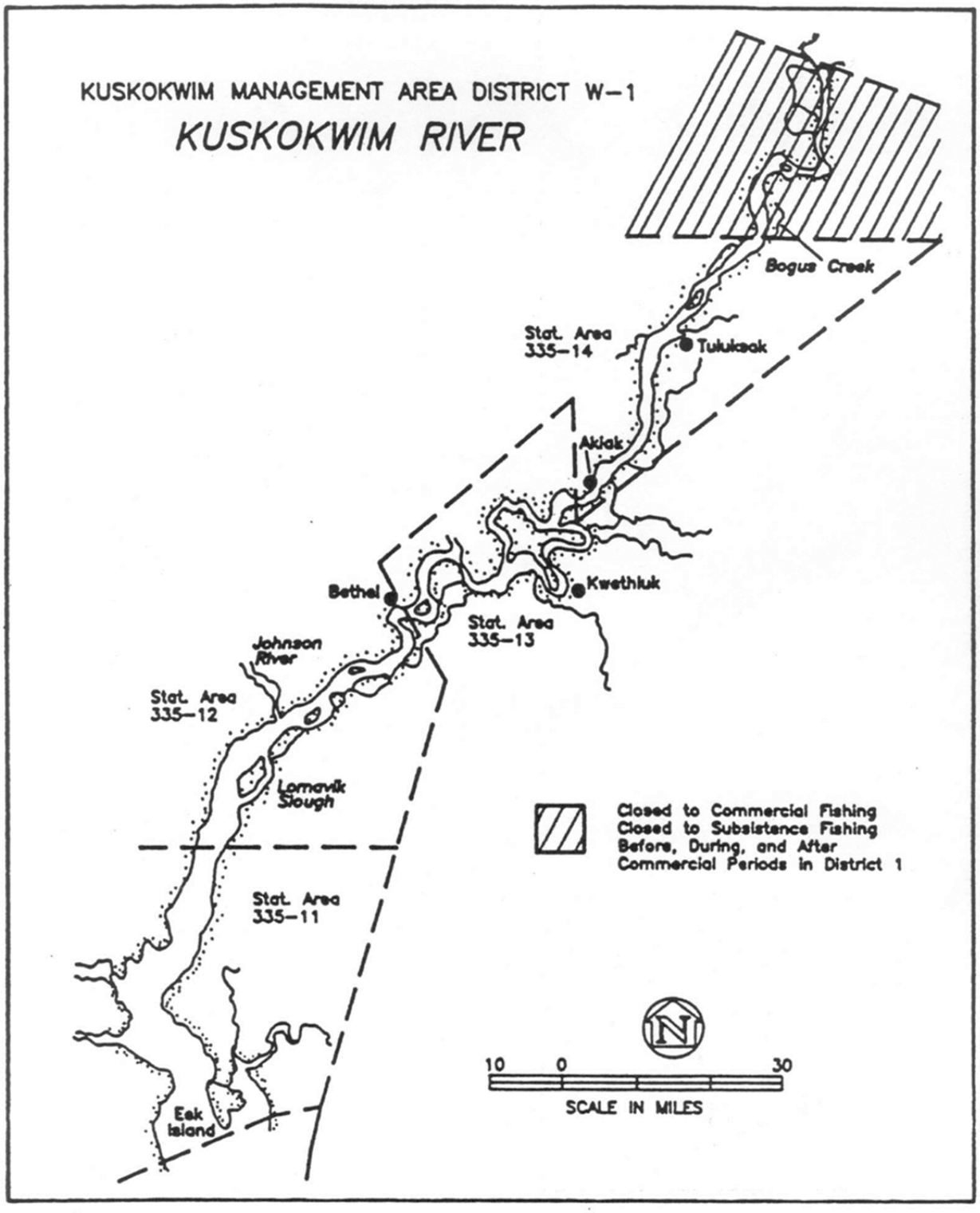

Figure 2.–Map of District W-1, Kuskokwim River, Kuskokwim Management Area.

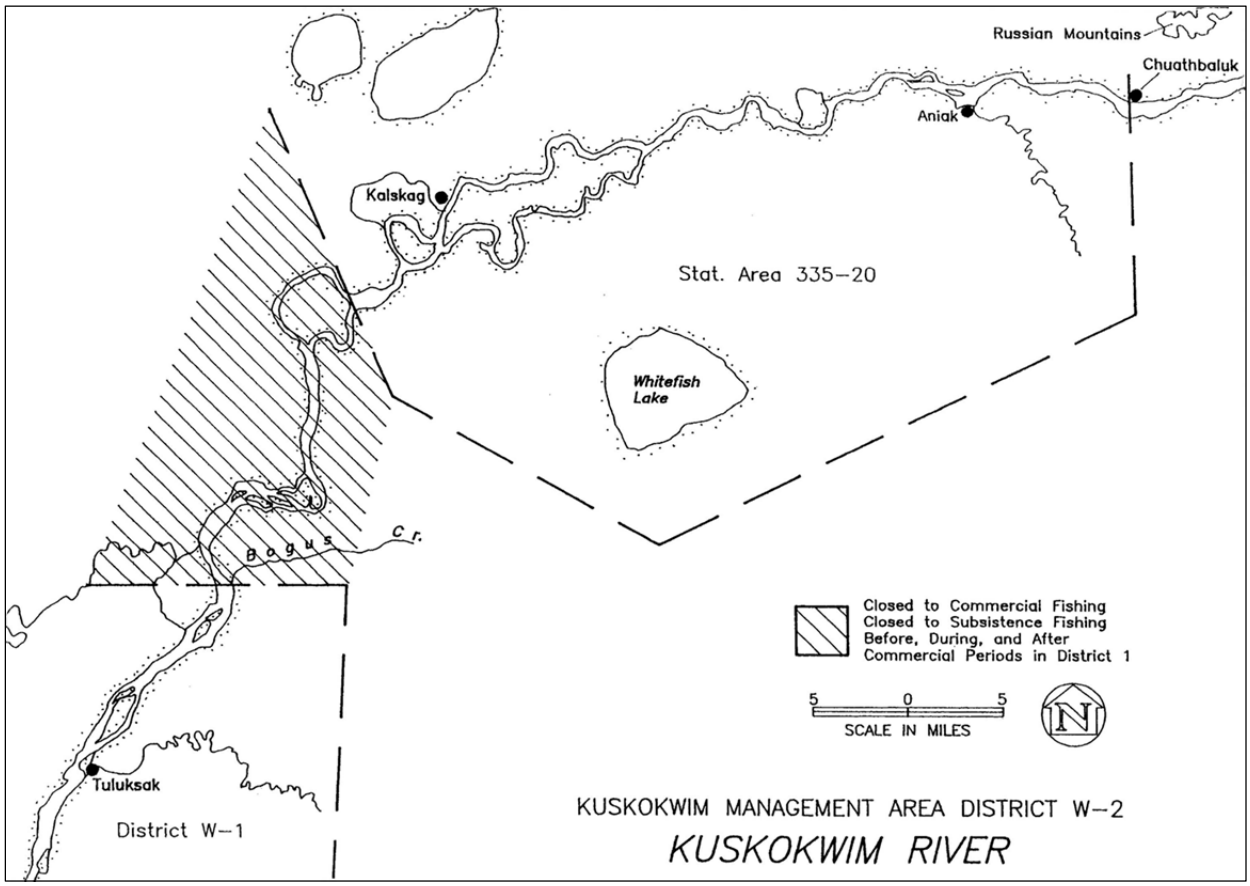

Figure 3.–Map of District W-2, Kuskokwim River, Kuskokwim Management Area.

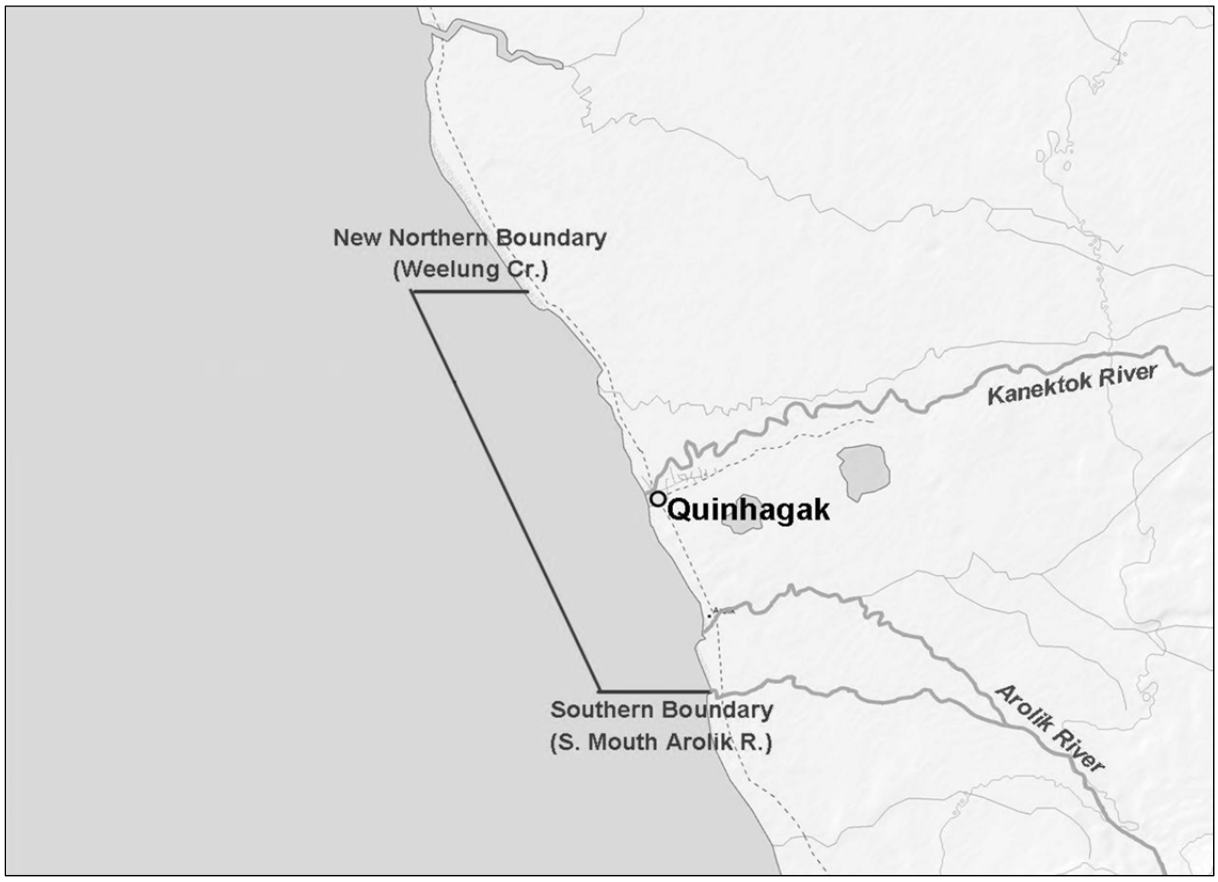

Figure 4.–Map of District W-4, Quinhagak, Kuskokwim Management Area.

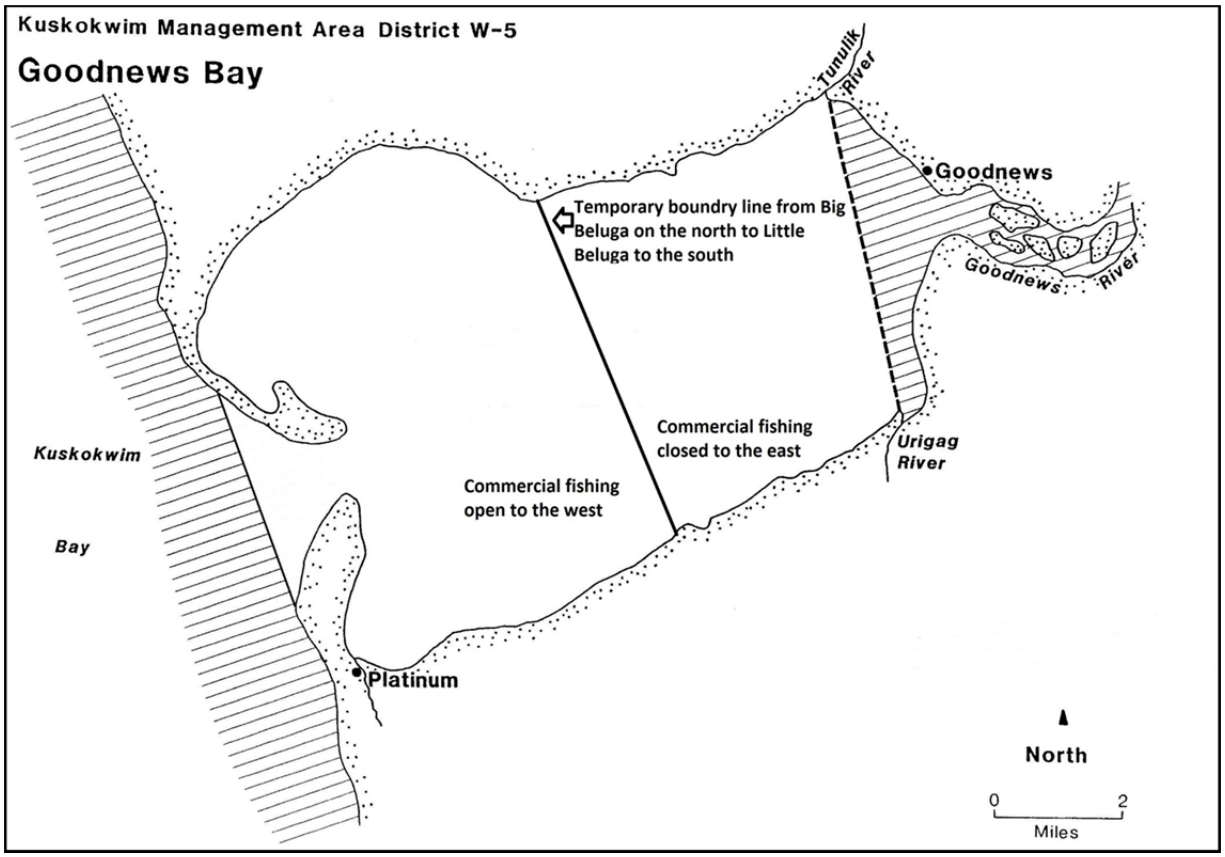

Figure 5.–Map of District W-5, Goodnews Bay, Kuskokwim Management Area.

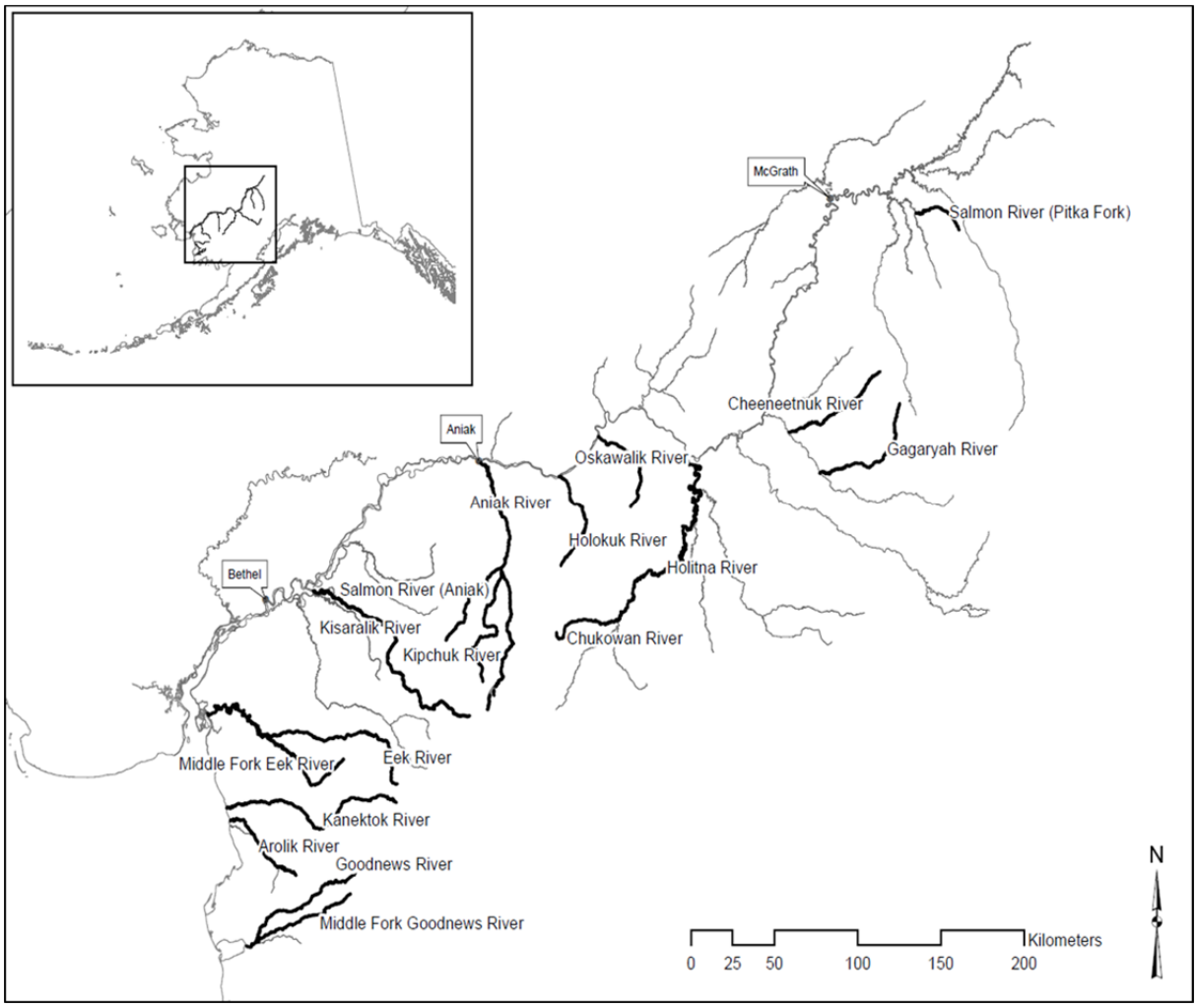

Figure 6.–Map of aerial survey streams, Kuskokwim Management Area.

Note: Bold rivers represent aerial survey rivers.

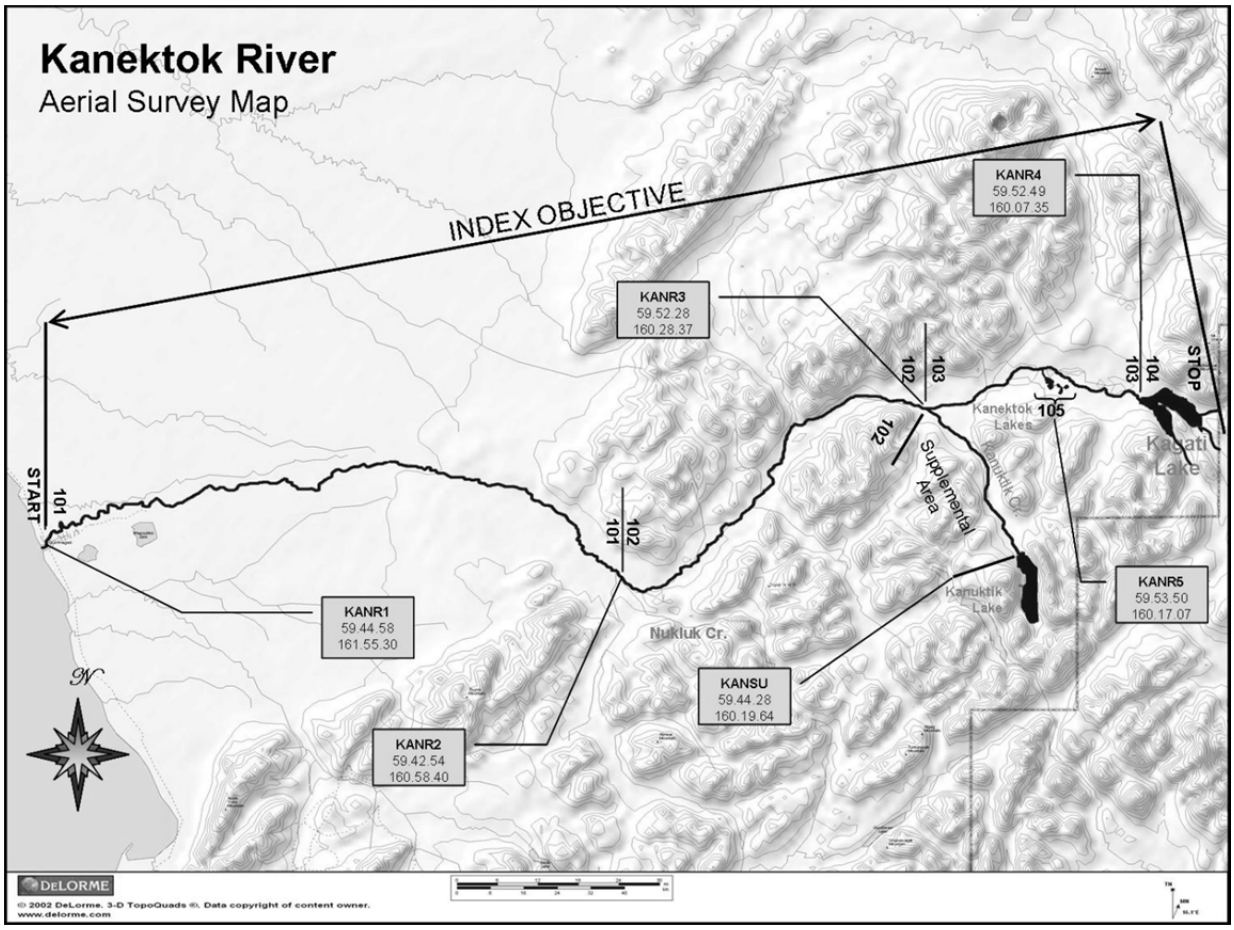

Figure 7.–Aerial survey map of the Kanektok River, Kuskokwim Management Area.

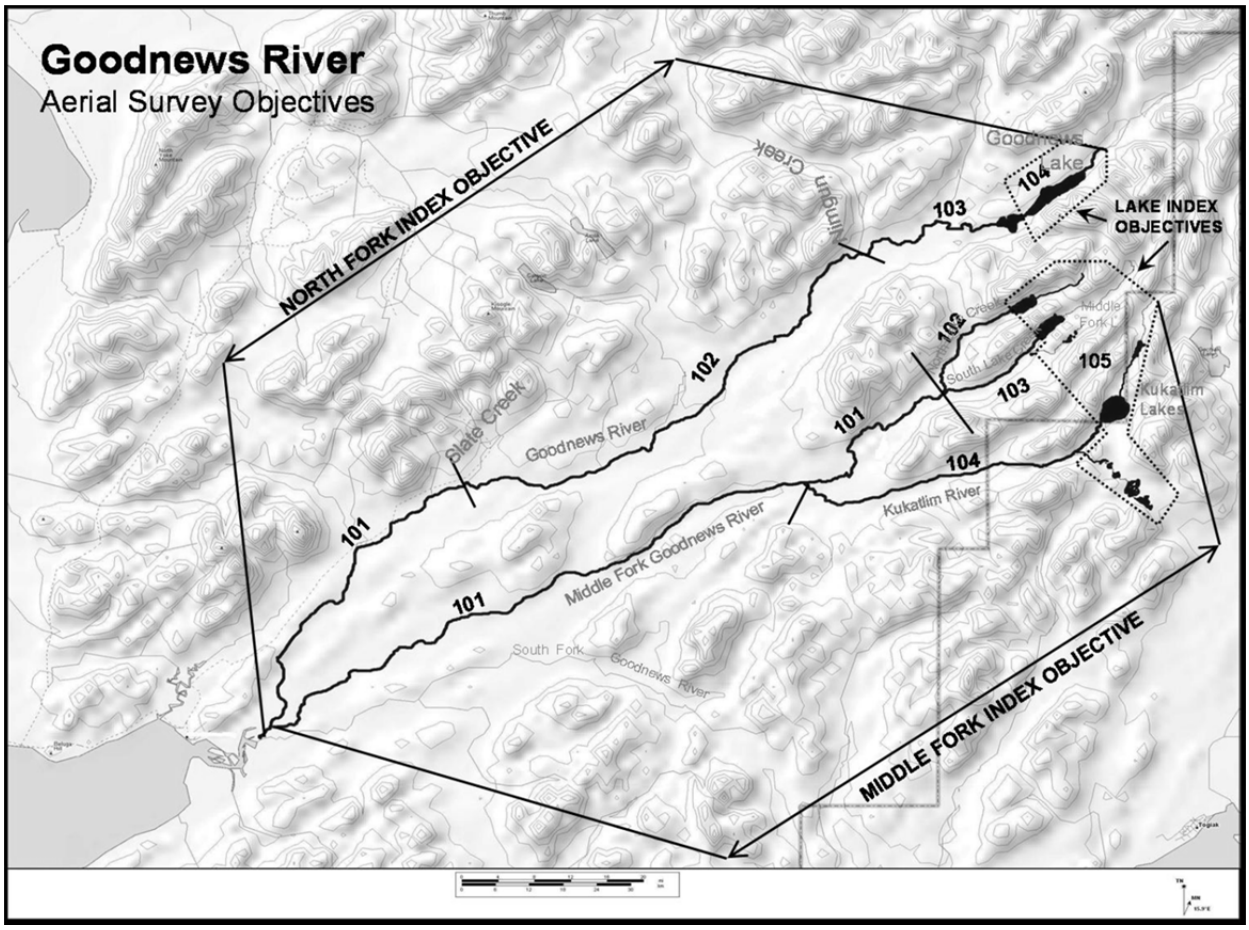

Figure 8.–Aerial survey map of the Goodnews River drainage, Kuskokwim Management Area.

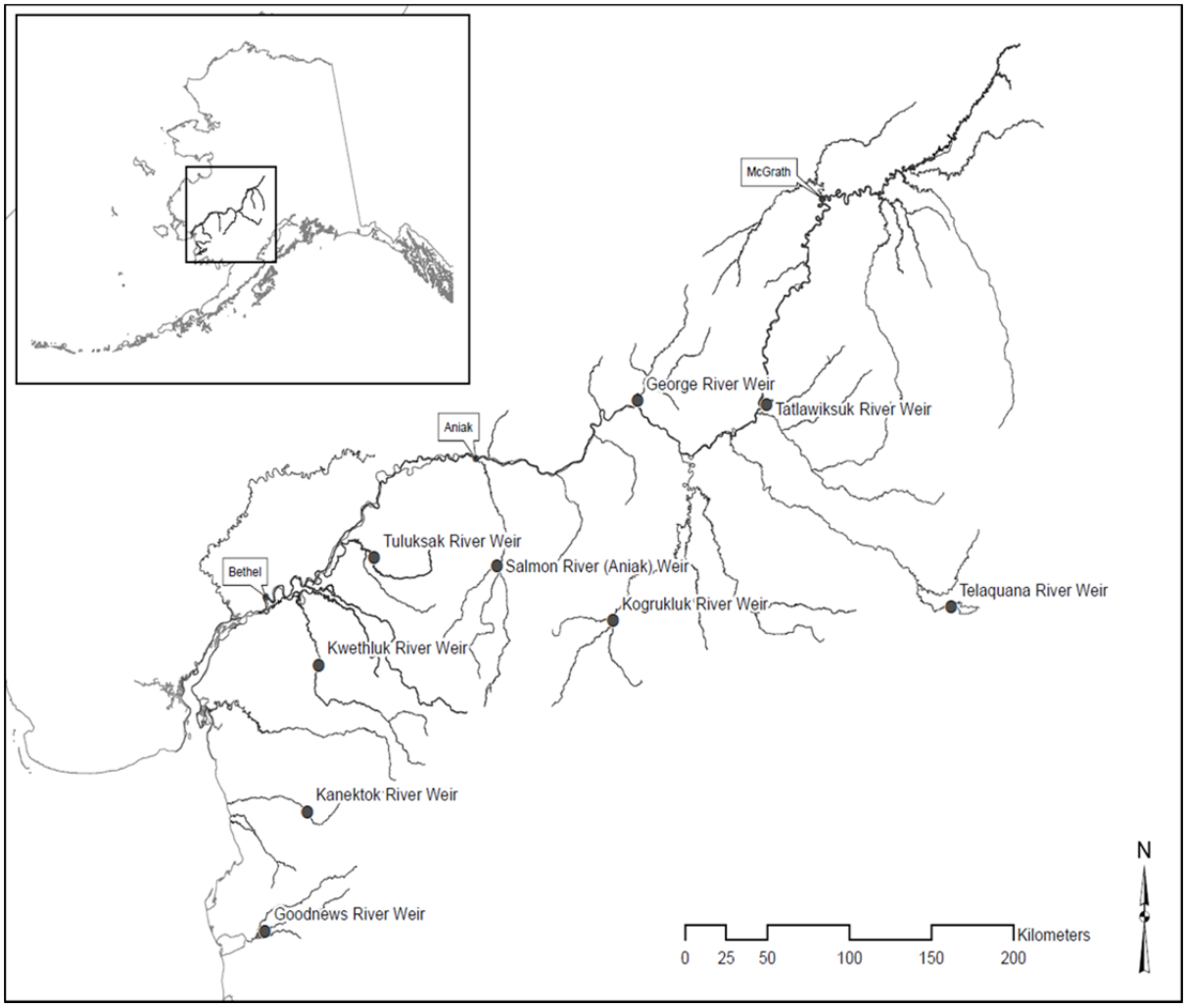

Figure 9.–Ground based escapement projects, Kuskokwim Management Area.

Note: Kwethluk and Tuluksak river weirs are operated by the United States Fish and Wildlife Service and are displayed to show ground based monitoring in its entirety.

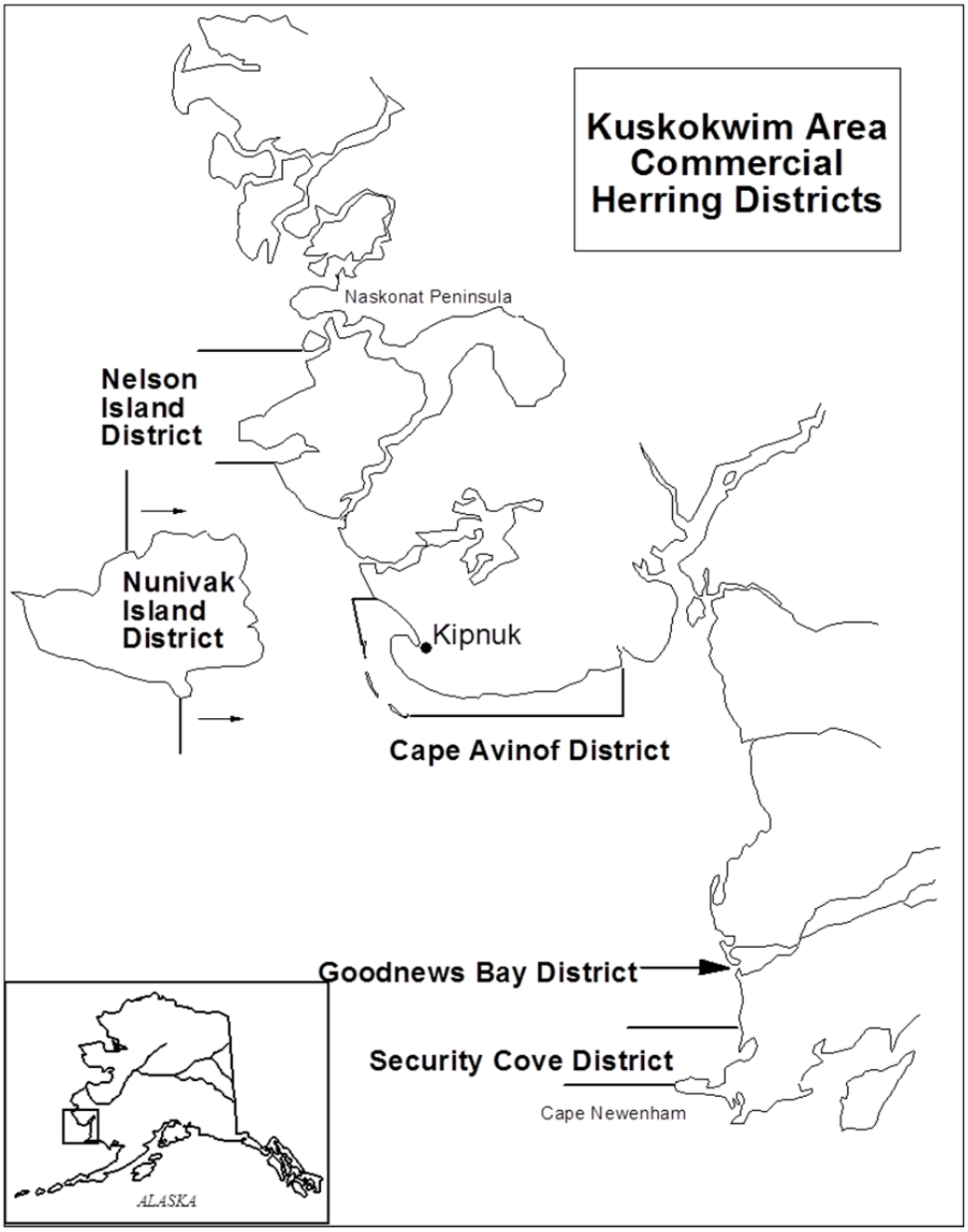

Figure 10.–Commercial herring districts, Kuskokwim Management Area.

APPENDIX A: KUSKOKWIM AREA

Appendix A1.–Historical events. Kuskokwim management area, 1913–2013.

Year	Event
1913	Commercial sale of salmon export first documented in the Kuskokwim Area.
1954	Commercial Chinook salmon quota established.
1959	First Chinook landing since quota established.
1960	Kanektok counting tower (1960–1962)
	Quinhagak District (W-4) commercial salmon fishery established.
	Kuskokwim Area divided into 4 subdistricts: Lower Kuskokwim River (Subdistrict 1), Middle Kuskokwim River (Subdistrict 2), Upper Kuskokwim River (Subdistrict 3), Quinhagak (Subdistrict 4). District boundaries are not well recorded; in the Aniak area, some commonly used drift sites overlap between District 2 and 3, which confused catch reporting.
	Kuskokwim River drainage surveys, 1960.
1961	ADF&G Kuskokwim River tagging study.
1962	ADF&G Kuskokwim River tagging study.
	Boundary between Subdistricts 2 and 3 changed; the new location was not recorded but the most likely location was Kolmakof River. The reason for the change was to move the boundary to a point which was between commonly used gillnet locations and thereby avoid confusion in catch reporting. As a result, there were no landings in Subdistrict 3.
1963	ADF&G Kuskokwim River tagging study.
	Boundaries of subdistrict documented; Subdistrict 1 extended from Kuskokuak to Mishevik Slough, Subdistrict 2 was from Mishevik Slough to Kolmakof River, and Subdistrict 3 was upstream of Kolmakof River.
1965	Kwegooyuk test fishery (1965–1984; no records available for 1965).
1966	ADF&G Kuskokwim River tagging study.
	Subdistrict 3 was deleted from the regulations due to a lack of landings.
1968	Goodnews Bay District (W-5) commercial salmon fishery established.
1969	District 4 tagging study (1969–1970) on Chinook and chum salmon.
	Kogrukluk River (a.k.a. Holitna River, Ignatti) tower/weir (1969–present).
1970	Effect of explosive detonation in ice on northern pike.
1971	Commercial fishing time in the Kuskokwim River reduced from two 24-hour periods per week to two 12-hour periods per week.
	Chum salmon fishery begins in the Kuskokwim River; season was from 25 June to 31 July, location limited to waters downstream of Napakiak, mesh size restricted to 6 in or smaller.
	Fishing periods established by Emergency Order in August.
	Gillnet mesh size in Districts 4 and 5 restricted to 6 in or smaller.
1974	Commercial sale of salmon roe from subsistence caught fish (1974–1977).

-continued-

Year	Event
1976	Commercial fishing time in the Kuskokwim River was reduced from two 12-hour periods per week to two 6-hour periods per week.
	Eek River reconnaissance survey.
	Study on genetic variants in chum and Chinook salmon.
1977	Fishing periods to be established by Emergency Order before 26 June and after 31 July.
	Limited entry permits issued.
	Subsistence fishing closed 24 hours before, during, and 6 hours after each commercial fishing period.
	Hoholitna River reconnaissance survey.
1978	Kasigluk River reconnaissance survey.
	Kwethluk River sonar project.
1979	The portion of District 1 used during the chum salmon season was extended from Napakiak upstream to Bethel.
	Kasigluk River sonar project.
	High seas salmon fleet moved from west of 160° W longitude to west of 180° W longitude.
1980	Subsistence fishing closed 24 hours before, during, and 6 hours after each commercial fishing period.
	Aniak River sonar project.
1981	Pilot test fish and FanScan projects at Bethel.
	Inventory of Kisaralik River and Lake.
	Goodnews River counting tower (1981–1990).
	Salmon River (Pitka Fork drainage) weir project (1981–1984).
	Species identification program results in better differentiation of sockeye and chum salmon.
1982	Kanektok River sonar project (1982–1986).
1983	Pilot test fish project at Bethel using drift gillnets.
	Provisional escapement goals established for many of the major spawning tributaries in the area.
	Management strategy shifts from guideline harvest based to obtaining escapement objective.
1984	Kwegooyuk test fishery replaced by the Bethel drift test fishery.
1985	Commercial fishing restricted to mesh sizes less than or equal to 6 in.
	Chum salmon season utilizes entire length of District 1.
1986	Migratory timing of coho salmon in the Kuskokwim Area, 1979–1984.
	Kuskokwim River salmon abundance estimate based on calibrated test fish CPUE.
	Downstream boundary of District 1 extended to a line from Apokak Slough to Popokamiut.
1987	Discontinued the directed commercial Chinook salmon fishery in the Kuskokwim River.
	Sale of Chinook salmon limited to 14,000 in the Kuskokwim River June commercial fishery.

-continued-

Year	Event
1987 (cont.)	First fishing period restricted to that portion of District 1, which is downstream of Bethel, due to Chinook conservation concerns.
	Subsistence fishing in all of District 2 and its tributary streams is closed before, during, and after commercial periods.
	South Peninsula sockeye and chum salmon tagging study.
1988	Review of the estimation of Kuskokwim River annual salmon passage through expansion of the Bethel test fish CPUE.
	Kuskokwim River sonar project (1988–1995).
	Kuskokwim River subsistence test fisheries (1988–1990).
	District 1 upstream boundary extended to Bogus Creek.
	District 2 reduced in size; downstream boundary moved upstream to High Bluffs and upstream boundary moved downstream to Chuathbaluk.
	Portion of Kuskokwim River between Districts 1 and 2 closed to subsistence fishing when District 1 subsistence fishing is closed.
	Reorganization of District 1 Statistical Areas.
	District 4 Salmon Management Plan adopted.
	Establishment of the Kuskokwim River Salmon Management Working Group (1988–present).
	Eek Test Fishery (1988–1990, 1992–1995).
1989	USFWS conducted genetic sampling throughout the Kuskokwim Area.
	USFWS conducted Chinook tagging study in the lower Kuskokwim River.
	Record low temperatures recorded in interior Alaska coupled with shallow snowpack threaten survival of salmon eggs/fry from 1988 spawning.
1990	ADF&G genetic sampling (1990–1996).
	Reorganization of District 1 statistical areas.
	Upstream boundary of District 1 moved downstream from Bogus Creek to Big (Nelson) Island.
	Downstream boundary of District 2 moved upstream to second slough below Kalskag.
	District 4 northern boundary is extended north to Weelung Creek.
1991	USFWS operates Tuluksak River weir (1991–1994).
	Weir replaces counting tower on Goodnews River (1991–present).
1992	Aniak and Chuathbaluk test fisheries (1992–1995).
	Eek test fishery is reestablished for the coho season.
	USFWS operates Kwethluk River weir (1992).
	Ban on high-seas drift gillnet fishing imposed.
	Unusual proportion of returning 5-year-old chum salmon had reduced growth between the second third annuli.

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Year	Event
1992 (cont.)	Failure of age-4 chum salmon in the Kuskokwim River; Aniak drainage especially hard hit; attributed to cold winter of 1988–1989.
1993	Failure of age-4 and age-5 chum salmon in the Kuskokwim River, Yukon River, and the Norton Sound/Kotzebue Area; cause unknown; especially hard hit were the Aniak drainage and the Yukon fall chum; commercial fishing severely restricted, chum sport fishery was closed, and the subsistence salmon fishery was restricted and closed for a period of time (first time ever).
	The BOF made a positive finding for customary and traditional use for all salmon in the entire Kuskokwim Area.
1994	Working Group commissioned and Dr. Mundy started "Recommendations for Strengthening the Cooperative Management Process of the Kuskokwim River Salmon Management Working Group."
	Upstream boundary of District 1 moved upstream to Bogus Creek.
1995	BSFA operates a chum salmon radiotelemetry project on the Kuskokwim River.
	Takotna Community School and ADF&G operate a salmon counting tower on the Takotna River (1995–1998).
	AVCP and BSFA operate the Lower Kuskokwim test fishery in cooperation with ADF&G; the project is a modification of the Eek test fishery.
1996	ADF&G genetic sampling for late spawning chum salmon and one mixed-stock sample from District 1.
	Near record low water levels during June and early August coupled with record high water temperatures.
	Irregular fishing schedule in District 1 during June and July due to limited market interest for chum salmon.
	Record early coho run coupled with record high harvest and escapement at Kogrukluk River.
	AVCP and ADF&G operate a salmon counting tower on the Kwethluk River (1996–1999).
	KNA and ADF&G operate a salmon weir on the George River (1996–present).
	Aniak River sonar is relocated to allow for full channel ensonification and configurable sonar technology is employed (1996–present).
	Native Village of Kwinhagak (NVK) begins development of a salmon counting tower on the Kanektok River.
1997	Kuskokwim River declared an economic disaster area due to very low chum and coho salmon returns, harvests and exvessel prices. Northern boundary of District 4 moved 3 miles south from July 14 to July 28. Record low chum salmon escapement at Kogrukluk River weir.
	Second summer of record low water levels in the Kuskokwim River basin during the summer and fall coupled with record high water temperatures.
	Anomalous Bering Sea conditions: warm water, odd plankton blooms, sea bird die-offs, etc.
	Aniak chum salmon return vastly exceeded expectations based on 1992–1993 spawning abundance estimates.
	Due to an extremely low return of chum salmon, ADF&G, AVCP, KNA, KRSMWG, ONC, TCC, and McGrath Native Village Council issue a joint appeal for subsistence users to conserve chum salmon. Record low subsistence harvest of chum salmon in the Kuskokwim Area.
	Aniak processor does not operate due to depressed salmon market (1997–present).

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Year	Event
1997 (cont.)	Sale of salmon roe is prohibited in Districts 1 and 2 (effective beginning December 1997).
	Middle Fork Goodnews River weir converted from fixed-panel to a resistance board "floating weir" and operated through majority of coho run for first time (1997-present).
	NVK and ADF&G operate a salmon counting tower on the Kanektok River (1997–1998).
1998	Kuskokwim River declared an economic disaster area for second straight year due to low chum and coho salmon returns, harvests, and exvessel prices.
	KNA and ADF&G operate a salmon weir on the Tatlawiksuk River (1998–present).
	Second year of anomalous Bering Sea conditions: warm water, odd plankton blooms, sea bird die-offs, etc.
	High water levels severely restrict operational period of many Kuskokwim Area escapement projects.
	Record low average water temperature measured at the Bethel test fish site.
1999	Kuskokwim River experiences extremely low returns, harvests, and exvessel prices of Chinook, chum, and coho salmon for third consecutive year. All species have very late run timing. Kuskokwim Bay coho returns and harvests extremely low.
	Federal government assumes control of subsistence fishery management in federal waters on October 1.
	KNA-operated salmon weirs on the Tatlawiksuk and George rivers converted to resistance board (floating) weirs and operations extended through coho run.
	Kuskokwim River sonar project begins redevelopment using split-beam sonar and is relocated to a new site one mile above upstream end of Church Slough.
2000	Kuskokwim River declared an economic disaster area due to extremely low chum salmon return, harvest, and exvessel price. Chinook salmon returns are very low for second consecutive year. Many subsistence fishermen report that they were unable to meet their Chinook and chum salmon harvest goals.
	Due to an extremely low return of Chinook salmon, ADF&G, AVCP, KNA, KRSMWG, Kwethluk IRA, TCC, McGrath Native Village Council, and USFWS issue a joint appeal for subsistence users to conserve Chinook salmon.
	ADF&G and Federal Office of Subsistence Management (FOSM) restrict subsistence Chinook salmon fishery.
	Takotna Community Schools and ADF&G operate a resistance board weir on the Takotna River (2000-present).
	Kwethluk IRA and USFWS operate a resistance board weir on the Kwethluk River (2000 to present).
	District W-1 divided into Subdistricts W-1A (above Bethel) and W-1B (below Bethel) and fishermen are required to register to fish in only one subdistrict. Due to limited processing capacity, only one subdistrict is opened at a time to reduce harvest.
	Commercial fishermen required to identify vessels with either ADF&G or CFEC permit number.

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Year	Event
2000 (cont.)	ADF&G Division of Sport Fish creates Lower Yukon–Kuskokwim Management Area and stations Area Management Biologist in Bethel.
	Line attached to a pole (rod and reel) added to legal gear for subsistence fishing in AVCP area (prior to 2000 fishing season).
	Use of rod and reel for subsistence extended throughout the Kuskokwim Area (2000–2001 BOF meeting).
2001	Alaska Board of Fisheries designates Kuskokwim River Chinook and chum salmon to be stocks of yield concern based on the Sustainable Fisheries Policy because of poor runs since 1997.
	Subsistence fishing schedule implemented in the Kuskokwim River during June and July to conserve Chinook and chum salmon and provide for adequate fishing opportunity throughout the drainage.
	Kuskokwim River declared an economic disaster area due to low chum salmon return, harvest and exvessel price. No commercial fishing periods in Kuskokwim River in June and July. Chinook salmon returns are below average in size.
	Due to an extremely low return of Chinook salmon, ADF&G, AVCP, KNA, KRSMWG, Kwethluk IRA, McGrath Native Village Council, ONC, and USFWS issue a joint appeal for subsistence users to conserve Chinook and chum salmon.
	Native Community of Tuluksak and USFWS operate a resistance board weir on the Tuluksak River.
	NVK and ADF&G operate a salmon counting weir on the Kanektok River.
	ADF&G/CF and KNA operate fish wheels at Kalskag and Birch Tree Crossing to tag salmon and then make salmon population estimates.
2002	The State of Alaska declared the Kuskokwim region a disaster area for the fifth year in 6 because of low salmon prices in the bay and river and a complete lack of buyers during the chum season on the river.
	ADF&G did not join USFWS and Native groups in issuing a preseason appeal for subsistence users to conserve Chinook and chum salmon because such a request is allocative in nature and only the BOF makes allocation decisions.
	In June the Federal Subsistence Board adopted a special regulatory action that tied the time allowed for sport fishing to the time allowed for subsistence net and fish wheel fishing in federal waters in the Kuskokwim River drainage. Upon a request for reconsideration by ADF&G, the Federal Subsistence Board rescinded its decision. The reason for the rescission was that under ANILCA, sport fishing on federal waters is managed by ADF&G unless there are overriding conservation or subsistence concerns. In this instance there were no overriding conservation or subsistence concerns.
	A subsistence fishing schedule was implemented in the Kuskokwim River during June to conserve Chinook and chum salmon and to provide adequate subsistence fishing opportunity throughout the drainage. However, because an average Chinook run and an above-average chum run developed, the subsistence schedule was lifted on June 28.
	The Kuskokwim River Fisheries Co-op dissolved. ACR #28 was accepted by BOF so that the formation of a Chignik-style salmon fishing cooperative on the Kuskokwim River could be considered.

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Year	Event
2002 (cont.)	ADF&G/SF and KNA operated salmon radiotelemetry projects on the Kuskokwim mainstem and on the Holitna River to estimate salmon abundance.
	Second consecutive season of no chum salmon (June or July) directed commercial fishery.
2003	A subsistence fishing schedule was implemented in the Kuskokwim River during June to conserve Chinook and chum salmon and to provide adequate subsistence fishing opportunity throughout the drainage. However, because an average Chinook and chum salmon run developed, the subsistence schedule was lifted on July 3.
	Third consecutive season of no chum salmon (June or July) directed commercial fishery.
	ADF&G/SF and KNA operated salmon radiotelemetry projects on the Kuskokwim mainstem and on the Holitna River to estimate salmon abundance.
	Record high coho salmon escapements throughout the Kuskokwim Area.
2004	The Alaska Board of Fisheries continued the stock of yield concern designation for Kuskokwim River Chinook and chum salmon based on the Sustainable Fisheries Policy. Chinook and chum salmon returns have been improving since 2000; however, a majority of annual returns in the previous 5 years did not have adequate harvestable surpluses beyond escapement and subsistence needs.
	The Alaska Board of Fisheries provided a commercial guideline harvest level of 0–50,000 sockeye salmon for the Kuskokwim River.
	The Alaska Board of Fisheries readopted regulations 1) to increase subsistence fishing opportunity prior to and after commercial salmon fishing periods, 2) to provide opportunity for subsistence salmon fishing to occur in a portion of the District 1 subdistrict not open to commercial fishing, and 3) to modify Kuskokwok Slough subsistence fishing regulations to be consistent with District 1 waters.
	The northern boundary of District W-4 (Quinhagak) was relocated approximately one mile north from Oyak Creek to the northernmost edge of the mouth of Weelung Creek.
	The western boundary of District W-5 (Goodnews Bay) was relocated seaward from a line between the northern and southern most points of the North and South spits at the entrance to Goodnews Bay to a line extending from approximately 2 miles South on the seaward entrance of Goodnews Bay to approximately 2 miles North on the seaward entrance to Goodnews Bay.
	Regulations for Districts 4 and 5 were amended to provide emergency order authority to increase gillnet length to 100 fathoms provided run strength was adequate.
	The Goodnews Bay District herring superexclusive use regulations were repealed.
	Evaluation of AYK Region escapement goals and methodology resulted in revisions of the majority of existing Kuskokwim Area escapement goals to Sustainable Escapement Goal ranges using the Bue-Hasbrouck method (ADF&G 2004; Bue and Hasbrouck 2001).
	A subsistence fishing schedule was implemented in the Kuskokwim River during June to conserve Chinook and chum salmon and to provide adequate subsistence fishing opportunity throughout the drainage. However, because an above average Chinook salmon run and an average to above-average chum salmon run developed, the subsistence schedule was lifted on June 18.
	A limited chum and sockeye directed commercial fishery was prosecuted in late June and early July for the first time since 2000. Participation and processor capacity was limited compared to previous years.

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Year	Event
2004 (cont.)	Water levels in rivers throughout the Kuskokwim Area were well below average from mid-July through September. Kuskokwim River water level attained a 50-year low during August as measured at the USGS gauging station at Crooked Creek.
2005	Chum escapements were at record highs at nearly all monitoring projects with the exception of George River where escapement was near average.
	Chinook escapements ranged from above average to record highs at nearly all monitored locations with the exception of George River where the escapement was near average.
	Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.
	Commercial salmon fishing opportunity in the Kuskokwim Bay districts was reduced during July because of limited processing capacity, and in August because of below-average coho salmon abundance.
2006	Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.
	Chum salmon escapements were at record highs at the Kwethluk, George, and Takotna river monitoring projects.
	During 4 commercial periods in early July limits were imposed on the number of fish that could be delivered by District 4 and 5 fishermen because of limited capacity to process an above average catch.
2007	The Alaska Board of Fisheries (BOF) discontinued the stock of concern designation for Kuskokwim River Chinook and chum salmon based on at or above the historical average runs each year since 2002.
	The BOF passed a proposal giving ADF&G authority to allow up to 8 in mesh gillnets in District 1 by emergency order; otherwise, all commercial openings will continue to be limited to gillnet mesh sizes of 6 in or less. The BOF's intent in allowing for up to 8 in mesh gear was not to establish a large mesh gear Chinook salmon commercial fishery, but to provide a management tool that may or may not be used. Additionally, the commercial Chinook salmon fishery closure was discontinued, and the commercial salmon fishery is to be managed based on run strength and harvestable surpluses of Chinook, sockeye, and chum salmon.
	The BOF passed a proposal giving ADF&G authority to allow the lower portion of Subdistrict 1-B to open to commercial fishing up to 2 hours earlier than the remainder of Subdistrict 1-B.
	A lack of processing capacity, commercial interest, and continued poor chum salmon market conditions resulted in no commercial openings in June and July.
	From late June through mid-July, limits on the number of fish that could be delivered by District 4 and 5 fishermen were imposed because of limited processing capacity.
2008	Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.
	From late June through mid-July, limits on the number of fish that could be delivered by District 4 and 5 fishermen were imposed because of limited processing capacity.

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Year	Event
2010	Kuskokwim River Chinook salmon spawning escapements were among the lowest on record and only the Kogrukluk achieved the lower end of the escapement goal.
	Kuskokwim River Tributaries, Kwethluk, and Tuluksak were closed to subsistence and sport harvest of Chinook salmon for most of the season by the USFWS.
	Kuskokwim River chum salmon catch was the largest since 1998.
	Kuskokwim River sockeye salmon run timing was the latest on record for the Bethel test fishery with 2 distinct pulses and an average commercial harvest.
	Telaquana Lake weir passed over 70,000 sockeye salmon.
	High water levels were sustained through most of August on the Kuskokwim River.
	Coho salmon fishery closed on August 12 due to low abundance and the commercial catch was the lowest since 1999.
	District W-4 highest exvessel value since 1988, primarily attributed to record sockeye salmon harvest.
	District W-5 had its highest exvessel value since 1994.
2011	Kuskokwim River Chinook salmon spawning escapements continued to be below average and only Kogrukluk met the escapement goal.
	Preseason management actions were taken in an effort to achieve escapement goals.
	Subsistence Chinook salmon fishing with hook and line gear was closed and subsistence fishing was restricted to the use of gillnets with 4 in or less mesh not to exceed 60 ft in the Tuluksak, Kisaralik, Kasigluk, and Kwethluk rivers including Kuksokuak Slough.
	Subsistence fishing was closed in District 1 from June 16 to June 19 and June 23 to June 28.
	Subsistence fishing was restricted to 6 in or smaller mesh from June 29 to July 7.
	Federal Special Actions in 3-KS-01-11 and 3-KS-02-11 preempted state management emergency orders from June 30 to July 2, 2011.
	Kuskokwim River chum salmon catch was the largest since 1998.
2012	Kuskokwim River Chinook salmon run was smallest on record resulting in 12 days of subsistence salmon fishing closures, additional Chinook salmon subsistence fishing restrictions, and the lowest Chinook salmon subsistence harvest on record.
	High water plagued escapement projects throughout the season and Chinook salmon escapement goals that were assessed were not achieved.
	Kuskokwim River declared an economic disaster due to low exvessel value and very small Chinook salmon subsistence harvest.
	District 4 and Kanektok River had the lowest catch and escapement of Chinook salmon on record.
	District 5 had highest sockeye salmon catch since 1994.
2013	In January of 2013, the Alaska Board of Fisheries adopted a new Kuskokwim River Salmon Management Plan (5 AAC 07.365), and a new drainagewide SEG of 65,000–120,000 Chinook salmon was established. Within the management plan it states that ADFG& shall use inseason run projections and test fishing indices to asses run abundance. This information would be evaluated inseason using the Bethel test fishery (BTF) catch per unit effort (CPUE) and subsistence harvest reports.

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Year	Event
(2013 cont.)	
	ANS ranges were adjusted at the January 2013 BOF meeting: 67,200–109,800 Chinook salmon in the Kuskokwim River drainage; 41,200–116,400 chum salmon in the Kuskokwim River drainage; 32,200–58,700 sockeye salmon in the Kuskokwim River drainage; 27,400–57,600 coho salmon in the Kuskokwim River drainage; 500–2,000 pink salmon in the Kuskokwim River drainage; 6,900–17,000 salmon in Districts 4 and 5 combined; 12,500–14,400 salmon for the remainder of the Kuskokwim Area.
	Kuskokwim River Chinook salmon run was the smallest on record. This resulted in 17 days of restrictions on the mainstem Kuskokwim River.
	The tributaries of Kwethluk, Kasigluk, Kisarolik, Tuluksak, and Aniak rivers were restricted to the use of gillnets with 4 in or less mesh size and 60 ft in length from June 1 to July 25.
	Chinook salmon escapements at tributary weirs were the lowest on record with escapements at the George and Kogrugluk river weirs being below their respective SEG range.
	The BOF removed the regulation allowing up to 8 in mesh size gillnets to be used in the Kuskokwim River commercial fishery by emergency order. This regulatory option had not been used and now only gillnets of 6 in or smaller mesh size may be used in the commercial fishery.

Appendix A2.–Commercial salmon harvest, including personal use, Kuskokwim Area, 1960–2013.

	Commercial harvest					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960[a]	5,969	5,649	5,498	0	0	17,116
1961[a]	23,246	2,308	5,090	90	18,864	49,598
1962[a]	20,867	10,313	12,432	4,340	45,707	93,659
1963[a]	18,571	0	15,660	0	0	34,231
1964[a]	21,230	13,422	28,992	939	707	65,290
1965[a]	24,965	1,886	12,191	0	4,242	43,284
1966	25,823	1,030	22,985	268	2,610	52,716
1967	29,986	652	58,239	0	8,235	97,112
1968	43,157	5,884	154,275	75,818	19,684	298,818
1969	64,777	10,362	110,473	1,251	50,377	237,240
1970	64,722	12,654	62,245	27,422	60,566	227,609
1971	44,936	6,054	10,006	13	99,423	160,432
1972	55,598	4,312	23,880	1,952	97,197	182,939
1973	51,374	5,224	152,408	634	184,207	393,847
1974	30,670	29,003	179,588	60,099	196,127	495,487
1975	28,219	17,705	110,576	915	225,308	382,723
1976	49,262	14,636	112,130	39,998	231,877	447,903
1977	58,256	18,621	263,727	434	298,959	639,997
1978	63,194	13,734	247,271	61,968	282,044	668,211
1979	53,314	39,463	308,683	574	297,167	699,201
1980	48,599	42,213	327,878	30,306	560,943	1,009,939
1981	79,377	105,940	278,551	463	485,653	949,984
1982	79,816	97,716	567,452	18,259	326,481	1,089,724
1983	93,676	90,834	248,389	379	306,554	739,832
1984	74,017	81,304	826,774	23,902	488,480	1,494,477
1985	74,083	121,221	382,096	111	224,680	802,191
1986	44,972	142,029	736,910	16,561	349,269	1,289,741
1987	65,558	170,849	478,594	163	603,274	1,318,438
1988	74,563	149,949	623,733	37,645	1,443,953	2,329,843
1989	67,003	82,628	556,312	819	802,199	1,508,961
1990	84,449	203,918	443,783	16,082	520,885	1,269,117
1991	48,170	202,441	556,818	522	502,187	1,310,138
1992	67,597	192,341	772,449	85,978	436,506	1,554,871
1993	26,636	167,235	686,570	71	94,937	975,449
1994	27,345	191,169	856,100	84,870	360,893	1,520,377
1995	72,352	198,045	555,539	318	707,212	1,533,466
1996	22,959	122,260	1,099,853	1,663	301,975	1,548,710
1997	47,990	123,002	166,648	7	67,200	404,847
1998	44,192	129,449	311,910	2,720	267,059	755,330
1999	25,019	81,201	32,251	2	72,659	211,132
2000	26,115	109,939	307,439	17	49,573	493,083
2001	14,384	59,545	220,804	0	21,893	316,626
2002	12,531	24,190	113,199	0	34,951	184,871
2003	16,014	63,646	346,555	0	36,225	462,440
2004	30,332	63,682	541,894	0	51,935	687,843
2005	31,014	120,379	205,762	19	85,236	442,410
2006	24,860	148,784	224,905	1	94,981	493,531
2007	22,878	153,812	189,456	6	79,864	446,016

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Appendix A2.–Page 2 of 2.

	Commercial harvest					
Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2008	23,958	112,581	259,681	15	98,239	494,474
2009	22,093	170,370	161,073	18	185,099	538,653
2010	18,721	201,869	76,621	7	227,441	524,659
2011	18,226	76,613	119,938	2	236,466	451,245
2012	8,576	91,192	143,123	0	150,822	393,713
2013	2,723	51,682	156,777	1	122,966	334,149
Average 2003–2012	21,667	120,293	226,901	5 [b]	124,631	493,498

[a] Includes harvests from District 3.

[b] Even years only.

Appendix A3.–Estimated exvessel value of the commercial salmon harvest and permits fished, Kuskokwim Management Area, 1987–2013.

	District 1		District 2		District 4		District 5			
Year	Value of catch	Permits fished [a]	Value of catch	Permits fished [a]	Value of catch	Permits fished [a]	Value of catch	Permits fished [a]	Total value	Total permits
1987	$4,893,016	705	$139,049	29	$858,818	310	$572,293	116	$6,463,176	800
1988	$10,060,427	745	$246,069	29	$1,381,661	289	$1,038,041	125	$12,480,129	813
1989	$3,883,321	743	$131,168	30	$746,071	227	$378,962	88	$5,008,354	824
1990	$3,385,636	742	$121,329	22	$1,013,472	390	$361,203	82	$4,760,311	823
1991	$2,971,767	749	$111,651	23	$592,436	346	$273,795	72	$3,837,998	819
1992	$3,764,804	741	$147,992	22	$993,664	349	$439,331	111	$5,197,799	814
1993	$2,533,895	737	$90,906	20	$898,255	408	$440,955	114	$3,873,105	804
1994	$3,559,114	706	$129,555	17	$837,157	307	$591,903	116	$4,988,174	793
1995	$2,776,677	712	$107,913	21	$1,047,188	382	$287,599	87	$4,111,464	798
1996	$2,108,418	620	$11,015	8	$534,726	218	$222,388	54	$2,865,532	714
1997	$430,614	604	$2,944	4	$497,071	289	$121,973	53	$1,049,658	702
1998	$982,791	615	$617	3	$467,843	203	$184,060	50	$1,634,694	707
1999	$170,278	509	$0	0	$279,092	218	$102,803	73	$552,173	604
2000	$509,594	532	$3,039	4	$466,560	230	$212,336	46	$1,188,490	623
2001	$429,534	412	$0	0	$228,615	159	$98,458	32	$756,607	514
2002	$127,208	318	$0	0	$167,748	114	$28,703	30	$323,659	407
2003	$453,187	359	$0	0	$304,553	114	$135,287	34	$893,027	438
2004	$943,767	390	$0	0	$405,344	116	$135,246	29	$1,484,357	467
2005	$448,853	403	$0	0	$571,965	145	$134,295	29	$1,155,113	484
2006	$451,390	373	$0	0	$551,182	132	$141,235	24	$1,143,807	453
2007	$380,842	366	$0	0	$660,865	125	$223,329	28	$1,265,036	456
2008	$538,310	374	$0	0	$750,731	146	$198,070	25	$1,487,111	462
2009	$502,848	342	$0	0	$747,325	179	$192,031	39	$1,442,204	434
2010	$765,606	433	$0	0	$1,655,321	241	$473,661	48	$2,894,588	530
2011	$764,358	413	$0	0	$1,176,435	219	$346,022	48	$2,286,815	510
2012	$597,998	379	$0	0	$824,435	179	$617,766	58	$2,040,199	477
2013	$1,184,847	378	$0	0	$761,537	197	$452,651	71	$2,399,035	469
Average 2003–2012	$584,716	383	$0	0	$764,816	160	$259,694	36	$1,609,226	471

[a] Number of permits that made at least one delivery.

Appendix A4.–Commercial salmon average mean weights and prices paid, Kuskokwim Area, Kuskokwim Area, 1967–2013.

	Average weight (lb)					Average price ($)				
Year	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
1967	27.8	7.4	5.9	[a]	7.0	0.13	0.05	0.09	[a]	0.04
1968	23.8	6.2	7.2	4.0	7.9	0.16	0.10	0.09	0.05	0.04
1969	19.6	6.2	7.3	3.6	5.8	0.19	0.15	0.10	0.06	0.07
1970	18.9	5.4	7.3	3.3	6.1	0.20	0.21	0.14	0.08	0.08
1971 [b]	26.2	6.9	6.1	[a]	6.4	0.17	0.10	0.13	[a]	0.08
1972	24.7	[a]	6.4	[a]	6.5	0.20	[a]	0.16	[a]	0.08
1973	26.7	[a]	5.8	[a]	6.8	0.25	[a]	0.26	[a]	0.19
1974	17.1	6.3	7.5	4.1	6.8	0.46	0.34	0.27	0.23	0.25
1975	14.9	[a]	8.2	[a]	6.4	0.54	[a]	0.31	[a]	0.26
1976 [c]	17.0	6.7	7.8	3.5	7.0	0.64	0.43	0.40	0.25	0.27
1977	22.7	8.3	7.8	3.9	7.3	1.15	0.45	0.65	0.25	0.45
1978	24.2	6.5	7.1	3.9	8.9	0.50	0.49	0.40	0.12	0.32
1979	16.6	6.9	7.9	3.9	7.0	0.66	0.53	0.75	0.11	0.37
1980	14.1	6.7	6.9	3.6	6.4	0.47	0.31	0.64	0.12	0.24
1981	17.8	7.2	6.4	3.5	7.5	0.84	0.61	0.63	0.11	0.23
1982	19.3	7.2	7.3	3.6	7.3	0.82	0.41	0.53	0.05	0.22
1983	18.8	6.8	6.8	3.5	7.4	0.54	0.51	0.39	0.05	0.33
1984	16.4	6.6	7.7	3.2	6.7	0.89	0.52	0.55	0.07	0.28
1985	17.0	7.0	7.5	3.6	7.1	0.71	0.59	0.51	0.05	0.25
1986	17.0	7.2	6.4	3.4	6.8	0.80	0.70	0.60	0.05	0.25
1987	15.2	7.5	7.2	3.7	6.8	1.10	1.30	0.73	0.10	0.27
1988	14.1	7.3	7.2	3.4	6.9	1.30	1.42	1.25	0.15	0.40
1989	16.6	7.2	7.3	3.4	6.8	0.75	1.20	0.55	0.05	0.26
1990	15.1	6.7	6.5	3.2	6.9	0.56	1.05	0.62	0.12	0.26
1991	15.3	6.9	6.5	3.4	6.3	0.56	0.67	0.45	0.12	0.31
1992	13.4	7.0	7.3	3.9	6.8	0.66	0.90	0.45	0.06	0.32
1993	14.3	7.1	6.6	3.4	6.5	0.62	0.70	0.58	0.25	0.40
1994	15.6	6.9	7.6	3.6	6.6	0.51	0.53	0.57	0.08	0.21
1995	17.3	6.9	7.2	3.7	6.9	0.60	0.71	0.41	0.12	0.18
1996	15.7	7.2	8.0	3.8	7.2	0.26	0.40	0.25	0.12	0.11
1997	16.2	7.1	7.5	2.7	7.3	0.28	0.42	0.33	0.10	0.12
1998	14.2	6.8	7.8	3.8	6.9	0.27	0.53	0.32	0.10	0.13
1999	15.5	6.5	6.6	3.0	7.3	0.32	0.58	0.32	0.05	0.10
2000	15.6	6.8	6.9	3.2	7.6	0.39	0.55	0.28	0.10	0.10
2001	20.0	7.6	7.7	[a]	7.5	0.36	0.35	0.28	[a]	0.10
2002	13.9	6.7	7.9	[a]	7.9	0.35	0.35	0.20	[a]	0.10
2003	13.6	7.3	6.9	[a]	8.0	0.35	0.44	0.10	[a]	0.21
2004	12.1	6.6	6.9	[a]	6.9	0.35	0.35	0.32	[a]	0.08
2005	14.5	6.7	7.4	3.7	6.7	0.59	0.55	0.27	0.05	0.05
2006	13.9	6.4	6.3	4.0	6.9	0.54	0.48	0.33	0.25	0.05
2007	14.1	6.6	7.2	[a]	6.8	0.59	0.53	0.38	[a]	0.05
2008	12.9	6.7	7.1	4.2	7.1	0.73	0.58	0.43	0.06	0.05
2009	13.1	6.5	7.6	3.5	6.9	0.71	0.56	0.35	0.00	0.15
2010	13.1	6.8	7.1	2.8	6.9	1.60	1.13	1.01	0.00	0.26
2011	12.5	6.5	7.1	4.0	6.4	0.85	0.86	0.75	0.00	0.68
2012	15.3	6.8	6.1	0.0	6.6	0.85	0.85	0.73	0.00	0.77
2013	17.1	6.4	7.6	0.0	6.8	1.00	1.00	1.00	0.00	1.00
Average 2003–2012	13.5	6.7	7.0	3.2	6.9	0.7	0.6	0.5	0.1	0.2

[a] Information unavailable.

[b] Information on price per pound was not available for District 5.

[c] Information was not available for District 4.

Appendix A5.–Salmon assessment programs, Kuskokwim Area, 2012.

Project name: Salmon management

Location: Kuskokwim Area

Duration: All year

Agencies and responsibilities: ADF&G CF and Subsistence (all aspects), OSM (monitor regulations, inseason actions), KRSMWG (make recommendations)

Primary objective(s):

- Develop a comprehensive plan for managing salmon stocks of the Kuskokwim Area.
- Define goals and objectives.
- Identify potential opportunities and concerns.
- Recommend appropriate procedures.
- Evaluate priorities.
- Provide sustained yield fishery management.

Project name: Postseason subsistence catch and effort assessment

Location: Kuskokwim Area

Duration: Postseason

Agencies and responsibilities: ADF&G CF all aspects, KNA and ONC survey crew, and OSM funding for Bethel and Aniak

Primary objective(s):

- Document and estimate the catch and associated effort of the subsistence salmon fisheries via interviews, catch calendars, mail-out questionnaires and telephone interviews.
- Household surveys in Bethel.
- Household surveys in Aniak.

Project name: Age, sex, and length (ASL) processing and reporting

Location: Kuskokwim Area

Duration: All year

Agencies and responsibilities: ADF&G CF all aspects and OSM funding

Primary objective(s):

- Scale aging, sample processing, and reporting of salmon age, sex, and length information of Chinook, sockeye, chum, and coho salmon from escapement and commercial and subsistence fisheries.

Project name: Subsistence ASL Sampling

Location: Lower Kuskokwim

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects, ONC all aspects in Bethel, and OSM funding in Bethel

Primary objective(s):

- Sample collection for age, sex, and length information from subsistence Chinook salmon harvest.
- Agency staff recruit and train subsistence fishermen to sample their own catches.

-continued-

Project name: Aerial surveys

Location: Kuskokwim area

Duration: July to August

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Index relative abundance of Chinook salmon spawning escapement in selected streams throughout the Kuskokwim Area.
- Index relative abundance of sockeye salmon spawning escapement in the Kanektok and Goodnews rivers.

Project name: Sport catch, harvest, and effort assessment.

Location: Kuskokwim area

Duration: Postseason

Agencies and responsibilities: ADF&G SF all aspects

Primary objective(s):

- Statewide mail out survey to estimate sport catch, harvest, and effort.

Project name: Commercial catch and effort assessment

Location: Districts 1, 2, 4, and 5

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Document and estimate the catch and associated effort of the commercial salmon fishery via receipts (fish tickets) of commercial sales and dock side sampling.

Project name: Commercial catch ASL sampling

Location: Districts 1, 4, and 5

Duration: June to August

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Determine age, sex, and length of salmon harvested in the commercial fisheries.

Project name: Kuskokwim River inseason subsistence harvest monitoring

Location: Lower Kuskokwim River

Duration: June to August

Agencies and responsibilities: ADF&G CF all aspects, ONC all aspects in Bethel, OSM funding

Primary objective(s):

- Weekly interviews with subsistence fishermen in lower Kuskokwim River to assess adequacy and quality of harvest.

-continued-

Project name: Kuskokwim River mark–recapture

Location: RM 179

Duration: June 10 to July 31

Agencies and responsibilities: ADF&G CF all aspects, KNA crew support, and AKSSF funding

Primary objective(s):

- Spaghetti tags were deployed on sockeye salmon caught using fish wheels near Kalskag in the mainstem Kuskokwim River and recovered upstream at several tributaries to determine stock-specific run timing, stock-specific travel speed, and to estimate total sockeye salmon run abundance using a 2 sample mark–recapture design.

Project name: Bethel test fishery

Location: Bethel Area RM 80

Duration: June to August

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Index relative run abundance of Chinook, sockeye, chum, and coho salmon using CPUE derived from drift gillnet catches.

Project name: Kwethluk River weir

Location: Kwelthluk River RM 99

Duration: June to September

Agencies and responsibilities: USFWS all aspects, ADF&G CF inseason data management, OVK crew support, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, coho, and pink salmon into the Kwethluk River.
- Estimate age, sex and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

Project name: Tuluksak River weir

Location: Tuluksak River RM 136

Duration: June to September

Agencies and responsibilities: USFWS all aspects, ADF&G CF inseason data management, TUTC crew support, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, coho, and pink salmon into the Tuluksak River.
- Estimate age, sex, and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

-continued-

Project name: George River weir

Location: George River RM 309

Duration: June to September

Agencies and responsibilities: KNA all aspects, ADF&G CF all aspects, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the George River.
- Estimate age, sex, and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

Project name: Kogrukluk River weir

Location: Holitna River drainage RM 335

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, and coho salmon into the Kogrukluk River.
- Estimate age, sex, and length composition of Chinook, chum, and coho salmon escapement.

Project name: Tatlawiksuk River weir

Location: Tatlawiksuk River RM 383

Duration: June to September

Agencies and responsibilities: KNA all aspects, ADF&G CF all aspects, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the Tatlawiksuk River.
- Estimate age, sex and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

Project name: Takotna River weir

Location: Takotna River RM 507

Duration: June to September

Agencies and responsibilities: TTC all aspects, ADF&G CF planning and supplies, CVRF funding, and OSM funding

Primary objective(s):

- Estimate daily escapement of Chinook, chum, and coho salmon into the Takotna River.
- Estimate age, sex, and length composition of Chinook, chum, and coho salmon escapement.
- Collect environmental/habitat information.

-continued-

Project name: Telequana River weir

Location: Outlet of Lake Stony River RM 756

Duration: July to August

Agencies and responsibilities: NPS co-managed and ADF&G CF co-managed

Primary objective(s):

- Estimate daily escapement of sockeye salmon into the Telaquana River.
- Estimate age, sex, and length composition sockeye salmon escapement.
- Drainagewide genetic and tagging mark and recapture estimates.
- Collect environmental/habitat information.

Project name: Kanektok River weir

Location: Mile 13 Kanektok River, Kuskokwim Bay

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects, NVK crew support, OSM funding, and CVRF funding

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the Kanektok River.
- Estimate age, sex, and length composition of Chinook, sockeye, and chum salmon escapement.

Project name: Middle Fork Goodnews River weir

Location: Mile 5 Middle Fork Goodnews River, Kuskokwim Bay

Duration: June to September

Agencies and responsibilities: ADF&G CF all aspects, USFWS crew support, and OSM funding – coho assessment

Primary objective(s):

- Estimate daily escapement of Chinook, sockeye, chum, pink, and coho salmon into the Middle Fork Goodnews River.
- Estimate age, sex, and length composition of Chinook, sockeye, chum, and coho salmon escapement

Note: ADF&G/CF = Division of Commercial Fisheries, Alaska Department of Fish and Game
ADF&G/SF = Division of Sport Fish, Alaska Department of Fish and Game
KNA = Kuskokwim River Native Association
NPS = National Park Service
NVK = Native Village of Kwinhagak
ONC = Orutsararmuit Native council
OSM = Federal Office of Subsistence Management
OVK = Organized Village of Kwethluk
TTC = Takotna Tribal Council
TUTC = Tuluksak Traditional Council
USFWS = U.S. Fish and Wildlife Service

Appendix A6.–Subsistence Chinook salmon harvest estimates by community, Kuskokwim Management Area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Kongiganak	2,003	2,663	1,536	***1,729***	1,865	2,233	1,243	1,456	1,208	***287***	***641***	1,285	1,622
North Kuskokwim Bay	2,003	2,663	1,536	1,729	1,865	2,233	1,243	1,456	1,208	287	641	1,285	1,622
Tuntutuliak	2,657	3,912	4,545	4,469	***4,614***	4,266	3,067	3,261	3,032	1,123	2,448	2,950	3,495
Eek	2,075	2,954	***3,133***	***2,501***	***2,512***	2,966	1,982	1,761	1,378	1,004	1,188	1,818	2,227
Kasigluk	4,711	***7,859***	***5,242***	***4,905***	***5,167***	2,471	2,464	3,014	2,823	552	2,919	2,265	3,921
Nunapitchuk	3,179	4,921	4,103	4,121	***4,661***	4,234	3,468	2,548	3,559	845	2,563	2,931	3,564
Atmautluak	547	2,153	***1,927***	1,758	***1,890***	1,298	1,567	1,088	1,236	234	1,592	1,085	1,370
Napakiak	2,438	2,839	3,060	5,125	3,245	1,903	2,387	1,674	1,963	457	1,588	1,677	2,509
Napaskiak	3,390	4,058	4,485	5,877	6,392	4,555	5,372	4,333	3,360	1,108	2,939	3,746	4,293
Oscarville	1,153	1,325	1,069	1,052	1,360	1,351	754	618	694	51	585	694	943
Bethel	24,584	29,443	28,293	27,805	30,422	27,800	26,170	26,157	25,093	7,321	17,246	22,508	25,309
Kwethluk	4,206	7,157	6,089	7,258	6,466	8,451	7,130	4,440	2,467	1,709	3,192	4,839	5,537
Akiachak	2,493	7,131	5,411	5,561	7,621	9,719	7,361	4,470	3,852	2,862	3,585	5,653	5,648
Akiak	3,905	3,775	3,860	4,423	4,297	4,090	3,247	3,625	2,455	***1,218***	1,449	2,927	3,489
Tuluksak	3,286	3,766	2,655	***2,372***	3,266	2,937	3,212	2,057	1,230	651	732	2,017	2,543
Lower Kuskokwim	58,624	81,293	73,872	77,228	81,914	76,040	68,181	59,046	53,142	19,135	42,026	55,109	64,847
Lower Kalskag	1,556	1,991	1,417	3,494	1,937	1,748	2,525	1,030	1,260	459	744	1,404	1,742
Upper Kalskag	1,328	2,498	2,533	1,569	1,383	2,435	1,696	1,496	1,772	562	1,317	1,592	1,727
Aniak	1,837	3,022	1,977	2,412	3,417	3,100	2,130	2,262	2,214	993	1,440	2,140	2,336
Chuathbaluk	405	1,460	913	***887***	973	772	877	551	409	103	155	542	735
Middle Kuskokwim	5,126	8,971	6,840	8,362	7,710	8,055	7,228	5,339	5,655	2,117	3,656	5,679	6,540
Crooked Creek	582	946	948	***736***	647	488	608	240	402	124	***145***	372	572
Red Devil	31	156	181	232	301	148	258	33	186	225	77	170	175
Sleetmute	600	906	522	750	861	933	693	272	242	132	96	454	591
Stony River	118	***688***	***311***	***288***	530	514	704	189	134	***151***	51	338	363
Lime Village	34	***69***	***171***	***103***	***95***	***29***	***75***	***47***	***118***	29	***43***	60	77
McGrath	395	***587***	910	689	495	288	600	262	829	68	95	409	512
Takotna	0	***16***	8	***0***	***10***	***0***	***8***	0	0	***0***	***0***	2	4
Nikolai	224	493	564	696	471	184	298	402	450	276	283	322	406
Telida	–	–	–	–	–	–	–	–	–	–	–	–	–

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Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Upper Kuskokwim	1,984	3,861	3,615	3,494	3,409	2,584	3,244	1,445	2,361	1,005	790	2,128	2,700
Kuskokwim River[b]	67,737	96,788	85,863	90,812	94,898	88,912	79,896	67,286	62,366	22,544	47,113	64,201	75,710
Quinhagak	2,563	4,563	3,505	5,163	4,686	3,125	3,312	2,793	2,588	2,396	3,143	2,843	3,469
Goodnews Bay	807	863	869	***713***	647	898	569	480	834	389	413	634	707
Platinum	45	122	74	***45***	66	42	61	17	62	24	39	41	56
South Kuskokwim Bay	3,415	5,548	4,448	5,921	5,399	4,065	3,942	3,290	3,484	2,809	3,595	3,518	4,232
Total estimated harvest	71,152	102,336	90,311	96,733	100,297	92,977	83,838	70,576	65,850	25,353	50,708	67,719	79,942

Source: Shelden et al. 2014.

Note: Dash indicates harvest was not estimated, bold italic indicates Bayesian imputed estimates.

[a] 5- and 10-year averages do not include the current year.

[b] Kuskokwim River total includes the Lower, Middle, and Upper Kuskokwim areas and North Kuskokwim Bay.

Appendix A7.–Estimated number of sockeye salmon harvested in the Kuskokwim area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Kongiganak	929	1,809	1,103	1,464	***960***	1,502	1,018	1,869	1,266	***1,307***	***1,031***	1,392	1,323
North Kuskokwim Bay	929	1,809	1,103	1,464	960	1,502	1,018	1,869	1,266	1,307	1,031	1,392	1,323
Tuntutuliak	1,148	1,620	2,145	1,834	1,763	***2,120***	932	2,068	1,274	1,516	1,183	1,582	1,642
Eek	586	567	1,033	***684***	***558***	***834***	1,019	1,241	664	1,490	1,319	1,050	868
Kasigluk	***2,429***	1,668	***1,634***	***2,248***	***1,786***	***1,041***	1,215	1,441	1,269	1,451	1,470	1,283	1,618
Nunapitchuk	1,714	1,659	1,821	1,871	2,147	***2,549***	1,538	1,902	2,223	2,396	1,806	2,122	1,982
Atmautluak	679	1,103	1,444	***1,012***	1,041	***1,250***	624	731	827	1,623	1,316	1,011	1,033
Napakiak	1,453	1,351	2,122	1,845	1,962	1,244	917	1,183	1,351	1,141	1,105	1,167	1,457
Napaskiak	1,643	1,148	1,344	1,784	1,738	2,620	1,579	1,979	1,587	2,065	2,069	1,966	1,749
Oscarville	806	436	278	778	712	677	332	250	228	323	347	362	482
Bethel	12,198	11,679	14,297	12,816	13,902	15,247	11,272	11,103	16,946	18,282	12,616	14,570	13,774
Kwethluk	1,903	3,302	2,457	2,770	3,536	4,920	2,432	2,534	2,357	2,884	2,705	3,025	2,910
Akiachak	1,607	3,109	2,372	2,661	3,269	4,354	2,407	2,433	2,647	3,443	2,594	3,057	2,830
Akiak	995	1,258	1,920	2,000	3,695	2,881	1,290	1,161	2,576	***1,818***	1,731	1,945	1,959
Tuluksak	875	1,670	987	2,247	***1,845***	2,133	1,691	2,483	1,699	1,380	1,541	1,877	1,701
Lower Kuskokwim	28,036	30,570	33,854	34,550	37,955	41,869	27,248	30,509	35,648	39,812	31,802	35,017	34,005
Lower Kalskag	515	775	439	1,434	780	1,583	1,044	507	802	891	977	965	877
Upper Kalskag	431	686	945	563	417	1,000	369	460	938	770	662	707	658
Aniak	756	996	1,015	692	1,261	1,585	923	1,165	1,168	1,375	1,466	1,243	1,094
Chuathbaluk	274	526	369	508	***484***	363	564	403	300	297	480	385	409

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Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Middle Kuskokwim	1,976	2,983	2,768	3,197	2,942	4,531	2,900	2,535	3,208	3,333	3,585	3,301	3,037
Crooked Creek	571	732	693	544	***523***	220	329	302	243	234	***514***	266	439
Red Devil	309	88	272	510	318	359	477	475	502	511	270	465	382
Sleetmute	504	980	673	1,181	1,303	1,164	684	1,024	693	715	362	856	892
Stony River	158	896	***688***	***746***	***1,019***	1,476	977	372	303	***469***	447	719	710
Lime Village	374	874	***1,368***	***1,216***	***1,406***	***659***	***1,080***	***932***	***739***	780	***831***	838	943
McGrath	112	194	***454***	149	375	417	965	650	630	233	538	579	418
Takotna	***1***	0	***1***	0	***1***	***3***	***3***	***2***	0	***2***	***2***	2	1
Nikolai	2	1	10	20	14	13	66	65	13	0	0	31	20
Telida	–	–	–	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim	2,031	3,765	4,160	4,365	4,960	4,310	4,581	3,822	3,123	2,945	2,964	3,756	3,806
Kuskokwim River[b]	32,973	39,127	41,885	43,577	46,817	52,213	35,747	38,735	43,245	47,396	39,382	43,467	42,171
Quinhagak	805	1,375	1,745	3,128	1,755	2,097	1,960	1,719	1,582	2,015	2,158	1,875	1,818
Goodnews Bay	705	873	1,213	995	***920***	1,739	902	1,093	1,328	1,197	1,113	1,252	1,096
Platinum	64	183	90	63	***121***	156	186	175	135	173	181	165	135
South Kuskokwim Bay	1,574	2,431	3,048	4,186	2,796	3,992	3,048	2,987	3,045	3,385	3,452	3,291	3,049
Total estimated harvest	34,547	41,558	44,933	47,763	49,613	56,205	38,795	41,722	46,290	50,781	42,834	46,759	45,221

Source: Shelden et al. 2014.

Note: Dash indicates harvest was not estimated, bold italic indicates Bayesian imputed estimates.

[a] 5- and 10-year averages do not include the current year.

[b] Kuskokwim River total includes the Lower, Middle, and Upper Kuskokwim areas and North Kuskokwim Bay.

Appendix A8.–Estimated number of coho salmon harvested in the Kuskokwim area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Kongiganak	236	937	740	657	883	***557***	561	483	613	***356***	***412***	514	602
North Kuskokwim Bay	236	937	740	657	883	557	561	483	613	356	412	514	602
Tuntutuliak	2,092	1,189	1,074	948	703	1,620	***359***	698	250	565	450	698	950
Eek	747	1,018	378	773	***459***	***661***	***176***	315	280	612	483	409	542
Kasigluk	***1,762***	***5,034***	1,304	***3,070***	***1,753***	***867***	***629***	1,043	430	303	418	654	1,620
Nunapitchuk	627	555	807	692	1,752	508	***286***	195	407	319	226	343	615
Atmautluak	283	744	530	254	***424***	262	***67***	36	263	383	203	202	325
Napakiak	992	1,648	742	2,363	1,244	1,006	420	877	927	402	634	726	1,062
Napaskiak	983	655	602	1,640	639	903	786	1,029	471	269	772	692	798
Oscarville	19	304	60	175	180	62	67	12	43	38	37	44	96
Bethel	15,062	17,040	12,994	18,810	12,972	15,839	12,895	20,426	18,141	13,280	12,662	16,116	15,746
Kwethluk	1,787	3,430	3,048	1,245	1,624	7,262	4,333	1,495	1,097	1,013	1,555	3,040	2,633
Akiachak	1,627	2,397	1,817	1,714	2,355	4,311	1,790	1,181	1,440	714	1,106	1,887	1,935
Akiak	1,094	1,342	1,847	379	1,325	1,358	661	475	505	***455***	454	691	944
Tuluksak	921	1,007	484	498	1,131	***635***	857	330	163	341	473	465	637
Lower Kuskokwim	27,996	36,363	25,687	32,561	26,561	35,293	23,326	28,112	24,417	18,694	19,473	25,969	27,901
Lower Kalskag	314	368	319	1,415	515	76	318	96	684	1,107	529	456	521
Upper Kalskag	462	1,500	594	1,799	381	2,350	181	92	998	360	636	796	872
Aniak	1,164	2,355	2,032	1,018	3,003	2,883	2,223	2,533	2,215	3,365	3,102	2,644	2,279
Chuathbaluk	259	284	346	727	419	***525***	96	76	109	179	319	197	302

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Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Middle Kuskokwim	2,199	4,507	3,291	4,959	4,318	5,834	2,818	2,797	4,006	5,011	4,586	4,093	3,974
Crooked Creek	375	713	312	401	289	***952***	283	87	297	149	***255***	354	386
Red Devil	351	65	331	171	193	307	126	88	130	238	318	178	200
Sleetmute	731	505	581	671	360	228	403	458	426	784	219	460	515
Stony River	214	679	468	***322***	***336***	***552***	634	201	333	***358***	120	416	410
Lime Village	***46***	231	372	***132***	***443***	***695***	***210***	***146***	***596***	117	***384***	353	299
McGrath	997	1,228	799	***894***	279	247	1,175	1,053	1,331	2,257	523	1,213	1,026
Takotna	6	***51***	8	***0***	8	***6***	***28***	***20***	3	***22***	***0***	16	15
Nikolai	379	171	166	407	95	53	203	135	20	214	119	125	184
Telida	–	–	–	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim	3,099	3,643	3,037	2,998	2,005	3,040	3,062	2,188	3,136	4,139	1,938	3,113	3,035
Kuskokwim River[b]	33,531	45,450	32,755	41,175	33,766	44,724	29,767	33,580	32,172	28,200	26,409	33,689	35,512
Quinhagak	1,133	1,868	1,435	1,558	1,315	1,550	1,869	1,824	1,599	1,369	1,380	1,642	1,552
Goodnews Bay	198	1,228	1,542	634	605	***468***	769	261	319	259	382	415	628
Platinum	96	144	266	223	116	***106***	114	81	197	143	124	128	149
South Kuskokwim Bay	1,427	3,240	3,243	2,415	2,036	2,124	2,752	2,166	2,115	1,771	1,886	2,186	2,329
Total Estimated Harvest	34,958	48,690	35,998	43,590	35,802	46,848	32,519	35,746	34,287	29,971	28,295	35,874	37,841

Source: Shelden et al. 2014.

Note: Dash indicates harvest was not estimated, bold italic indicates Bayesian imputed estimates.

[a] 5- and 10-year averages do not include the current year.

[b] Kuskokwim River total includes the Lower, Middle, and Upper Kuskokwim areas and North Kuskokwim Bay.

Appendix A9.–Estimated number of chum salmon harvested in the Kuskokwim area, 2003–2013.

Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Kongiganak	897	2,958	1,960	2,420	***2,353***	1,755	1,420	2,522	2,809	***1,638***	***1,397***	2,029	2,073
North Kuskokwim Bay	897	2,958	1,960	2,420	2,353	1,755	1,420	2,522	2,809	1,638	1,397	2,029	2,073
Tuntutuliak	1,288	2,546	3,568	4,024	3,350	***3,375***	3,330	2,439	1,865	2,614	2,180	2,725	2,840
Eek	578	688	**877**	***1,075***	***783***	***788***	782	721	486	1,552	1,232	866	833
Kasigluk	***3,581***	5,064	***4,194***	***5,461***	***4,309***	***1,502***	1,857	2,338	2,029	3,261	2,197	2,197	3,360
Nunapitchuk	2,865	5,053	4,167	5,150	**6,619**	***4,705***	3,468	3,223	4,257	5,312	2,977	4,193	4,482
Atmautluak	849	2,271	1,940	***2,337***	2,193	*2,177*	1,665	1,386	1,864	2,701	2,409	1,959	1,938
Napakiak	1,560	2,328	3,238	8,143	3,628	1,313	1,638	1,759	1,546	1,711	1,185	1,593	2,686
Napaskiak	2,061	2,705	2,205	4,323	3,032	2,400	1,451	3,110	1,783	3,216	2,589	2,392	2,629
Oscarville	804	828	686	1,151	932	847	534	352	402	599	490	547	714
Bethel	11,452	13,448	14,273	20,953	16,540	15,853	10,055	9,575	15,324	26,872	12,506	15,536	15,435
Kwethluk	2,294	4,288	4,328	6,328	6,291	5,729	4,111	3,112	3,484	3,849	3,825	4,057	4,381
Akiachak	2,650	3,880	2,428	4,333	4,782	6,856	2,872	2,856	3,205	4,150	3,417	3,988	3,801
Akiak	2,928	3,499	3,528	3,095	4,141	3,522	1,350	1,163	2,421	***2,925***	2,212	2,276	2,857
Tuluksak	894	2,433	2,183	3,094	***3,202***	2,920	1,570	3,180	2,697	2,585	3,062	2,590	2,476
Lower Kuskokwim	33,804	49,031	47,615	69,466	59,803	51,988	34,683	35,214	41,363	61,347	40,281	44,919	48,431
Lower Kalskag	1,087	1,316	997	4,703	1,997	1,004	930	691	1,643	3,284	1,214	1,510	1,765
Upper Kalskag	516	1,656	1,201	2,469	294	2,432	329	391	1,599	1,930	1,534	1,336	1,282
Aniak	820	2,535	2,952	3,722	4,108	2,830	2,602	2,515	2,391	5,667	2,880	3,201	3,014
Chuathbaluk	2,502	2,352	530	1,451	***1,541***	593	937	535	686	796	935	709	1,192

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Community	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	5-yr avg[a]	10-yr avg[a]
Middle Kuskokwim	4,925	7,859	5,680	12,345	7,940	6,859	4,798	4,132	6,319	11,677	6,563	6,757	7,253
Crooked Creek	750	1,583	1,064	1,513	***813***	352	519	539	862	610	***1,803***	576	861
Red Devil	63	135	214	41	186	188	244	122	434	516	981	301	214
Sleetmute	468	1,054	422	1,475	818	373	367	524	689	1,004	542	591	719
Stony River	361	754	***324***	***790***	***540***	1,247	771	338	516	***491***	***27***	673	613
Lime Village	110	199	***573***	***316***	***419***	***297***	***405***	***314***	***499***	419	909	387	355
McGrath	513	290	***470***	999	464	676	825	944	476	885	598	761	654
Takotna	***0***	0	*4*	0	***0***	***0***	***0***	***0***	0	***0***	***12***	0	0
Nikolai	191	277	230	308	223	54	292	440	349	1,044	513	436	341
Telida	–	–	–	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim	2,456	4,292	3,301	5,442	3,464	3,187	3,423	3,221	3,825	4,970	5,386	3,725	3,758
Kuskokwim River[b]	42,082	64,140	58,555	89,674	73,560	63,789	44,324	45,089	54,316	79,631	53,627	57,430	61,516
Quinhagak	559	1,383	994	2,754	2,249	1,794	1,557	1,347	1,255	2,001	1,958	1,591	1,589
Goodnews Bay	200	240	192	555	*395*	586	138	324	349	322	153	344	330
Platinum	19	42	21	108	*77*	106	28	37	70	76	90	63	58
South Kuskokwim Bay	778	1,665	1,207	3,417	2,720	2,486	1,723	1,708	1,674	2,399	2,201	1,998	1,978
Total Estimated Harvest	42,860	65,805	59,762	93,091	76,281	66,275	46,047	46,797	55,990	82,030	55,828	59,428	63,494

Source: Shelden et al. 2014.

Note: Dash indicates harvest was not estimated, bold italic indicates Bayesian imputed estimates.

[a] 5- and 10-year averages do not include the current year.

[b] Kuskokwim River total includes the Lower, Middle, and Upper Kuskokwim areas and North Kuskokwim Bay.

APPENDIX B: KUSKOKWIM RIVER SALMON

Appendix B1.–Districts 1 and 2 combined commercial salmon harvests, including personal use, Kuskokwim River, 1960–2013.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960[a]	5,969	0	2,498	0	0	8,467
1961[a]	18,918	0	5,044	0	0	23,962
1962[a]	15,341	0	12,432	0	0	27,773
1963[a]	12,016	0	15,660	0	0	27,676
1964[a]	17,149	0	28,613	0	0	45,762
1965[a]	21,989	0	12,191	0	0	34,180
1966	25,545	0	22,985	0	0	48,530
1967	29,986	0	56,313	0	148	86,447
1968	34,278	0	127,306	0	187	161,771
1969	43,997	322	83,765	0	7,165	135,249
1970	39,290	117	38,601	44	1,664	79,716
1971	40,274	2,606	5,253	0	68,914	117,047
1972	39,454	102	22,579	8	78,619	140,762
1973	32,838	369	130,876	33	148,746	312,862
1974	18,664	136	147,269	84	171,887	338,040
1975	22,135	23	81,945	10	184,171	288,284
1976	30,735	2,971	88,501	133	177,864	300,204
1977	35,830	9,379	241,364	203	248,721	535,497
1978	45,641	733	213,393	5,832	248,656	514,255
1979	38,966	1,054	219,060	78	261,874	521,032
1980	35,881	360	222,012	803	483,211	742,267
1981	47,663	48,375	211,251	292	418,677	726,258
1982	48,234	33,154	447,117	1,748	278,306	808,559
1983	33,174	68,855	196,287	211	276,698	575,225
1984	31,742	48,575	623,447	2,942	423,718	1,130,424
1985	37,889	106,647	335,606	75	199,478	679,695
1986	19,414	95,433	659,988	3,422	309,213	1,087,470
1987	36,179	136,602	399,467	43	574,336	1,146,627
1988	55,716	92,025	524,296	10,825	1,381,674	2,064,536
1989	43,217	42,747	479,856	464	749,182	1,315,466
1990	53,502	84,414	409,053	3,397	459,974	1,010,340
1991	37,778	108,946	500,935	378	431,802	1,079,839
1992	46,872	92,218	666,170	7,451	344,603	1,157,314
1993	8,735	27,008	610,739	64	43,337	689,883
1994	16,211	49,365	724,689	30,949	271,115	1,092,329
1995	30,846	92,500	471,461	93	605,918	1,200,818
1996	7,419	33,878	937,299	1,621	207,877	1,188,094
1997	10,441	21,989	130,803	2	17,026	180,261
1998	17,359	60,906	210,481	92	207,809	496,647
1999	4,705	16,976	23,593	2	23,006	68,282
2000	444	4,130	261,379	7	11,570	277,530
2001	90	84	192,998	0	1,272	194,444
2002	72	84	83,463	0	1,900	85,519
2003	158	282	284,064	0	2,764	287,268

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Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2004	2,305	8,532	435,407	0	20,150	466,394
2005	4,784	27,645	142,319	0	69,139	243,887
2006	2,777	12,618	185,636	1	44,152	245,184
2007	179	703	141,049		10,783	152,714
2008	8,865	15,601	142,877	15	30,798	198,156
2009	6,664	25,673	104,552	18	76,956	213,863
2010	2,732	22,433	58,031	7	93,917	177,120
2011	747	13,497	74,123	2	118,316	206,685
2012	627	2,857	86,394		65,195	155,073
2013	174	768	114,069	1	52,236	167,248
Average 2003–2012	2,984	12,984	165,445	6 [b]	53,217	234,636

[a] Includes harvests from District 3.

[b] Even years only.

Appendix B2.–Commercial salmon harvest and exvessel value, District W-1, Kuskokwim River, Kuskokwim Management Area,1993–2013.

Year	Chinook		Sockeye		Coho		Pink		Chum		Total	
	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value	Number	Value
1993	8,735	$72,659	27,008	$140,000	610,739	$2,535,321	64	$59	43,337	$112,756	689,883	$2,860,795
1994	16,211	$126,892	49,365	$188,691	724,689	$2,875,803	30,930	$8,967	271,115	$381,639	1,092,310	$3,581,992
1995	30,846	$280,287	92,500	$448,530	471,461	$1,313,742	335	$50	605,918	$724,273	1,201,060	$2,766,882
1996	7,419	$23,665	33,878	$97,176	937,299	$1,824,683	1,621	$744	207,877	$170,977	1,188,094	$2,117,245
1997	10,441	$36,843	21,989	$64,922	130,803	$2,167,491	2	$1	17,026	$19,509	180,261	$2,288,766
1998	17,359	$74,387	60,906	$209,860	210,481	$516,024	92	$55	207,809	$183,307	496,647	$983,633
1999	4,705	$22,266	16,976	$86,442	23,593	$44,633	2	-	23,006	$16,428	68,282	$169,769
2000	444	$ 3,044	4,130	$14,272	261,379	$489,644	7	$3	11,570	$7,967	277,530	$514,930
2001	90	$534	84	$265	192,998	$422,573	-	-	1,272	$827	194,444	$424,199
2002	72	$212	84	$196	83,463	$124,763	-	-	1,900	$1,190	85,519	$126,361
2003	158	$846	282	$803	284,064	$450,451	-	-	2,764	$1,087	287,268	$453,187
2004	2,305	$9,815	8,532	$19,549	435,407	$907,791	-	-	20,150	$6,611	466,394	$943,766
2005	4,784	$29,040	27,645	$109,063	142,319	$287,635	-	-	69,139	$23,115	243,887	$448,853
2006	2,777	$16,192	12,618	$41,891	185,598	$378,318	1	$1	44,070	$14,988	245,064	$451,390
2007	179	$1,607	703	$2,411	141,049	$373,789	-	-	10,763	$ 3,033	152,694	$380,840
2008	8,865	$70,988	15,601	$59,777	142,862	$396,329	15	$4	30,516	$11,212	197,859	$538,310
2009	6,664	$61,452	25,673	$101,445	104,546	$263,457	2	-	76,790	$76,494	213,675	$502,848
2010	2,731	$53,134	22,428	$167,575	58,031	$382,452	-	-	93,148	$162,445	176,338	$765,606
2011	49	$411	13,482	$79,370	74,108	$334,452	1	-	118,256	$350,124	205,896	$764,357
2012	14	$225	2,857	$16,154	86,389	$323,687	-	$0	65,171	$257,932	154,431	$597,998
2013	1	$6	768	$ 5,226	114,069	$833,327	-	-	52,236	$346,288	167,074	$1,184,847
Average 2003–2012	2,853	$24,371	12,982	$59,804	165,437	$409,836	2	$0	53,077	$90,704	234,351	$584,715

Appendix B3.–Chinook salmon utilization, Kuskokwim River, Kuskokwim Area, 1990–2013.

	Harvest				
Year	Commercial [a]	Subsistence	Test fish [b]	Sport	Total
1990	53,504 [c]	109,778	257	394	163,933
1991	37,778 [c]	74,820	149	401	113,148
1992	46,872 [c]	82,654	518	367	130,411
1993	8,735 [c]	87,674	2,515	587	99,511
1994	16,211 [c]	103,343	1,850	1,139	122,543
1995	30,846 [c]	102,110	1,001	541	134,498
1996	7,419 [c]	96,413	247	1,432	105,511
1997	10,441 [c]	79,381	332	1,227	91,381
1998	17,359 [c]	81,213	210	1,434	100,216
1999	4,705	72,775	98	252	77,830
2000	444	67,620	60	105	68,229
2001	90	78,009	0	290	78,389
2002	72	80,982	0	319	81,373
2003	158	67,134	0	401	67,693
2004	2,305	96,788	19	857	99,969
2005	4,784	85,090	2	572	90,448
2006	2,777	90,085	0	444	93,306
2007	179	96,155	0	1,478	97,812
2008	8,865	98,103	0	708	107,676
2009	6,664	78,231	0	904	85,799
2010	2,731	66,056	0	354	69,141
2011	49	62,368	0	579	62,996
2012	14	22,544	0	0	22,558
2013	1	47,113	0	0	47,114
Average 2003–2012	2,853	76,255	2	630	79,740

[a] Not including personal use.

[b] Test fishery sales only, does not include donations.

[c] Districts 1 and 2.

Appendix B4.–Sockeye salmon utilization, Kuskokwim River, Kuskokwim Area, 1990−2013.

	Harvest				
Year	Commercial [a]	Subsistence	Test Fish [b]	Sport Fish	Total
1990	84,414 [c]	45,897	456	61	130,372
1991	108,946 [c]	47,370	383	38	156,354
1992	92,218 [c]	43,514	1,264	131	135,863
1993	27,008 [c]	51,616	4,706	348	78,972
1994	49,365 [c]	42,362	2,561	359	92,086
1995	92,500 [c]	30,905	1,992	95	123,500
1996	33,878 [c]	40,591	623	315	74,784
1997	21,989 [c]	38,744	584	423	61,156
1998	60,906	36,103	625	178	97,187
1999	16,976	47,360	562	54	64,390
2000	4,130	45,942	410	46	50,118
2001	84	53,245	510	231	54,070
2002	84	32,296	0	42	32,422
2003	282	32,241	0	140	32,663
2004	8,532	39,127	44	400	48,103
2005	27,645	41,589	7	636	69,877
2006	12,618	43,315	0	231	56,164
2007	703	47,339	4	322	48,368
2008	15,601	58,729	0	273	74,603
2009	25,673	34,941	0	162	60,776
2010	22,428	38,103	0	419	60,950
2011	13,482	43,251	0	98	56,831
2012	2,857	47,396	1	132	50,386
2013	768	39,382	0	85	40,235
Average 2003–2012	12,982	42,603	6	281	55,872

[a] Not including personal use.

[b] Test fishery sales only, does not include donations.

[c] Districts 1 and 2.

Appendix B5.–Coho salmon utilization, Kuskokwim River, Kuskokwim Management Area, 1990−2013.

Year	Harvest				
	Commercial [a]	Subsistence	Test Fish [b]	Sport Fish	Total
1990	409,053 [c]	57,560	1,279	581	468,473
1991	500,935 [c]	39,252	1,188	1,003	542,378
1992	666,170 [c]	52,299	10,109	1,692	730,270
1993	610,739 [c]	28,485	8,084	980	648,288
1994	724,689 [c]	36,609	7,854	1,925	771,077
1995	471,461 [c]	36,823	6,620	1,497	516,401
1996	937,299 [c]	43,173	3,013	3,423	986,908
1997	130,803 [c]	29,816	1,103	2,408	164,130
1998	210,481 [c]	24,667	607	2,419	238,174
1999	23,593	27,409	343	1,998	53,343
2000	261,379 [c]	42,341	2,818	1,689	308,227
2001	192,998	31,089	1,530	1,204	226,821
2002	83,463	42,602	680	2,030	128,775
2003	284,064	33,531	570	3,244	321,409
2004	435,407	45,450	464	4,996	486,317
2005	142,319	32,755	454	3,539	179,067
2006	185,598	41,175	169	1,474	228,416
2007	141,049	33,766	446	2,355	177,616
2008	142,862	44,724	0	3,755	191,341
2009	104,546	29,767	0	3,257	137,570
2010	58,031	33,580	0	1,482	93,093
2011	74,108	32,172	0	896	107,176
2012	86,389	28,200	151	974	115,714
2013	114,069	26,409	0	1,147	141,625
Average 2003–2012	165,437	35,512	225	2,597	203,772

[a] Not including personal use.

[b] Test fishery sales only, does not include donations.

[c] Districts 1 and 2.

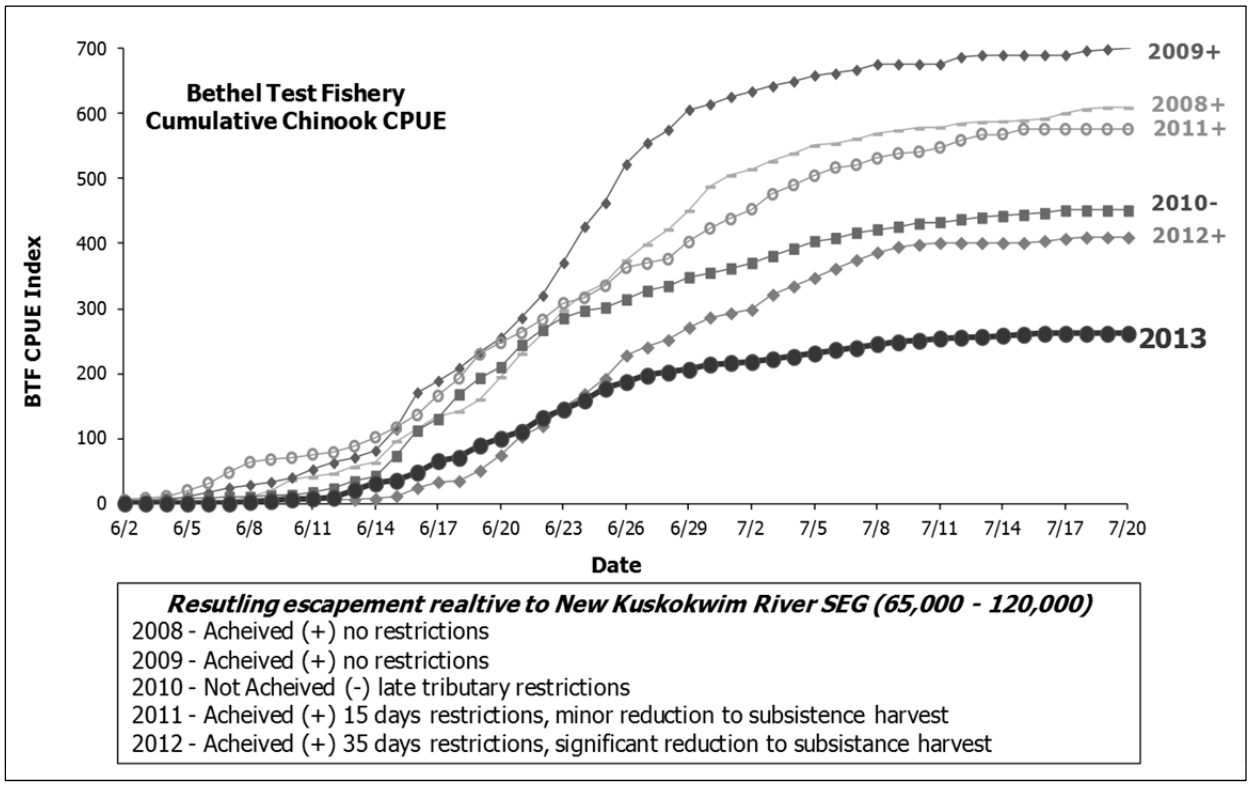
Appendix B6.–Chum salmon utilization, Kuskokwim River, Kuskokwim Area, 1990–2013.

Year	Harvest				
	Commercial [a]	Subsistence	Test Fish [b]	Sport Fish	Total
1990	459,974 [c]	153,825	1,650	533	615,982
1991	431,802 [c]	87,237	1,014	378	520,431
1992	344,603 [c]	116,391	12,409	608	474,011
1993	43,337 [c]	59,797	8,365	359	111,858
1994	271,115 [c]	76,937	11,637	1,280	360,969
1995	605,918 [c]	70,977	16,241	226	693,362
1996	207,877 [c]	100,913	2,864	280	311,934
1997	17,026 [c]	37,366	790	86	55,268
1998	207,809 [c]	61,732	1,140	291	270,972
1999	23,006	44,242	363	180	67,791
2000	11,570	56,499	1,033	26	69,128
2001	1,272	56,005	19	112	57,408
2002	1,900	86,381	7	53	88,341
2003	2,764	41,167	0	53	43,984
2004	20,150	64,140	113	84	84,487
2005	69,139	58,013	96	500	127,748
2006	44,070	89,620	0	13	133,703
2007	10,763	73,603	53	391	84,810
2008	30,516	68,633	0	121	99,270
2009	76,790	43,635	0	285	120,710
2010	93,148	46,148	0	85	139,381
2011	118,256	54,321	0	83	172,660
2012	65,171	79,631	93	80	144,975
2013	52,235	53,627	0	31	105,893
Average 2003–2012	53,077	61,891	36	170	115,173

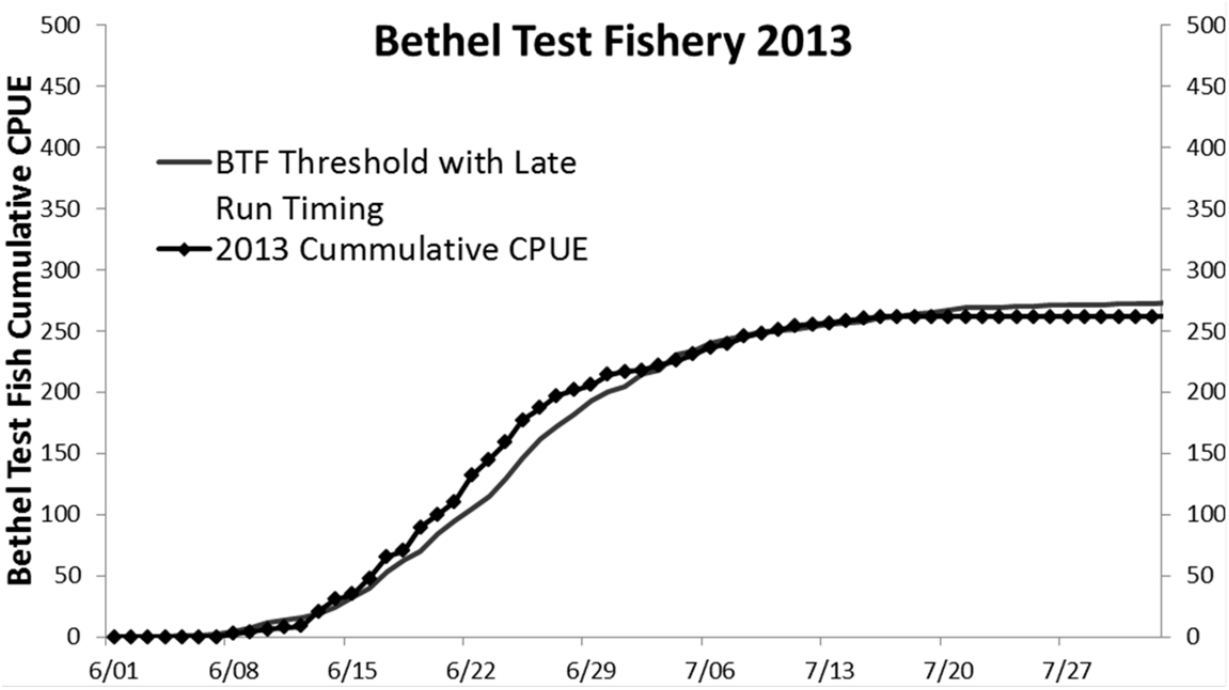
[a] Not including personal use.

[b] Test fishery sales only, does not include donations.

[c] Districts 1 and 2.



Appendix B7.–Cumulative Chinook salmon CPUE in the Bethel test fishery, Kuskokwim River, 2008–2013.



Appendix B8.–Daily inseason projection of the end of season test fishery Chinook salmon cumulative value using late run timing, Kuskokwim River, 2013.

Appendix B9.–Bethel test fishery harvest donations and sales, Kuskokwim River, Kuskokwim Management Area, 1990−2013.

	Chinook			Sockeye			Coho			Chum		
Year	Donated [a]	Sales [b]	Total	Donated [a]	Sales [b]	Total	Donated [a]	Sales [b]	Total	Donated [a]	Sales [b]	Total
1990[c]	255	257	512	–	456	–		1,279	–	457	1,650	2,107
1991	0	149	149	–	383	–		1,188	–	0	1,014	1,014
1992[d]	862	518	1,380	–	1,264	–		10,109	–	2,921	12,409	15,330
1993[d]	0	2,515	2,515	–	4,706	–		8,084	–	86	8,365	8,451
1994[d]	87	1,850	1,937	–	2,561	–		7,854	–	361	11,637	11,998
1995[d]	420	1,001	1,421	–	1,992	–		6,620	–	1,232	16,241	17,473
1996	0	247	247	–	623	–		3,013	–	0	2,864	2,864
1997	0	332	332	–	584	–		1,103	–	0	790	790
1998	0	210	210	–	625	–		607	–	0	1,140	1,140
1999	0	98	98	–	562	–	0	343	343	199	363	562
2000	4	60	64	–	410	–	10	2,818	2,828	5	1,033	1,038
2001	86	0	86	0	510	510	193	1,530	1,723	1,724	19	1,743
2002	288	0	288	228	0	228	1,804	680	2,484	2,659	7	2,666
2003	409	0	409	646	0	646	1,807	570	2,377	1,713	0	1,713
2004	672	19	691	698	44	742	1,795	464	2,259	1,697	113	1,810
2005	555	2	557	1,055	7	1,062	1,045	454	1,499	4,363	96	4,459
2006	352	0	352	519	0	519	1,017	169	1,186	3,547	0	3,547
2007	305	0	305	484	4	488	1,111	446	1,557	3,184	53	3,237
2008	420	0	420	584	0	584	2,954	0	2,984	2,472	0	2,472
2009	470	0	470	515	0	515	2,394	0	2,394	2,746	0	2,741
2010	292	0	292	495	0	495	1,020	0	1,020	2,872	0	2,872
2011	337	0	337	380	0	380	1,207	0	1,207	2,289	0	2,289
2012	321	0	321	398	1	399	1,104	151	1,255	2,637	93	2,730
2013	201	0	201	462	0	462	1,767	0	1,767	2,615	0	2,615
Average 2003–2012	413	2	415	577	6	583	1,545	225	1,774	2,752	36	2,787

Note: Dashes indicate no information available.

[a] Test fishery donations are included in postseason subsistence salmon harvest survey estimates.

[b] Test fishery sales are not included in commercial harvest tables.

[c] Includes Eek test fishery.

[d] Includes Eek and Aniak test fisheries.

Appendix B10.–Chinook salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2013.

	Chinook salmon escapement						
Year	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Salmon
2003	14,474	1,064	4,693	11,771	1,683	378	[a]
2004	28,605	1,475	5,207	19,651	2,833	461	[a]
2005	[a]	2,653	3,845	22,000	2,918	499	[a]
2006	17,619	1,043	4,357	19,414	1,700	539	[a]
2007	12,927	374	4,883	13,029	2,061	418	6,220
2008	5,276	701	2,698	9,730	1,071	413	2,376
2009	5,744	362	3,663	9,702	1,071	311	[a]
2010	1,668	201	1,500	5,690	567	178	[a]
2011	4,079	284	1,571	6,891	1,012	134	[a]
2012	[a]	560	2,302	[a]	1,116	228	[a]
2013	844	193	1,292	1,819	495	97	625
SEG	4,100–7,500		1,800–3,300	4,800–8,800			
Average 2003–2012	11,299	872	3,472	13,098	1,603	356	4,298

[a] Weir did not operate or counts were incomplete.

Appendix B11.–Chinook salmon spawning aerial survey index estimates, Kuskokwim River drainage, Kuskokwim Management Area, 2003−2013.

	Lower Kuskokwim River [a]				Middle Kuskokwim River [a]						Upper Kuskokwim River [a]		
Year	Eek	Kwethluk Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk	Salmon	Holokuk	Oskawalik	Holitna	Gagarayah	Cheeneetnuk	Salmon (Pitka)
2003	1,236	2,628	654	94	3,514	1,493	1,242	528	844		1,095	810	1,241
2004	4,653	6,801	5,157	1,196	5,362	1,868	2,177	306	293	4,051	670	918	1,138
2005	[b]	5,059	2,206	672	[b]	1,679	4,097	268	582	1,760	788	1,155	1,801
2006	[b]	[b]	4,734	[b]	5,639	1,618	[b]	365	386	1,866	531	1,015	862
2007	[b]	[b]	692	173	3,984	2,147	1,458	146	[b]	[b]	1,035	[b]	943
2008	[b]	487	1,074	[b]	3,222	1,061	589	190	213	[b]	177	290	1,305
2009	[b]	[b]	[b]	[b]	[b]	[b]	[b]	390	379	[b]	303	323	632
2010	[b]	[b]	235	[b]	[b]	[b]	[b]	108	b	587	62	[b]	135
2011	263	[b]	534	[b]	[b]	116	79	20	26	[b]	96	249	767
2012	[b]	[b]	610	[b]	[b]	193	49	9	51	[b]	178	229	670
2013	240	1,165	597	83	754	261	154	29	38	670	74	138	475
SEG			400–1,200		1,200–2,300		330–1,200			970–2,100	300–830	340–1,300	470–1,600
Average 2003–2012	2,051	3,744	1,766	534	4,344	1,272	1,384	233	347	2,066	494	624	949

[a] Estimates are from aerial surveys conducted during peak spawning periods under good or fair survey conditions.

[b] Survey was either not flown or did not meet acceptable survey criteria.

Appendix B12.–Sockeye salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2013.

	Sockeye salmon escapement							
Year	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Telaquana	Salmon
2003	2,928	288	16	9,164	[a]	3	[a]	[a]
2004	3,490	136	177	6,775	10	17	[a]	[a]
2005	[a]	642	276	37,939	77	34	[a]	[a]
2006	6,733	985	164	60,807	41	59	[a]	[a]
2007	5,262	352	74	16,525	27	13	[a]	2,130
2008	2,451	188	94	19,675	39	12	[a]	1,181
2009	4,230	686	54	23,785	39	3	[a]	[a]
2010	4,239	437	115	13,995	33	8	72,021	[a]
2011	2,031	126	43	8,132	23	1	35,105	[a]
2012	[a]	187	79	[a]	9	0	22,994	[a]
2013	746	394	150	7,808	37	0	28,050	966
SEG					4,400–17,000			
Average 2003–2012	3,921	403	109	21,866	33	15	43,373	1,656

[a] Weir did not operate or counts were incomplete.

Appendix B13.–Chum salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2013.

	Chum salmon escapement							
Year	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Aniak	Salmon
2003	41,812	11,725	33,666	23,413	[a]	3,393	477,544	[a]
2004	38,646	11,796	14,409	24,201	21,245	1,630	672,931	[a]
2005	[a]	35,696	14,828	197,723	55,720	6,467	1,151,505	[a]
2006	47,491	25,652	41,467	180,594	32,301	12,598	1,108,626	[a]
2007	54,913	17,286	55,842	49,505	83,246	8,900	696,801	25,379
2008	20,030	12,550	29,978	44,978	30,896	5,691	427,911	9,459
2009	32,191	13,671	7,941	84,940	19,975	2,487	479,531	[a]
2010	19,235	13,042	26,154	63,583	36,701	4,057	429,643	[a]
2011	18,329	9,828	44,640	76,384	84,202	8,414	345,630	[a]
2012	[a]	16,981	34,336	[a]	44,572	6,050	[a]	[a]
2013	22,380	12,911	37,879	65,644	32,249	6,465	[a]	7,723
SEG				15,000–49,000			222,000–480,000	
Average 2003–2012	34,081	16,823	30,326	82,813	45,429	5,969	643,347	17,419

[a] Weir did not operate or counts were incomplete.

Appendix B14.–Coho salmon escapements at weir projects, Kuskokwim River, Kuskokwim Management Area, 2003–2013.

	Coho salmon escapement						
Year	Kwethluk	Tuluksak	George	Kogrukluk	Tatlawiksuk	Takotna	Salmon
2003	109,163	41,071	33,280	74,604	[a]	7,171	[a]
2004	64,216	20,336	12,499	27,041	16,410	3,207	[a]
2005	[a]	11,324	8,200	24,116	7,495	2,216	[a]
2006	25,664	6,111	11,296	17,011	9,453	5,548	[a]
2007	20,256	2,807	29,317	27,033	8,685	2,853	[a]
2008	49,972	7,457	21,931	29,661	11,065	2,817	11,022
2009	21,911	8,137	12,573	22,981	10,148	2,708	6,391
2010	[a]	1,216	12,961	13,971	3,520	3,217	[a]
2011	[a]	[a]	30,028	24,174	12,928	4,063	[a]
2012	19,960	4,407	15,272	13,697	8,070	1,838	[a]
2013	[a]	6,490	15,308	21,207	12,764	4,026	2,797
SEG	>19,000			13,000–28,000			
Average 2003–2012	44,449	11,430	18,736	27,429	9,753	3,564	8,707

[a] Weir did not operate or counts were incomplete.

APPENDIX C: DISTRICT 4 SALMON

Appendix C1.–Commercial salmon fishing periods, hours, and permits fished, District 4 Quinhagak, Kuskokwim Bay, 1980−2013.

Year	Number of periods	Fishing hours	Permits fished [a]
1980	36	432	169
1981	33	396	186
1982	34	408	177
1983	28	318	226
1984	33	396	263
1985	23	276	300
1986	29	348	324
1987	19	216	310
1988	32	384	288
1989	29	348	227
1990	30	444	390
1991	31	372	346
1992	34	420	349
1993	32	384	409
1994	32	384	308
1995	35	414	382
1996	27	298	218
1997	31	372	289
1998	34	408	203
1999	19	228	218
2000	27	324	230
2001	20	231	159
2002	24	294	114
2003	24	288	114
2004	24	288	116
2005	23	276	145
2006	29	348	132
2007	33	396	125
2008	31	372	146
2009	29	342	179
2010	24	312	241
2011	26	312	219
2012	22	264	179
2013	18	216	197
Average 2003–2012	27	320	160

[a] Permits that made at least one delivery during the year.

Appendix C2.–Commercial salmon harvest, including personal use, District 4, Quinhagak, Kuskokwim Bay, 1960–2013.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1960	0	5,649	3,000	0	0	8,649
1961	4,328	2,308	46	90	18,864	25,636
1962	5,526	10,313	0	4,340	45,707	65,886
1963	6,555	0	0	0	0	6,555
1964	4,081	13,422	379	939	707	19,528
1965	2,976	1,886	0	0	4,242	9,104
1966	278	1,030	0	268	2,610	4,186
1967	0	652	1,926	0	8,087	10,665
1968	8,879	5,884	21,511	75,818	19,497	131,589
1969	16,802	3,784	15,077	953	38,206	74,822
1970	18,269	5,393	16,850	15,195	46,556	102,263
1971	4,185	3,118	2,982	13	30,208	40,506
1972	15,880	3,286	376	1,878	17,247	38,667
1973	14,993	2,783	16,515	277	19,680	54,248
1974	8,704	19,510	10,979	43,642	15,298	98,133
1975	3,928	8,584	10,742	486	35,233	58,973
1976	14,110	6,090	13,777	31,412	43,659	109,048
1977	19,090	5,519	9,028	202	43,707	77,546
1978	12,335	7,589	20,114	47,033	24,798	111,869
1979	11,144	18,828	47,525	295	25,995	103,787
1980	10,387	13,221	62,610	21,671	65,984	173,873
1981	24,524	17,292	47,551	160	53,334	142,861
1982	22,106	25,685	73,652	11,838	34,346	167,627
1983	46,385	10,263	32,442	168	23,090	112,348
1984	33,663	17,255	132,151	16,249	50,422	249,740
1985	30,401	7,876	29,992	28	20,418	88,715
1986	22,835	21,484	57,544	8,700	29,700	140,263
1987	26,022	6,489	50,070	66	8,557	91,204
1988	13,883	21,556	68,605	21,311	29,220	154,575
1989	20,820	20,582	44,607	273	39,395	125,677
1990	27,644	83,681	26,926	12,056	47,717	198,024
1991	9,480	53,657	42,571	115	54,493	160,316
1992	17,197	60,929	86,404	64,217	73,383	302,130
1993	15,784	80,934	55,817	7	40,943	193,485
1994	8,564	72,314	83,912	35,904	61,301	261,995
1995	38,584	68,194	66,203	186	81,462	254,629
1996	14,165	57,665	118,718 [a]	20	83,005	273,573
1997	35,510	69,562	32,862	5	38,445	176,384
1998	23,158	41,382	80,183	2,217	45,095	192,035
1999	18,426	41,315	6,184	0	38,091	104,016
2000	21,229	68,557	30,529	3	30,553	150,871
2001	12,775	33,807	18,531	0	17,209	82,322
2002	11,480	17,802	26,695	0	29,252	85,229
2003	14,444	33,941	49,833	0	27,868	126,086

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Appendix C2.–Page 2 of 2.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
2004	25,462	34,627	82,398	0	25,820	168,307
2005	24,195	68,801	51,708	19	13,529	158,252
2006	19,184	106,308	26,831	0	39,151	191,474
2007	19,573	109,343	34,710	0	61,228	224,854
2008	13,812	69,743	94,257	0	57,033	234,845
2009	13,920	112,153	48,115	0	91,158	265,346
2010	14,230	138,362	13,690	0	106,610	272,892
2011	15,387	38,543	30,457	0	104,959	189,346
2012	6,675	37,688	31,214	0	61,140	136,717
2013	2,054	26,393	21,126	0	58,079	107,652
Average 2003–2012	16,688	74,951	46,321	2	58,850	196,812

[a] Estimate of chum salmon roe included.

Appendix C3.–Commercial salmon fishing exvessel value, District 4, Quinhagak, Kuskokwim Bay, 1990–2013.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	$253,562	$542,485	$123,936	$4,146	$89,343	$1,013,472
1991	$94,950	$246,734	$144,379	$52	$106,321	$592,436
1992	$166,471	$368,310	$303,740	$15,875	$139,268	$993,664
1993	$143,506	$402,763	$246,746	$4	$105,236	$898,255
1994	$67,584	$253,922	$420,802	$10,454	$84,395	$837,157
1995	$418,067	$323,104	$201,413	$81	$104,523	$1,047,188
1996	$61,004	$165,100	$246,930	$6	$61,686	$534,726
1997	$171,688	$204,190	$91,584	$0	$29,609	$497,071
1998	$82,168	$150,631	$197,676	$871	$36,497	$467,843
1999	$94,880	$140,846	$14,997	$0	$28,368	$279,091
2000	$131,351	$249,382	$31,898	$1	$23,929	$436,561
2001	$93,697	$89,334	$32,577	$0	$13,007	$228,615
2002	$56,356	$40,368	$47,651	$0	$23,374	$167,749
2003	$69,201	$107,287	$108,804	$0	$19,261	$304,553
2004	$107,700	$77,394	$201,879	$0	$18,372	$405,345
2005	$221,854	$241,478	$101,776	$4	$6,853	$571,965
2006	$147,802	$327,917	$61,433	$0	$14,030	$551,182
2007	$163,248	$374,004	$102,569	$0	$21,044	$660,865
2008	$140,580	$272,427	$317,143	$0	$20,581	$750,731
2009	$130,561	$384,209	$136,562	$0	$95,993	$747,325
2010	$294,163	$1,049,395	$117,658	$0	$194,105	$1,655,321
2011	$166,606	$207,642	$198,333	$0	$603,855	$1,176,436
2012	$85,934	$208,023	$167,638	$0	$362,840	$824,435
2013	$35,126	$154,135	$172,739	$0	$399,537	$761,537
Average 2003–2012	$152,765	$324,978	$151,380	$0	$135,693	$764,816

Appendix C4.–Chinook salmon total utilization, District 4 Quinhagak, Kuskokwim Bay, 1990–2013.

Year	Commercial [a]	Subsistence [b]	Sport	Total
1990	27,644	3,881	503	32,028
1991	9,480	3,753	316	13,549
1992	17,197	4,394	656	22,247
1993	15,784	3,634	1,006	20,424
1994	8,564	3,977	751	13,292
1995	38,584	2,864	739	42,187
1996	14,165	3,506	689	18,360
1997	35,510	3,186	1,632	40,328
1998	23,158	3,774	1,475	28,407
1999	18,426	2,815	854	22,095
2000	21,229	3,053	833	25,115
2001	12,775	3,177	947	16,899
2002	11,480	2,649	779	14,908
2003	14,444	2,563	323	17,330
2004	25,465	4,563	228	30,256
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	17,955
2009	13,920	2,976	400	17,296
2010	14,230	2,692	552	17,474
2011	15,387	2,588	925	18,900
2012	6,675	2,396	591	9,662
2013	2,054	3,143	30	5,227
Average 2003–2012	16,689	3,506	515	20,709

[a] Does not include personal use.

[b] Subsistence harvest by the community of Quinhagak.

Appendix C5.–Sockeye salmon total utilization, District 4 Quinhagak, Kuskokwim Bay, 1990–2013.

Year	Commercial [a]	Subsistence [b]	Sport	Total
1990	83,681	1,710	462	85,853
1991	53,657	1,818	88	55,563
1992	60,929	1,448	66	62,443
1993	80,934	1,228	331	82,493
1994	72,314	962	313	73,589
1995	68,194	597	148	68,939
1996	57,665	499	335	58,499
1997	69,562	460	607	70,629
1998	41,382	1,368	942	43,692
1999	41,315	1,433	496	43,244
2000	68,557	1,368	694	70,619
2001	33,807	1,054	83	34,944
2002	17,802	909	73	18,784
2003	33,941	805	107	34,853
2004	34,627	1,375	112	36,114
2005	68,801	1,745	156	70,702
2006	106,308	3,128	523	109,959
2007	109,343	1,755	385	111,483
2008	69,743	2,692	654	73,089
2009	112,153	1,744	75	113,972
2010	138,362	1,671	404	140,437
2011	38,543	1,582	429	40,554
2012	37,688	2,015	157	39,860
2013	26,393	2,158	159	28,710
Average 2003–2012	74,951	1,851	300	77,102

[a] Does not include personal use.

[b] Subsistence harvest by the community of Quinhagak.

Appendix C6.–Coho salmon total utilization, District 4 Quinhagak, Kuskokwim Bay, 1990–2013.

Year	Commercial [a]	Subsistence [b]	Sport	Total
1990	26,926	3,799	644	30,800
1991	42,571	3,230	358	46,220
1992	86,404	3,291	275	88,708
1993	55,817	2,029	734	59,095
1994	83,912	2,544	675	87,067
1995	66,203	2,480	970	68,907
1996	118,718	1,734	875	120,698
1997	32,862	1,105	1,220	35,619
1998	80,183	1,537	751	82,715
1999	6,184	1,781	1,091	8,317
2000	30,529	1,042	799	33,047
2001	18,531	1,719	2,448	22,112
2002	26,695	1,133	1,784	30,347
2003	49,833	1,868	1,076	52,344
2004	82,398	1,435	1,362	85,318
2005	51,708	1,558	1,006	54,029
2006	26,831	1,315	1,742	30,123
2007	34,710	1,550	1,087	37,666
2008	94,257	1,869	1,541	97,622
2009	48,115	1,824	876	50,590
2010	13,690	1,599	1,280	16,339
2011	30,457	1,369	1,287	33,124
2012	31,214	1,380	2,596	34,897
2013	21,126	1,087	2,509	25,212
Average 2003–2012	46,321	1,577	1,385	49,205

[a] Does not include personal use.

[b] Subsistence harvest by the community of Quinhagak.

Appendix C7.–Chum salmon total utilization, District 4 Quinhagak, Kuskokwim Bay, 1990–2013.

Year	Commercial [a]	Subsistence [b]	Sport	Total
1990	47,717	3,161	202	51,080
1991	54,493	1,631	80	56,204
1992	73,383	2,287	251	75,921
1993	40,943	1,053	183	42,179
1994	61,301	1,401	156	62,858
1995	81,462	669	213	82,344
1996	83,005	943	200	84,148
1997	38,445	572	212	39,229
1998	45,095	1,375	213	46,683
1999	38,091	1,587	293	39,971
2000	30,553	895	231	31,679
2001	17,209	808	43	18,060
2002	29,252	2,011	446	31,709
2003	27,868	559	14	28,441
2004	25,820	1,383	33	27,236
2005	13,529	994	108	14,631
2006	39,151	2,754	145	42,050
2007	61,228	2,249	15	63,492
2008	57,033	1,795	48	58,876
2009	91,158	1,297	44	92,499
2010	106,610	1,376	44	108,030
2011	104,959	1,255	271	106,485
2012	61,140	2,001	249	63,390
2013	58,079	1,958	320	60,357
Average 2003–2012	55,661	1,567	117	57,345

[a] Does not include personal use.

[b] Subsistence harvest by the community of Quinhagak.

Appendix C8.–Salmon spawning escapement, Kanektok River, Kuskokwim Bay, 1996−2013.

Year	Operating Period [a]	Chinook	Sockeye	Coho	Pink [b]	Chum
Kanektok River						
Counting Tower						
1996	7/2-7/13; 7/20-7/25	[c]	[c]			[c]
1997	06/11 to 08/21	16,731	96,348	[c]	7,872	51,180
1998	07/23 to 08/17	[c]	[c]	[c]	[c]	[c]
1999		Not Operational				
2000		Not Operational				
Weir						
2001	08/10 to 10/03	132 [c]	739 [c]	35,650	19	1,056 [c]
2002	07/01 to 09/20	5,343 [d]	58,326 [d]	24,840	87,031	42,009 [d]
2003	06/24 to 09/18	8,231	127,471	72,448	2,443	40,066
2004	06/29 to 09/20	19,528	102,867	87,828	98,060	46,444
2005	06/25 to 09/18	14,331	242,208	26,343 [e]	3,530	53,580
2006		Not Operational				
2007	06/19 to 09/18	14,120	307,750	30,471	3,075	133,215
2008	07/17 to 08/21	6,578 [d]	141,388 [e]	24,490 [d]	142,430	54,024 [d]
2009	07/05 to 08/11	6,841	272,483 [d]	2,336 [c]	1,246	51,652 [d]
2010	06/28 to 08/05	5,800	202,643	344 [c]	114,074	62,567
2011	06/27 to 08/15	5,032	84,805	5,779 [c]	491	50,908
2012	07/06 to 08/15	1,568 [a]	88,800 [e]	4,248 [c]	62,141	24,173 [a]
2013	06/25 to 08/15	3,569	128,761	3,116 [c]	532	43,040

[a] The operational period is inclusive of days when passage was estimated; unless noted otherwise, less than 20% of the total annual escapement is estimated.

[b] Pink salmon numbers represent actual counts. No estimates of missed escapement, due to picket spacing allowing unmonitored for small pink salmon.

[c] Field operations were incomplete and total annual escapement was not estimated.

[d] Field operations were incomplete; sum of daily counts is an underestimate of total escapement, but considered reasonable. Additional estimates were not made.

[e] Field operations were incomplete; more than 20% of the total estimate is based on daily passage estimates.

Appendix C9.–Salmon spawning aerial survey index estimates, Kanektok River, Kuskokwim Bay drainage, 1962−2013.

Year	Chinook	Sockeye	Coho	Chum
1962	935	43,108	[a]	[a]
1963	[a]	[a]	[a]	[a]
1964	[a]	[a]	[a]	[a]
1965	[a]	[a]	[a]	[a]
1966	3,718 [a]	[a]	28,800	[a]
1967	[a]	[a]	[a]	[a]
1968	4,170	8,000	14,000	[a]
1969	[a]	[a]	[a]	[a]
1970	3,112 [a]	11,375	[a]	[a]
1971	[a]	[a]	[a]	[a]
1972	[a]	[a]	[a]	[a]
1973	814	[a]	[a]	[a]
1974	[a]	[a]	[a]	[a]
1975	[a]	6,018	[a]	[a]
1976	[a]	22,936	8,697	[a]
1977	5,787	7,244	32,157	[a]
1978	19,180	44,215	229,290 [b]	[a]
1979	[a]	[a]	[a]	[a]
1980		[a]	[a]	[a]
1981	6,172	113,931	25,950	69,325
1982	15,900	49,175	71,840	[a]
1983	8,142	55,940	[a]	[a]
1984	8,890	2,340	9,360	[a]
1985	12,182	30,840	53,060	46,830
1986	13,465	16,270	14,385	[a]
1987	3,643	14,940	16,790	[a]
1988	4,223	51,753	9,420	20,056
1989	11,180	30,440	20,583	[a]
1990	7,914	14,735	6,270	[a]
1991	2,563	32,082	2,475	[a]
1992	2,100	44,436	[a]	4,330
1993	3,856	14,955	25,675	[a]
1994	4,670	23,128	1,285	[a]
1995	7,386	30,090	10,000	[a]
1996	6,107	22,020	[a]	23,656 [a]
1997	[a]	[a]	[a]	[a]
1998	[a]	[a]	[a]	[a]
1999	[a]	[a]	[a]	[a]
2000	[a]	[a]	[a]	[a]
2001	6,483	38,610	11,440	[a]
2002	[a]	[a]	[a]	[a]
2003	6,206	21,335	[a]	[a]
2004	28,375	78,380	[a]	[a]
2005	14,202	110,730	[a]	[a]

-continued-

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Year	Chinook	Sockeye	Coho	Chum
2006	8,433	382,800	[a]	[a]
2007	[a]	[a]	[a]	[a]
2008	3,659	38,900	[a]	[a]
2009	[a]	[a]	[a]	[a]
2010	1,228	16,950	[a]	[a]
2011	[a]	[a]	[a]	[a]
2012	[a]	[a]	[a]	[a]
2013	2,346	64,802	[a]	[a]
SEG	3,500–8,000	14,000–34,000	>5,200	

Note: Aerial surveys are those rated as fair to good, obtained between 20 July and 5 August for Chinook and sockeye salmon, 20–31 July for chum salmon, and 20 August and 5 September for coho salmon.

[a] Survey either not flown or did not meet acceptable survey criteria.

[b] Chum salmon count excluded from escapement objective calculation due to exceptional magnitude.

APPENDIX D: DISTRICT 5 SALMON

Appendix D1.–Commercial salmon fishing periods, hours, and permits fished, District 5, Goodnews Bay, Kuskokwim Bay, 1980–2013.

Year	Number of periods	Fishing hours	Permits fished[a]
1980	38	456	48
1981	34	492	48
1982	34	540	48
1983	28	336	79
1984	31	372	77
1985	22	264	69
1986	30	360	86
1987	21	252	69
1988	30	360	125
1989	28	336	88
1990	28	396	82
1991	27	432	72
1992	26	396	111
1993	28	336	114
1994	32	432	116
1995	25	396	118
1996	21	247	53
1997	23	276	54
1998	29	348	50
1999	20	240	73
2000	25	300	46
2001	16	183	32
2002	12	144	30
2003	23	216	34
2004	21	252	29
2005	21	252	29
2006	27	324	24
2007	33	396	28
2008	30	360	25
2009	26	306	39
2010	22	260	48
2011	21	252	48
2012	28	336	58
2013	21	252	71
Average 2003–2012	25	295	36

[a] Permits that made at least one delivery during the year.

Appendix D2.–Commercial salmon harvests, including personal use, District W-5 Goodnews Bay, Kuskokwim Bay, 1968–2013.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1968	[a]	[a]	5,458	[a]	[a]	5,458
1969	3,978	6,256	11,631	298	5,006	27,169
1970	7,163	7,144	6,794	12,183	12,346	45,630
1971	477	330	1,771	0	301	2,879
1972	264	924	925	66	1,331	3,510
1973	3,543	2,072	5,017	324	15,781	26,737
1974	3,302	9,357	21,340	16,373	8,942	59,314
1975	2,156	9,098	17,889	419	5,904	35,466
1976	4,417	5,575	9,852	8,453	10,354	38,651
1977	3,336	3,723	13,335	29	6,531	26,954
1978	5,218	5,412	13,764	9,103	8,590	42,087
1979	3,204	19,581	42,098	201	9,298	74,382
1980	2,331	28,632	43,256	7,832	11,748	93,799
1981	7,190	40,273	19,749	11	13,642	80,865
1982	9,476	38,877	46,683	4,673	13,829	113,538
1983	14,117	11,716	19,660	0	6,766	52,259
1984	8,612	15,474	71,176	4,711	14,340	114,313
1985	5,793	6,698	16,498	8	4,784	33,781
1986	2,723	25,112	19,378	4,439	10,356	62,008
1987	3,357	27,758	29,057	54	20,381	80,607
1988	4,964	36,368	30,832	5,509	33,059	110,732
1989	2,966	19,299	31,849	82	13,622	67,818
1990	3,303	35,823	7,804	629	13,194	60,753
1991	912	39,838	13,312	29	15,892	69,983
1992	3,528	39,194	19,875	14,310	18,520	95,427
1993	2,117	59,293	20,014	0	10,657	92,081
1994	2,570	69,490	47,499	18,017	28,477	166,053
1995	2,922	37,351	17,875	39	19,832	78,019
1996	1,375	30,717	43,836	22	11,093	87,043
1997	2,039	31,451	2,983	0	11,729	48,202
1998	3,675	27,161	21,246	411	14,155	66,648
1999	1,888	22,910	2,474	0	11,562	38,834
2000	4,442	37,252	15,531	7	7,450	64,682
2001	1,519	25,654	9,275	0	3,412	39,860
2002	979	6,304	3,041	0	3,799	14,123
2003	1,412	29,423	12,658	0	5,593	49,086
2004	2,565	20,523	24,089	0	5,965	53,142
2005	2,035	23,933	11,735	0	2,568	40,271
2006	2,899	29,858	12,438	0	11,678	56,873
2007	3,126	43,766	13,697	6	7,853	68,448
2008	1,281	27,237	22,547	0	10,408	61,473
2009	1,509	32,544	8,406	0	16,985	59,444
2010	1,759	41,074	4,900	0	26,914	74,647
2011	2,092	24,573	15,358	0	13,191	55,214
2012	1,536	50,647	25,515	0	24,487	102,185
2013	495	24,521	21,582	0	12,651	59,249
Average 2003–2012	2,021	32,358	15,134	1	12,564	62,078

[a] No harvest information available.

Appendix D3.–Commercial salmon fishing exvessel value, District W-5 Goodnews Bay, Kuskokwim Bay, 1990–2013.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
1990	$32,135	$263,598	$38,910	$254	$25,767	$360,664
1991	$8,370	$187,622	$47,519	$14	$31,394	$274,919
1992	$30,688	$257,457	$75,278	$2,913	$39,111	$405,447
1993	$21,351	$296,437	$95,043	$0	$28,304	$441,135
1994	$21,732	$309,577	$271,687	$5,442	$41,309	$649,747
1995	$31,339	$175,552	$58,061	$19	$21,427	$286,398
1996	$5,952	$87,427	$120,191	$4	$9,015	$222,589
1997	$10,867	$93,146	$9,497	$0	$9,358	$122,868
1998	$13,685	$100,171	$59,102	$174	$11,133	$184,265
1999	$9,020	$78,800	$7,515	$0	$8,327	$103,662
2000	$25,614	$146,708	$34,689	$2	$6,001	$213,014
2001	$10,496	$68,678	$17,089	$0	$2,586	$98,849
2002	$343	$15,846	$5,634	$0	$2,979	$24,802
2003	$6,461	$95,818	$28,945	$0	$3,883	$135,107
2004	$10,857	$49,741	$70,404	$0	$4,244	$135,246
2005	$16,696	$91,135	$25,010	$0	$1,454	$134,295
2006	$21,314	$87,996	$27,587	$0	$4,368	$141,265
2007	$23,951	$156,802	$38,796	$0	$2,781	$222,330
2008	$13,181	$104,296	$76,683	$0	$3,910	$198,070
2009	$13,333	$134,244	$25,456	$0	$18,998	$192,031
2010	$44,910	$334,366	$44,706	$0	$46,679	$470,661
2011	$19,224	$141,347	$106,471	$0	$78,980	$346,022
2012	$20,509	$299,187	$15,668	$0	$147,401	$482,765
2013	$8,546	$169,318	$185,332	$0	$89,455	$452,651
Average 2003–2012	$19,044	$149,493	$45,973	$0	$31,270	$245,779

Appendix D4.–Chinook salmon total utilization, District W-5 Goodnews Bay, Kuskokwim Bay, 1990–2013.

Year	Harvest			
	Commercial [a]	Subsistence [b]	Sport	Total
1990	3,303	560		3,863
1991	912	872	26	1,810
1992	3,528	615	23	4,166
1993	2,117	665	81	2,863
1994	2,570	746	163	3,479
1995	2,922	813	41	3,776
1996	1,375	433	157	1,965
1997	2,039	455	86	2,580
1998	3,675	792	431	4,898
1999	1,888	828	223	2,939
2000	4,442	663	243	5,348
2001	1,519	920	147	2,586
2002	979	877	224	2,080
2003	1,412	852	10	2,274
2004	2,565	985	100	3,650
2005	2,035	943	0	2,978
2006	2,892	758	79	3,729
2007	3,112	713	177	4,002
2008	1,281	1,054	78	2,413
2009	1,509	646	31	2,186
2010	1,752	494	0	2,246
2011	2,092	896	51	3,039
2012	1,531	413	41	1,985
2013	495	452	102	1,049
Average 2003–2012	2,018	775	57	2,850

[a] Does not include personal use.

[b] Subsistence harvest by the communities of Goodnews Bay and Platinum.

Appendix D5.–Sockeye salmon total utilization, District W-5 Goodnews Bay, Kuskokwim Bay, 1990–2013.

	Harvest			
Year	Commercial [a]	Subsistence [b]	Sport	Total
1990	35,823	1,145		36,968
1991	39,838	1,195	63	41,096
1992	39,194	1,531	8	40,733
1993	59,293	781	53	60,127
1994	69,490	736	70	70,296
1995	37,351	234	34	37,619
1996	30,717	443	87	31,247
1997	31,451	623	61	32,135
1998	27,161	578	502	28,241
1999	22,910	821	561	24,292
2000	37,252	1,139	82	38,473
2001	25,654	991	108	26,753
2002	6,304	1,112	149	7,565
2003	29,423	769	42	30,234
2004	20,523	1,056	0	21,579
2005	23,933	1,303	0	25,236
2006	29,857	1,058	98	31,013
2007	43,716	998	84	44,798
2008	27,236	2,381	104	29,721
2009	32,544	1,094	111	33,749
2010	41,074	1,268	15	42,357
2011	24,573	1,463	733	26,769
2012	50,635	1,370	286	52,291
2013	24,521	1,294	227	26,042
Average 2003–2012	32,351	1,276	147	33,775

[a] Does not include personal use.

[b] Subsistence harvest by the communities of Goodnews Bay and Platinum.

Appendix D6.–Coho salmon total utilization, District W-5 Goodnews Bay, Kuskokwim Bay, 1990–2013.

	Harvest			
Year	Commercial [a]	Subsistence [b]	Sport	Total
1990	7,804	1,725		9,529
1991	13,312	1,740	297	15,349
1992	19,875	1,961	138	21,974
1993	20,014	1,145	189	21,348
1994	47,499	515	170	48,184
1995	17,875	279	114	18,268
1996	43,836	371	466	44,673
1997	2,983	403	855	4,241
1998	21,246	390	574	22,210
1999	2,474	568	789	3,831
2000	15,531	480	795	16,806
2001	9,275	666	822	10,763
2002	3,041	294	429	3,764
2003	12,658	1,372	42	14,072
2004	24,089	1,808	622	26,519
2005	11,735	857	1,046	13,638
2006	12,436	721	553	13,710
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	402	733	16,493
2012	25,515	506	624	26,645
2013	21,581	345	2,152	24,078
Average 2003–2012	15,133	820	493	16,447

[a] Does not include personal use.

[b] Subsistence harvest by the communities of Goodnews Bay and Platinum.

Appendix D7.–Chum salmon total utilization, District W-5 Goodnews Bay, Kuskokwim Bay, 1990–2013.

Year	Harvest			
	Commercial [a]	Subsistence [b]	Sport	Total
1990	13,194	349		13,543
1991	15,892	140	189	16,221
1992	18,520	1,448	0	19,968
1993	10,657	177	156	10,990
1994	28,477	457	15	28,949
1995	19,832	143	0	19,975
1996	11,093	223	0	11,316
1997	11,729	135	24	11,888
1998	14,155	306	50	14,511
1999	11,562	265	47	11,874
2000	7,450	333	12	7,795
2001	3,412	247	21	3,680
2002	3,799	444	99	4,342
2003	5,593	219	14	5,826
2004	5,965	282	0	6,247
2005	2,568	213	0	2,781
2006	11,568	663	0	12,231
2007	7,519	335	0	7,854
2008	10,340	749	26	11,115
2009	16,985	169	22	17,176
2010	26,914	361	0	27,275
2011	13,191	419	0	13,610
2012	24,487	398	51	24,936
2013	12,651	243	0	12,894
Average 2003–2012	10,444	385	16	10,846

[a] Does not include personal use.

[b] Subsistence harvest by the communities of Goodnews Bay and Platinum.

Appendix D8.–Salmon spawning escapement, Middle Fork Goodnews River, Kuskokwim Bay drainage, 1981–2013.

Year	Operating Period [a]	Chinook	Sockeye	Coho	Pink [b]	Chum
BEG:		1,500-2,900	18,000-40,000			
SEG:				>12,000		>12,000
Counting Tower						
1981	06/13 to 08/15	3,688	49,108	[c]	1,327	21,827
1982	06/23 to 08/03	1,395	56,255	[c]	13,855	6,767
1983	06/11 to 07/28	6,027	25,816	[c]	102	15,548
1984	06/15 to 07/31	3,260	32,053	[c]	13,744	19,003
1985	06/27 to 07/31	2,831	24,131	[c]	144	10,367
1986	06/16 to 07/24	2,080	51,069	[c]	8,134	14,764
1987	06/22 to 07/30	2,272	28,871	[c]	71	17,517
1988	06/23 to 07/30	2,712	15,799	[c]	6,781	20,799
1989	06/29 to 07/31	1,915	21,186	[c]	246	10,380
1990	06/19 to 07/24	3,636	31,679	[c]	3,378	6,410
Weir						
1991	06/29 to 08/24	1,952	47,397 [d]	[c]	1,694	31,644
1992	06/29 to 08/25	1,905 [d]	27,268	[c]	22,155	22,023
1993	06/22 to 08/18	2,349	26,452 [e]	[c]	318	14,952
1994	06/23 to 08/08	3,856	50,801	[c]	38,710	34,849 [d]
1995	06/19 to 08/28	4,836	39,009	[c]	322	33,699
1996	06/19 to 08/23	2,931 [d]	58,290	[c]	20,105	40,450 [d]
1997	06/11 to 09/17	2,937	35,530	13,413	970	17,369
1998	07/04 to 09/13	4,584	49,513 [d]	36,596	10,376	28,832
1999	06/26 to 09/26	3,221	48,205	11,545	914	19,513
2000	07/02 to 09/22	3,295 [e]	32,341 [e]	13,907 [e]	2,529	13,791 [e]
2001	06/26 to 09/30	5,391 [e]	21,024 [e]	19,626 [e]	1,328	26,829 [e]
2002	06/22 to 09/18	3,085	22,101	27,364	3,034	30,300
2003	06/18 to 09/18	2,389	44,387	52,810	1,881	21,637
2004	06/21 to 09/20	4,388	55,926	47,916	21,633	31,616
2005	06/26 to 09/20	4,633	113,809	15,683	5,926	26,690
2006	06/26 to 09/18	4,559	126,772	15,969	18,432	54,699
2007	06/25 to 09/19	3,852	72,282	20,975 [d]	4,919	48,285
2008	07/02 to 09/16	2,158	51,763 [d]	36,663	9,807	44,310 [d]
2009	06/28 to 09/22	1,630	25,465	19,992	767	19,715
2010	06/25 to 09/18	2,244	35,762	23,898 [d]	3,444	26,687
2011	06/24 to 09/18	1,861	17,946	23,826	1,394	19,974
2012	06/29 to 09/03	513 [d]	30,472 [a]	13,679 [a]	6,316	10,723 [d]
2013	06/25 to 09/18	1,189	23,243	[d]	530	28,091

[a] The operational period is inclusive of days when passage was estimated; unless noted otherwise, less than 20% of the total annual escapement is estimated.

[b] Pink salmon passage is not estimated because they are small enough to pass between weir pickets.

[c] Field operations were incomplete and total annual escapement was not estimated.

[d] Field operations were incomplete; more than 20% of the total annual escapement is based on daily passage estimates.

[e] Field operations were incomplete; sum of daily counts is an underestimate of total escapement, but considered reasonable. Additional estimates were not made.

Appendix D9.–Salmon spawning aerial survey index estimates, Goodnews rivers and lakes, Kuskokwim Bay drainage, 1980–2013.

	Goodnews River and Lakes			Middle Fork Goodnews River and Lakes		
Year	Chinook	Sockeye	Chum	Chinook	Sockeye	Chum
1980	1,228	75,639	1,975	1,164	18,926	3,782
1981	[a]	[a]	[a]	[a]	[a]	[a]
1982	1,990	19,160	9,700	1,546	2,327	6,300
1983	2,600	9,650	[a]	2,500	5,900	[a]
1984	3,235	9,240	17,250	2,020	12,897	9,172
1985	3,535	2,843	4,415	2,050	5,470	3,593
1986	1,068	8,960	11,850	1,249	16,990	7,645
1987	2,244	19,786	12,148	2,222	24,505	9,789
1988	[a]	[a]	[a]	[a]	[a]	[a]
1989	[a]	[a]	[a]	[a]	[a]	[a]
1990	658	27,689	[a]	[a]	[a]	[a]
1991	[a]	[a]	[a]	[a]	[a]	[a]
1992	875	10,397	1,950	1,012	7,200	3,270
1993	[a]	[a]	[a]	[a]	[a]	[a]
1994	[a]	[a]	[a]	[a]	[a]	[a]
1995	3,314	[a]	[a]	[a]	[a]	[a]
1996	[a]	[a]	[a]	[a]	[a]	[a]
1997	3,611	12,610	[a]	1,447	19,843	[a]
1998	578	3,497	2,743	731	11,632	3,619
1999	[a]	[a]	[a]	[a]	[a]	[a]
2000	[a]	[a]	[a]	[a]	[a]	[a]
2001	3,561	29,340	7,330	2,799	12,383	6,945
2002	1,470	3,475	3,075	1,195	2,626	1,208
2003	3,935	50,140	[a]	2,131	29,150	[a]
2004	7,462	31,695	[a]	2,617	33,670	[a]
2005	[a]	[a]	[a]	[a]	[a]	[a]
2006	4,159	78,100	[a]	[a]	[a]	[a]
2007	[a]	[a]	[a]	[a]	[a]	[a]
2008	2,155	32,500	[a]	2,190	13,935	[a]
2009	[a]	[a]	[a]	[a]	[a]	[a]
2010	[a]	[a]	[a]	[a]	[a]	[a]
2011	853	14,140	[a]	[a]	[a]	[a]
2012	382	16,700	[a]	380	6,933	[a]
2013	[a]	[a]	[a]	[a]	[a]	[a]
SEG	640 – 3,300	5,500 – 19,500	[b]	[b]	[b]	[b]

[a] Survey was either not flown or not rated as acceptable.

[b] Aerial survey escapement goal was discontinued in 2004.

APPENDIX E: HERRING

Appendix E1.–Estimated biomass, commercial harvest, effort and value of Pacific herring in Kuskokwim Area fishing districts, Alaska, 1981–2013.

Year	District	Est Biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated Value [a]	Avg Income Per Permit
2013	Security Cove	9,313	0.0	0	0.0		$0	$0
	Goodnews Bay	4,054	254.9	5	348.0		$38,235	$7,647
	Cape Avinof	1,415 [a]	36.2	11	72.0		$5,430	$494
	Nelson Is.	4,893	354.6	12	168.0		$53,190	$4,433
	Nunivak Is.	2,420 [a]	0.0	0	0.0		$0	$0
2012	Security Cove	12,193 [a]	0	0	0		$0	$0
	Goodnews Bay	33,008 [a]	0	0	0		$0	$0
	Cape Avinof	2,095 [a]	0	0	0		$0	$0
	Nelson Is.	4,703 [a]	0	0	0		$0	$0
	Nunivak Is.	2,879 [a]	0	0	0		$0	$0
2011	Security Cove	13,119 [a]	0	0	0		$0	$0
	Goodnews Bay	36,810 [a]	0	0	0		$0	$0
	Cape Avinof	2,324 [a]	0	0	0		$0	$0
	Nelson Is.	5,252 [a]	0	0	0		$0	$0
	Nunivak Is.	3,322 [a]	0	0	0		$0	$0
2010	Security Cove	13,440	0	0	0		$0	$0
	Goodnews Bay	33,490 [b]	0	0	0		$0	$0
	Cape Avinof	2,393 [a]	0	0	0		$0	$0
	Nelson Is.	5,449 [a]	0	0	0		$0	$0
	Nunivak Is.	31,141 [a]	0	0	0		$0	$0
2009	Security Cove	5,686 [a]	0	0	0		$0	$0
	Goodnews Bay	6,143	0	0	0		$0	$0
	Cape Avinof	2,251 [a]	0	0	0		$0	$0
	Nelson Is.	5,152 [a]	0	0	0		$0	$0
	Nunivak Is.	3,141 [a]	0	0	0		$0	$0
2008	Security Cove	6,442	0	0	0		$0	$0
	Goodnews Bay	3,259	0	0	0		$0	$0
	Cape Avinof	806	0	0	0		$0	$0
	Nelson Is.	3,424	0	0	0		$0	$0
	Nunivak Is.	3,688	0	0	0		$0	$0
2007	Security Cove	7,081	0	0	0		$0	$0
	Goodnews Bay	3,683	0	0	0		$0	$0
	Cape Avinof	878	0	0	0		$0	$0
	Nelson Is.	3,614	0	0	0		$0	$0
	Nunivak Is.	4,054	0	0	0		$0	$0
2006	Security Cove	7,477	64	2	156		$7,878	$3,939
	Goodnews Bay	4,111	64	5	96		$8,935	$1,787
	Cape Avinof	702	0	0	0		$0	$0
	Nelson Is.	3,809	262	25	169		$53,225	$2,129
	Nunivak Is.	4,260	0	0	0		$0	$0
2005	Security Cove	18,192	2,031	30	198		$317,153	$10,572
	Goodnews Bay	13,410	49	6	123		$4,321	$720
	Cape Avinof	3,377	149	14	160		$37,631	$2,688
	Nelson Is.	4,440	665	27	277		$119,193	$4,415
	Nunivak Is.	4,782	0	0	0.0		$0	$0
2004	Security Cove	9,698	0	0	0		$0	$0
	Goodnews Bay	7,744	34	10	96.0		$3,600	$360
	Cape Avinof	3,369	63	23	288.5		$10,900	$474
	Nelson Is.	5,085	825	39	194.5		$165,300	$4,238
	Nunivak Is.	4,739	0	0	816.0		$0	$0

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Year	District	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value [a]	Average income per permit
2003	Security Cove	10,600	0	0	0	$0	$0
	Goodnews Bay	8,300	36	12	50.5	$4,600	$383
	Cape Avinof	3,812	176	22	74.5	$36,100	$1,641
	Nelson Is.	6,130	816	44	78.0	$187,500	$4,261
	Nunivak Is.	5,182	229	19	204.0 [b]	$7,200	$379
2002	Security Cove	109	25	17.0		$10,000	$400
	Goodnews Bay	13	5	28.5		$1,000	$200
	Cape Avinof	79	37	97.0		$8,000	$216
	Nelson Is.	950	54	80.5		$101,000	$1,870
	Nunivak Is.	175	29	243.0	[b]	$19,000	$655
2001	Security Cove	1,024	56	17.5		$110,000	$1,964
	Goodnews Bay	45	23	16.0		$6,000	$261
	Cape Avinof	231	45	63.0		$23,000	$511
	Nelson Is.	678	49	25.5		$66,000	$1,347
	Nunivak Is.	0	0	0		$0	$0
2000	Security Cove	284	79	16.0		$54,386	$688
	Goodnews Bay	20	57	27.0		$3,318	$58
	Cape Avinof	366	86	59.0		$68,532	$797
	Nelson Is.	813	86	20.0		$154,280	$1,794
	Nunivak Is.	40	34	93.0	[b]	$11,880	$349
1999	Security Cove	1,072	97	9.0		$338,000	$3,485
	Goodnews Bay	1,366	94	49.0		$301,000	$3,202
	Cape Avinof	533	117	51.0		$185,000	$1,581
	Nelson Is.	1,366	94	22.0		$430,000	$4,574
	Nunivak Is.	0	0	0		$0	$0
1998	Security Cove	1,012	78	28.5		$202,340	$2,594
	Goodnews Bay	831	84	79.0		$166,220	$1,979
	Cape Avinof	656	109	44.0		$131,120	$1,203
	Nelson Is.	1,250	86	76.0		$235,900	$2,743
	Nunivak Is.	202	7	6.0		$440	$63
1997	Security Cove	892	222	10.5		$221,000	$995
	Goodnews Bay	805	139	65.0		$228,000	$1,640
	Cape Avinof	687	145	26.0		$157,000	$1,083
	Nelson Is.	778	105	10.0		$198,000	$1,886
	Nunivak Is.	0	12	70.0		$0	$0
1996	Security Cove	1,859	326	5.5		$1,252,270	$3,841
	Goodnews Bay	1,204	182	45.0		$893,900	$4,912
	Cape Avinof	820	161	57.0		$659,280	$4,095
	Nelson Is.	1,031	109	25.0		$676,624	$6,208
	Nunivak Is.	101	24	256.0		$38,234	$1,593
1995	Security Cove	1,292	106	12.0		$956,000	$9,019
	Goodnews Bay	1,054	127	56.0		$848,000	$6,677
	Cape Avinof	485	93	48.0		$363,000	$3,903
	Nelson Is.	1,113	100	28.0		$710,000	$7,100
	Nunivak Is.	41	13	387.0		$22,000	$1,692
1994	Security Cove	0	0	0		$0	$0
	Goodnews Bay	1,062	103	38.0		$391,000	$3,796
	Cape Avinof	427	85	62.0		$156,000	$1,835
	Nelson Is.	717	104	26.0		$235,000	$2,260
	Nunivak Is.	14	12	6.0		$4,000	$333

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Year	District	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value [a]	Average income per permit
1993	Security Cove	5	9	24.5		$2,000	$222
	Goodnews Bay	954	63	123.0		$293,000	$4,651
	Cape Avinof	215	97	106.0		$75,000	$773
	Nelson Is.	739	73	63.5		$198,000	$2,712
	Nunivak Is.	0	0	0		$0	$0
1992	Security Cove	834	58	34.0		$285,000	$4,914
	Goodnews Bay	740	78	29.0		$286,000	$3,667
	Cape Avinof	452	121	12.0		$178,000	$1,471
	Nelson Is.	246	85	10.0		$78,000	$918
	Nunivak Is.	27	14	6.0		$4,000	$286
1991	Security Cove	570	52	12.0		$208,000	$4,000
	Goodnews Bay	263	103	4.0		$93,000	$903
	Cape Avinof	267	137	28.0		$94,000	$686
	Nelson Is.	0	0	0		$0	$0
	Nunivak Is.	59	17	12.0		$9,000	$529
1990	Security Cove	234	52	7.0		$94,000	$1,808
	Goodnews Bay	455	126	32.0		$314,000	$2,492
	Cape Avinof	50	101	3.0		$35,000	$347
	Nelson Is.	0	0	0		$0	$0
	Nunivak Is.	0	0	0		$0	$0
1989	Security Cove	554	104	4.0		$256,000	$2,462
	Goodnews Bay	616	138	50.0		$335,000	$2,428
	Cape Avinof	129	147	194.0		$54,000	$367
	Nelson Is.	233	162	15.0		$57,000	$352
	Nunivak Is.	116	45	186.0		$42,000	$933
1988	Security Cove	324	31	23.5		$362,000	$11,677
	Goodnews Bay	483	60	40.0		$463,000	$7,717
	Cape Avinof	348	98	88.5		$264,000	$2,694
	Nelson Is.	775	174	7.5		$713,000	$4,098
	Nunivak Is.	0	0	0		$0	$0
1987	Security Cove	313	65	13.0		$242,000	$3,723
	Goodnews Bay	321	117	11.0		$133,000	$1,137
	Nelson Is.	923	235	6.0		$661,000	$2,813
	Nunivak Is.	414	61	39.0		$231,000	$3,787
1986	Security Cove	751	88	73.0		$535,000	$6,080
	Goodnews Bay	557	104	53.0		$325,000	$3,125
	Nelson Is.	886	163	40.0		$428,000	$2,626
	Nunivak Is.	511	36	156.0		$213,000	$5,917
1985	Security Cove	733	107	125.0		$335,000	$3,131
	Goodnews Bay	724	83	130.0		$309,000	$3,723
	Nelson Is.	977	143	44.0		$527,000	$3,685
	Nunivak Is.	358	37	228.0		$146,000	$3,946
1984	Security Cove	335	38	345.0		$110,000	$2,895
	Goodnews Bay	717	130	139.0		$168,000	$1,292
1983	Security Cove	1,073	94	87.0		$443,000	$4,713
	Goodnews Bay	435	84	278.0		$185,000	$2,202
1982	Security Cove	813	107	302.0		$271,000	$2,533
	Goodnews Bay	486	84	314.0		$188,000	$2,238
1981	Security Cove	1,173	113	90.0		$347,000	$3,071
	Goodnews Bay	657	175	133.0		$196,000	$1,120

[a] Estimated biomass is the projection. Aerial surveys were inadequate or not flown.

[b] Biomass estimate from Goodnews Bay include Jacksmith Bay aerial survey estimates conducted on the same day.

Appendix E2.–Age class composition of biomass from samples collected by ADF&G variable mesh gillnet test fisheries, Goodnews Bay and Nelson Island Districts, Kuskokwim Bay, 2013.

	Goodnews Bay			Nelson Island		
Age	No. in	% by	tons	No. in	% by	tons
3	3	0.3	12	1	0.2	10
4	12	1.2	49	26	7.8	382
5	29	3.7	150	10	3.8	186
6	100	15.2	616	28	14.6	714
7	116	22.1	896	19	13.0	636
8	128	28.8	1,168	40	31.0	1,517
9	66	16.6	673	29	25.8	1,262
10	21	5.7	231	1	1.1	54
11	9	2.6	105	1	0.7	34
12	5	1.6	65	0	0.0	0
13+	3	1.0	41	1	1.3	64
No Read	7	1.3	53	1	0.3	15
Total	499		4,054 [a]	157		4,893 [a]

[a] Differences in total tons and estimated biomass is attributed to rounding error.

Appendix E3.–Age composition of Pacific herring sampled from the ADF&G variable mesh gillnet (VMG) test fisheries, Goodnews Bay and Nelson Island Districts, Kuskokwim Bay, 2013.

			Aged	Age Composition					
		Samples	Sample	< 6		6-8		> 8	
District	Fishery	Collected	Size	No. of Fish	%	No. of Fish	%	No. of Fish	%
Goodnews Bay	test fishery (VMG)	499	492	44	8.9	344	69.9	104	21.1
Nelson Island	test fishery (VMG)	157	156	37	23.7	87	55.8	32	20.5

Appendix E4.–Length and weight composition by age of Pacific herring caught by ADF&G variable mesh gillnet (VMG) test fisheries, Goodnews Bay and Nelson Island Districts, Kuskokwim Bay, 2013.

		Age Class								
		< 6			6 - 8			> 8		
		Length (millimeters)								
District	Fishery	min	avg	max	min	avg	max	min	avg	max
Goodnews Bay	test fishery (VMG)	210	238	271	207	276	394	273	305	343
Nelson Island	test fishery (VMG)	127	218	303	232	271	302	218	299	382

		Age Class								
		< 6			6 - 8			> 8		
		Weight (grams)								
District	Fishery	min	avg	max	min	avg	max	min	avg	max
Goodnews Bay	test fishery (VMG)	110	168	256	136	277	461	230	381	578
Nelson Island	test fishery (VMG)	104	129	186	153	271	389	136	365	544