

Fishery Management Report No. 18-22

2017 Kuskokwim Area Management Report

by

Colton Lipka

and

Aaron Tiernan

December 2018

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



Symbols and Abbreviations

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

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

FISHERY MANAGEMENT REPORT NO. 18-22

2017 KUSKOKWIM AREA MANAGEMENT REPORT

by

Colton Lipka and Aaron Tiernan

Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1565

December 2018

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.

*Colton Lipka and Aaron Tiernan
Alaska Department of Fish and Game, Division of Commercial Fisheries,
333 Raspberry Road, Anchorage, AK 99518, USA*

This document should be cited as follows:

Lipka C., and A. Tiernan. 2018. 2017 Kuskokwim area management report. Alaska Department of Fish and Game, Fishery Management Report No. 18-22, Anchorage.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK 99811-5526

U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA 22203

Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street NW MS 5230, Washington DC 20240

The department's ADA Coordinator can be reached via phone at the following numbers:

(VOICE) 907-465-6077, (Statewide Telecommunication Device for the Deaf) 1-800-478-3648,

(Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:

ADF&G, Division of Sport Fish, Research and Technical Services, 333 Raspberry Rd, Anchorage AK 99518 (907) 267-2375

TABLE OF CONTENTS

	Page
LIST OF APPENDICES	iii
ABSTRACT	1
INTRODUCTION	1
Management Area Description	1
Management	2
Background.....	2
Salmon Stock Status	3
Run Reconstruction	4
Subsistence	4
Federal Subsistence Program.....	5
Cooperative Management Process	5
Run Strength Indicators	6
Bethel Test Fishery	6
Escapement Projects	6
Inseason Subsistence Catch Monitoring	6
Postseason Subsistence Survey.....	6
2017 Management Plan	7
2017 COMMERCIAL SALMON FISHERY.....	7
Kuskokwim River.....	7
Kuskokwim Bay	8
2017 SUBSISTENCE SALMON FISHERY.....	8
Subsistence Harvest.....	9
2017 BETHEL TEST FISHERY ASSESSMENT	9
Chinook Salmon	9
Sockeye Salmon	9
Chum Salmon	10
Coho Salmon	10
ESCAPEMENT	10
2017 Escapement Assessment	10
Kuskokwim River.....	11
Kwethluk River Weir	11
Tuluksak River Weir	11
Salmon River (Aniak) Weir	11
George River Weir	11
Kogruklu River Weir.....	11
Tatlawiksuk River Weir	11
Telaquana River Weir	11
Salmon River (Pitka Fork) Weir.....	12
Kuskokwim Bay	12
Middle Fork Goodnews River Weir	12
AERIAL SURVEYS	12
Kuskokwim River.....	12

TABLE OF CONTENTS (Continued)

	Page
Lower Kuskokwim River.....	12
Upper Kuskokwim River.....	12
Kuskokwim Bay	13
Kuskokwim Bay	13
KUSKOKWIM HERRING FISHERY.....	13
Management Area.....	13
Fishery Management	13
Commercial Fishery Overview.....	14
Security Cove and Goodnews Bay Districts.....	14
Nelson and Nunivak Islands Districts.....	14
Cape Avinof District.....	15
2017 COMMERCIAL HERRING FISHERY	16
Subsistence Fishery	16
Stock Assessment	16
2017 Stock Assessment	17
ACKNOWLEDGEMENTS.....	17
REFERENCES CITED	18
APPENDIX A	19
APPENDIX B.....	59
APPENDIX C.....	79
APPENDIX D	87
APPENDIX E.....	93

LIST OF APPENDICES

Appendix	Page
A1 The Kuskokwim Management Area and commercial fishing districts.....	20
A2 Historical events in the Kuskokwim Management Area, 1913–2015.	21
A3 Commercial salmon harvest, excluding personal use, Kuskokwim Area, 1960–2017.....	33
A4 Estimated exvessel value of the commercial salmon harvest and permits fished, Kuskokwim Management Area, 1987–2017.	35
A5 Commercially harvested salmon average weights and prices paid, Kuskokwim Management Area, 1967–2017.....	36
A6 Emergency order summary Kuskokwim Management Area, 2017.....	38
A7 Subsistence Chinook salmon harvest estimates by community, Kuskokwim Management Area, 1990–2017.....	42
A8 Subsistence sockeye salmon harvest estimates by community, Kuskokwim Management Area, 1990–2017.....	45
A9 Subsistence coho salmon harvest estimates by community, Kuskokwim area, 1990–2017.....	48
A10 Subsistence chum salmon harvest estimates by community, Kuskokwim area, 1990–2017.....	51
A11 Estimated subsistence salmon harvest by species and community, Kuskokwim Management Area, 2017.....	54
A12 Weir project location within the Kuskokwim Management Area.	57
A13 Map of aerial survey streams, Kuskokwim Management Area.....	58
B1 Map of commercial fishing District W-1, Kuskokwim Management Area.....	60
B2 Map of commercial fishing District W-2, Kuskokwim Management Area.....	61
B3 Chinook salmon utilization, Kuskokwim River, 1990–2017.	62
B4 Commercial salmon harvest in Districts 1 and 2 combined including personal use, 1960–2017.....	63
B5 District 1 commercial salmon harvest and exvessel value, 1993–2017.....	65
B6 Sockeye salmon utilization, Kuskokwim River 1990–2017.	67
B7 Coho salmon utilization, Kuskokwim River, 1990–2017.	68
B8 Chum salmon utilization, Kuskokwim River, 1990–2017.	69
B9 District W-1 commercial salmon harvest by period, 2016.	70
B10 Daily mean tidal CPUE, cumulative mean tidal CPUE, and percent passage for the Bethel test fishery, 2017.....	71
B11 Bethel test fishery cumulative CPUE by species, 1984–2017.....	74
B12 Chinook salmon escapements at Kuskokwim River weir projects, 2003–2017.....	75
B13 Sockeye salmon escapements at Kuskokwim River weir projects, 2003–2017.	75
B14 Coho salmon escapements at Kuskokwim River weir projects, 2003–2017.....	76
B15 Chum salmon escapements at Kuskokwim River weir projects, 2003–2017.	76
B16 Kuskokwim River drainage Chinook salmon aerial survey estimates, 2003–2017.....	77
C1 Map of commercial fishing District W-4, Kuskokwim Management Area.....	80
C2 District 4 commercial salmon harvest, including personal use, 1960–2017.....	81
C3 District 4 commercial salmon fishing exvessel value, 1990–2017.....	83
C4 Kanektok River salmon escapement, 1996–2017.	84
C5 Kanektok River salmon aerial survey estimates, 1962–2017.....	85
D1 Map of commercial fishing District W-5, Kuskokwim Management Area.....	88
D2 District 5 commercial salmon harvest including personal use, 1968–2017.....	89
D3 District 5 commercial salmon fishing exvessel value, 1990–2017.....	90
D4 Middle Fork Goodnews River salmon escapement, 1981–2017.	91
D5 Goodnews River drainage salmon aerial survey estimates, 1980–2017.....	92
E1 Commercial herring districts, Kuskokwim Management Area.	94
E2 Estimated biomass, commercial effort, and harvest value of Pacific herring in Kuskokwim Management Area, 1981–2017.	95

ABSTRACT

This report summarizes the 2017 season and historical information regarding commercial salmon and herring fisheries, as well as subsistence salmon fisheries, within the Kuskokwim Management Area (KMA). These fisheries mainly target 4 species of Pacific salmon (Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, and chum *O. keta*). There was no large-scale commercial salmon processor in the Kuskokwim Management Area in 2017. Within the subsistence fishery, amounts reasonably necessary for subsistence (ANS) have been consistently achieved throughout the Kuskokwim Area, with the exception of Chinook salmon in recent years. There are 23 escapement goals for salmon within the KMA, 15 of which were met or exceeded, 1 was not met, and 7 were not assessed in 2017. Historically, Pacific herring (*Clupea pallasii*) have been harvested for commercial and subsistence purposes in the KMA. In recent years, the market for commercial herring has declined and no harvest has occurred in the Kuskokwim Area since 2013.

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

INTRODUCTION

MANAGEMENT AREA DESCRIPTION

The Kuskokwim Management Area (KMA) consists of all waters of Alaska between Cape Newenham and the Naskonat Peninsula, including Nunivak and St. Matthew Islands (Appendix A1).

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. 2016). 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, Cheforak, 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 (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 A2). 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 (Appendix B1). District 1 was divided into Subdistricts 1-A and 1-B, 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. Subdistrict 1-B consists of that portion of District 1 downstream from regulatory markers at Steamboat Slough. 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 (Appendix B2). The most recent commercial fishing periods in District 2 occurred in 2000. District 4, Quinhagak, consists of Kuskokwim Bay waters from the northernmost edge

of the mouth of Weelung Creek to the southernmost tip of the south mouth of the Arolik River and extending for 3 miles from the coast (Appendix C1). 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 (Appendix D1).

MANAGEMENT

Background

The large size of the Kuskokwim River drainage and the distances between the fisheries and 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, and sockeye (*O. nerka*) and chum (*O. keta*) salmon begin their entry in mid-June. Chinook and sockeye salmon runs fall off in early July, and the chum salmon run begins to fall off in late July, when the coho salmon (*O. kisutch*) run begins. Coho salmon entry to the river falls off in late August to early September. Fishery management information about 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 weeks 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 and 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 occur in Districts 4 and 5 when abundance is adequate to allow a commercial fishery. The harvest of sockeye salmon was considered incidental to chum salmon harvest in Kuskokwim River from 1987 to 2003, but 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 and those fisheries occur from late July through August.

The KMA commercial fishery was relatively stable from 1987 to 1996 and harvest ranged between 975,000 to 2.3 million fish (Appendix A3), effort ranged between 714 and 824 permits fished, and exvessel value ranged between \$2.8 million and \$12.7 million (Appendix A4). Beginning in 1997, the value of salmon (Appendix A5), particularly chum salmon, began to decline, which led to a decrease in fishing effort, number of fish harvested, and the exvessel value of the fishery. From 1997 to 2002 commercial salmon harvests in the area ranged from approximately 755,000 fish in 1998 to 185,000 fish in 2002 (Appendix A3). Effort ranged from 707 permits in 1998 to 407 permits in 2002, and the exvessel value of the fishery ranged from approximately \$1.6 million in 1998 to \$324,000 in 2002. Poor Chinook and chum salmon returns from 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. These same factors limited commercial fishing opportunity during July in both Districts 4 and 5, and led to registered buyers imposing harvest limits on fishermen. Since 2004, commercial salmon harvests in the area have ranged from approximately 234,000 fish to 688,000 fish (Appendix A3). Effort ranged from 283 permit holders to 433 permit holders, and the salmon exvessel value ranged from approximately \$876,000 to \$2.9 million (Appendix A4). A fish processing plant located in Platinum began operation in 2009 and has improved processing capacity in the area. Improvements in the chum salmon market and the improved processing capacity led to increased fishing opportunity since 2009. The Bethel-based fish processor Kuskokwim Seafoods permanently closed operations in 2013, which limited fish processing in the area to the Coastal Villages Seafoods (CVS) Platinum, Alaska facility for the foreseeable future. In 2016, CVS discontinued salmon buying and processing operations, which left the Kuskokwim Area without a large-scale salmon processor for the first time since statehood.

Kuskokwim River Chinook salmon are harvested primarily for subsistence and some incidentally harvested in the commercial fishery (Appendix B3). Since 1996, Chinook salmon harvests in the commercial fishery have been below average (Appendix B4). Since 2000, commercial Chinook salmon harvests have contributed between 0% and 13% of the total District 1 exvessel value (Appendix B5). Chinook salmon run reconstruction information indicates an exploitation rate of Chinook salmon of approximately 40% since 2000 and the majority of the harvest (96%) was attributed to the subsistence fishery (Bue et al. 2012).

Kuskokwim River sockeye salmon are primarily harvested in the subsistence fishery, but they are also harvested in District 1 commercial fisheries (Appendix B6). Kuskokwim River commercial sockeye salmon harvests make up approximately 15% of the total District 1 exvessel value (Appendix B5).

Kuskokwim River coho salmon are harvested primarily in the commercial fishery (Appendix B7). 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 B5).

Kuskokwim River chum salmon, though an important subsistence species, have historically been primarily targeted for commercial use (Appendix B8). From 1996 to 2010, commercial chum salmon harvests contributed less than 20% of the total District 1 exvessel value. Beginning in 2011, chum salmon harvests contributed over 40% of the total exvessel value in District 1 (Appendix B5).

In Kuskokwim Bay commercial fisheries, the largest 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. However, chum salmon exceeded the exvessel value of sockeye salmon between 2011 and 2013 (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 (Appendices A3 and A4). In 2001, Kuskokwim River Chinook and chum salmon were both designated stocks of yield concern by the Alaska Board of Fisheries (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). The BOF discontinued the stock of concern status for both species in the winter of 2007. Since 2007, Chinook salmon abundance has decreased and 2 of the lowest total runs occurred in 2012 and 2013 (Tiernan and Poetter 2015). The Kuskokwim River was declared a fisheries disaster by the State of Alaska because of low Chinook salmon runs in 2011 and 2012.

The 2017 Chinook return was similar to the 2016 return but still below the historical average. Chum salmon returned to near average levels through 2014 and the 2017 return was estimated to be above average. Sockeye salmon abundance has varied between average and above average. There is limited information about the size and quality of the coho salmon escapement but available information indicated the 2017 escapement was at least average.

Run Reconstruction

During the January 2013 BOF meeting, 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 (CPUE, catch per unit effort), sport fish harvest, mark–recapture estimates of inriver abundance, counts of salmon at 6 weirs, and peak aerial survey counts from 14 tributaries throughout the Kuskokwim River drainage were simultaneously combined to inform the model. The estimates 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 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 SEGs for 3 rivers with weir assessment projects as follows: Kwethluk River 4,100–7,500 fish, Kogruklu River 4,800–8,800 fish, and George River 1,800–3,300 fish.

Subsistence

The subsistence salmon fishery in the Kuskokwim Area is one of the largest in the state and in North America. Many households throughout the region are involved in harvesting, processing, and preserving salmon for subsistence use. Approximately 2,400 households in the Kuskokwim Area annually harvest salmon for subsistence use (Shelden et al. 2016). 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).

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 of all salmon in the entire Kuskokwim

Area (Appendix A2). 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, 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 salmon, and 500–2,000 pink salmon, 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.

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 (RACs) 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 by issuing a Special Action.

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 exist in some cases.

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 is the forum through which inseason management decisions regarding Kuskokwim River subsistence, commercial, and sport salmon fisheries are discussed. Working Group representative participation in meetings in Bethel and outside the Kuskokwim River drainage allows an exchange of information between members and fishery managers. Representatives are also able to testify at regulatory meetings in support of Working Group positions.

The Working Group met 14 times in 2017. During these meetings, fishery management information was presented by state and federal staff, Working Group members, Tribal organizations, Kuskokwim River Intertribal Fisheries Commission (KRITFC), fishery partners, and the public. The Working Group discussed subsistence fishing reports from members and the public, the lower Kuskokwim River inseason subsistence harvest report, test fishery project summaries, and reports from weir, tagging, sonar, and aerial survey programs.

RUN STRENGTH INDICATORS

Bethel Test Fishery

Daily inseason assessment of Kuskokwim River salmon run strength and timing is available from a drift gillnet test fishery operated near Bethel. The project began in 1984 and the methodology has remained largely unchanged (Bue et al. 2012). The test fishery catch from each tide is tallied by species and those fish not released alive during sampling are distributed to charities. Catch statistics for Chinook, sockeye, chum, and coho salmon are presented as daily CPUE indices and season cumulative CPUE indices by species. Comparisons are made to test fishery results from previous years, however these comparisons are subjective observations of variables such as water level, fishing patterns, and changing river morphology.

Historically, other test fisheries have been attempted in the Kuskokwim River: Kwegooyuk test fishery, 1966–1983 (Huttunen 1984); Eek test fishery, 1988–1994; Kuskokwim River subsistence test fishery, 1988–1990 (Kuskokwim Fishermen’s Cooperative 1991); Aniak test fishery, 1992–1995 and 2015–2017; 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 ambiguous results, consistency problems, difficulties with catch disposition, and lack of funding.

Escapement Projects

In the Kuskokwim River, escapement projects provide limited utility inseason because of the great distances between areas of harvest and project locations. 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 and escapement data can be more effectively used for inseason management of the subsistence and commercial fisheries. Managers also use 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.

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. Information from the interviews, in combination with other fisheries information, is used to assess salmon run timing and relative abundance. This program can provide timely insight into the subsistence fishery, a relative index of catches based on those interviewed, and an avenue for local user input into the management process. Summaries of interview responses are presented during Working Group meetings throughout the season (<http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareakuskokwim.kswg>).

Postseason Subsistence Survey

Annual household surveys are conducted by ADF&G to collect information about the harvest and use of salmon in the Kuskokwim Area. Methods to estimate total annual subsistence harvest

have been developed by ADF&G who also collaborates with local tribal organizations to complete the annual postseason harvest surveys (Shelden et al. 2016). Subsistence surveys have been aimed at primarily gathering data about the harvest and use of Chinook, chum, sockeye, and coho salmon. Pink salmon are harvested in the Kuskokwim Area but 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.

2017 MANAGEMENT PLAN

In January of 2013, after thorough public input, the BOF adopted a new *Kuskokwim River Salmon Management Plan* (5 AAC 07.365), which provides guidelines to manage the Kuskokwim River salmon fishery to meet escapement goals and subsistence use priority.

The BOF met in January 2016 to deliberate Arctic-Yukon-Kuskokwim in-cycle proposals. There were a number of proposals before the BOF that sought a mechanism to move Chinook salmon to the middle and upper Kuskokwim River for escapement and subsistence uses. An early season Chinook salmon subsistence fishing closure, similar to the approach taken in 2014 and 2015, was suggested and agreed to by a group of Kuskokwim River residents that were in attendance. The BOF passed language that would annually suspend directed subsistence fishing for Chinook salmon in the Kuskokwim River until after June 11.

The BOF passed a proposal that established specifications for beach seine gear used for subsistence fishing. A beach seine may not exceed 50 fathoms in length or 100 meshes in depth, and the maximum mesh size is 3.5 inches.

Subsistence salmon fishing permits were discussed at the BOF meeting and 2 proposals related to permits were tabled until a later date. This was done to allow more time for the public to discuss subsistence salmon fishing permits in the Kuskokwim River.

The Kuskokwim Bay fisheries are managed according to the *District 4 Management Plan* (5 AAC 07.367). These regulations provide ADF&G guidance about establishing 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 allow Chinook salmon escapement.

2017 COMMERCIAL SALMON FISHERY

In 2016, CVS discontinued salmon buying and processing operations, which left the Kuskokwim Area without a largescale salmon processor for the first time since statehood. No commercial fisheries occurred in Districts 4 and 5 in 2017. Subdistrict 1-A was opened for 3 short periods for registered Kuskokwim Area catcher/sellers. Commercial harvest and exvessel information for the 2017 season is confidential due to the number of participants (Appendices A3–A4).

KUSKOKWIM RIVER

Commercial fishing in Subdistrict 1-A occurred on July 30, August 14, and August 17 (Appendices A6 and B9). The commercial fishery was delayed until the majority of the Chinook salmon 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 and was directed on coho salmon.

A total of 3 or less permit holders recorded landings in District 1 during the 2017 season (Appendix B9), which was also below the 2006–2015 average of 370 permit holders (Appendix A4).

KUSKOKWIM BAY

There was no commercial salmon fishery in Districts 4 and 5 during 2017 (Appendices C2–C3 and D2–D3).

2017 SUBSISTENCE SALMON FISHERY

The 2017 preseason Chinook salmon forecast was 132,000–222,000 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 was approximately 84,000 Chinook salmon. If the run was as forecast, then there may have been enough Chinook salmon for escapement and subsistence uses. Subsistence fishing in the mainstem of the Kuskokwim River was restricted at the start of the season.

An early season Chinook salmon subsistence closure began on May 20 within the lower river and closures proceeded at 5 day increments upriver following subsistence districts, as recommended by the Working Group. The early season closure was a restriction on subsistence fishing with gillnets in the mainstem Kuskokwim River. Beach seines, dip nets, fish wheels, and hook and line are allowed because Chinook salmon can be immediately released alive. As prescribed in regulation, this closure would be in effect through June 11. During the front end closure there were 3 gillnet opportunities using 4.0-inch or smaller mesh to allow subsistence fishermen to harvest non-salmon species. These openings occurred on May 27, June 3, and June 10. Subsistence fishing with gillnets was also restricted in the Kwethluk, Kisaralik, Kasigluk, Tuluksak, and Aniak rivers to protect Chinook salmon.

Beginning June 12, the Federal Subsistence Board adopted a Special Action to close the Kuskokwim River Chinook salmon fishery to non-federally qualified users within the boundary of the Yukon Delta National Wildlife Refuge (NWR). USFWS managed the subsistence fishery within the Yukon Delta NWR through July 8, at which time ADF&G resumed management of the entirety of the Kuskokwim River.

Subsistence management under ADF&G consisted of a June 12, 24-hour 6.0-inch or less mesh, 25 fathom gillnet opening from the refuge boundary at Aniak to the Holitna River and removal of subsistence gillnet restriction in waters upstream of the Holitna River. Two 12 hour 6.0-inch or less mesh, 25 fathom gillnet opportunities occurred on June 24 and July 3 in state waters from Aniak to the Holitna River mouth. Beginning July 8, the entirety of the mainstem of the Kuskokwim River was open to 6.0-inch or less mesh, 25 fathoms in length until further notice. Mainstem gear restrictions were removed on July 27 and the tributary restrictions were finally lifted on August 17. The tributary restrictions were kept in place beyond the mainstem restrictions to protect Chinook salmon on their spawning grounds.

Subsistence fishing was restricted a total of 90 days from May 20 through July 27. Subsistence salmon fishing was closed by emergency order 6 hours before, during, and 3 hours after commercial fishing periods.

SUBSISTENCE HARVEST

Subsistence harvests of salmon remained relatively stable from 1990 to 2011. The 2012 to 2017 Chinook salmon harvest declined as a result of below average run size and subsistence salmon fishing restrictions (Appendices A7–A11). The 2017 total subsistence salmon preliminary harvest estimates for the Kuskokwim Area were 22,151 Chinook, 53,522 sockeye, 40,084 coho, 54,459 chum, and 2,291 pink salmon (Appendices A8–A11). Chinook salmon subsistence harvest was below the 2007–2016 average but chum, sockeye, and coho salmon harvest was above their respective averages. Residents of communities in the lower Kuskokwim River (from Tuluksak to Eek) took 76% of the subsistence salmon harvest. The lower river communities are relatively densely populated and include approximately 75% of the total number of households in the Kuskokwim Area.

2017 BETHEL TEST FISHERY ASSESSMENT

In 2017, the Bethel test fishery (BTF) operated from June 1 until the last tide on August 24 (Appendix B10). From May 25 to June 1 the BTF project undertook a preseason evaluation in response to an early spring and verbal reports from the public that salmon were being caught. This was an observational period only; any salmon caught were not integrated into the standard operational period indices and the catch data will not be included. BTF data used for comparison and management decisions began June 1. During the 85 day period there were 164 high tides in which 579 drifts resulted in cumulative CPUE of 376 Chinook, 2,690 sockeye, 3,245 coho, and 6,785 chum salmon (Appendices B10 and B11). Chinook, sockeye, and chum salmon migrations have primarily all passed the BTF site before the project ended, but catches of coho salmon persisted through the final drift session. Six days during the project's operational period had only 1 high tide and 2 tides were missed due to weather.

CHINOOK SALMON

The first Chinook salmon was caught in BTF on May 25. The peak daily CPUE index of 28 occurred on June 27 and the cumulative daily CPUE index through August 24 was 376. Based on the cumulative index, the central 50% of the run passed the BTF site between June 21 and July 5 and the midpoint occurred on June 27, which was 5 days later than the average midpoint on June 22 (Appendix B10). Daily indices tracked below the 5-year average throughout the entirety of the return. The season total cumulative index was the second lowest for the time period of 2008–2016 (Appendix B11).

Due to the early season subsistence fishery closures and abnormal water conditions, BTF was not a good indicator of Chinook salmon run timing inseason. The BTF cumulative CPUE was below the 2008–2016 average and showed indications of a very weak run, but postseason analysis showed escapement was probably just below average (Appendix B11). Because of uncertainty about run timing and strength, managers used a cautious and conservative approach during the 2017 fishing season.

SOCKEYE SALMON

The first sockeye salmon was caught in BTF on June 12. The peak daily CPUE index of 230 occurred on July 18 and the cumulative CPUE index through August 24 was 2,690. Based on the cumulative CPUE index, the central 50% of the sockeye salmon run passed the BTF site between June 30 and July 13, and the midpoint of passage occurred on July 7 (Appendix B10). The

season total cumulative index was well above the 2008–2016 average of 1,603 and the third largest since 1984 (Appendix B11). BTF was a good indicator of sockeye salmon run timing and relative abundance when compared postseason to other Kuskokwim Area monitoring sites.

CHUM SALMON

The first chum salmon was caught in BTF on June 6. The peak daily CPUE index of 509 occurred on July 9 and the cumulative CPUE index through August 24 was 6,785. Based on the cumulative CPUE index, the central 50% of the chum salmon run passed the BTF site between June 28 and July 11, and the midpoint of passage occurred on July 6 (Appendix B10). The total cumulative CPUE index was above the 2008–2016 average of 6,492 (Appendix B11). BTF was a good indicator of chum salmon run timing and relative abundance when compared postseason to other Kuskokwim Area monitoring sites.

COHO SALMON

The first coho salmon was caught in BTF on July 15 and catches continued through the last drift session of the season on August 24. The peak daily CPUE index of 276 occurred on August 12 and the cumulative CPUE index on August 24 was 3,245. Based on the cumulative CPUE index, the central 50% of the run passed the BTF site between August 6 and August 18, and the midpoint of passage occurred on August 12 (Appendix B10). The cumulative CPUE index was slightly below the 2008–2016 average of 3,495 (Appendix B11).

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 last 2 decades, efforts have been taken to expand coverage and apply new technologies to improve estimation of salmon run timing and run strength monitoring by comparing 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 utility. Since 2000, the number of escapement projects in the Kuskokwim Area has increased through cooperative partnerships with federal agencies and local organizations. These cooperative efforts have added substantially to ADF&G's ability to monitor salmon escapements and to evaluate the effectiveness of management actions postseason.

There are currently 15 established escapement goals on tributaries of the Kuskokwim River; 11 Chinook, 1 chum, 2 coho, and 1 sockeye salmon goals (Appendices B12–B16, C4–C5, and D4–D5). Comprehensive reviews of escapement data for most Kuskokwim Area goals are conducted in unison with the Kuskokwim Area BOF cycle. The last review was done in 2015 for the 2016 BOF meeting (Conitz et al. 2015) and the next review will be for the January 2019 BOF meeting.

2017 ESCAPEMENT ASSESSMENT

There are numerous escapement assessment projects throughout the Kuskokwim River drainage and Kuskokwim Bay drainages (Appendix A12). Methods, daily passage counts, climate and hydrological information, and escapement age, sex, and length (ASL) information can be found in Head and Liller 2017. The AYK Database Management System contains historical as well as

current ASL information from the various escapement monitoring projects (past and present), as well as information from area commercial and subsistence harvests:

(<http://www.adfg.alaska.gov/CommFishR3/WebSite/AYKDBMSWebsite/Default.aspx>).

Kuskokwim River

Kwethluk River Weir

Kwethluk River weir escapements included 7,429 Chinook, 29,940 sockeye, 46,594 coho, and 53,745 chum salmon (Appendices B12–B15). The Chinook salmon escapement was within the SEG range of 4,100–7,500 and the coho salmon escapement was well above the SEG threshold of 19,000 fish (Appendices B12 and B14).

Tuluksak River Weir

Tuluksak River weir escapements included 936 Chinook, 4,094 sockeye, 28,922 coho, and 22,405 chum salmon (Appendices B12–B15). The Chinook, sockeye, coho, and chum salmon escapements were above average.

Salmon River (Aniak) Weir

Salmon River weir escapements included 2,800 Chinook and 10,173 chum salmon, however coho salmon escapement was not observed because of a shorter operational period (Appendices B12–B15). Due to operational difficulties, more than 40% of the sockeye salmon run was missed and annual escapement was not determined. Chinook and chum salmon escapements were above average.

George River Weir

George River weir escapements included 3,685 Chinook, 912 sockeye, 25,384 coho, and 40,028 chum salmon (Appendices B12–B15). Chinook salmon escapement was above the SEG range of 1,800–3,300 fish (Appendix B12). Sockeye, coho, and chum salmon escapements were above average.

Kogrukluk River Weir

Kogrukluk River weir escapements included 9,992 Chinook, 27,315 sockeye, and 94,387 chum salmon (Appendices B12–B15). Coho salmon escapement was not determined due to high water in the later part of the operational period. Chinook salmon escapement exceeded the SEG range of 4,800–8,800 (Appendix B12). The escapement goal for sockeye salmon of 4,400–17,000 fish was exceeded and the chum salmon escapement goal of 15,000–49,000 fish was exceeded (Appendices B13–B15).

Tatlawiksuk River Weir

Tatlawiksuk River weir escapements included 2,156 Chinook, 59 sockeye, and 29,876 chum salmon (Appendices B12 and B14–B15). Coho salmon abundance was not estimated due to environmental conditions that prohibited weir operation. Chinook and sockeye salmon escapements were above average, but chum salmon escapement was below average.

Telaquana River Weir

Telaquana River sockeye salmon escapement was 145,287 sockeye (Appendix B13). This was the eighth year of operation for this project and the highest observed escapement on record.

Salmon River (Pitka Fork) Weir

Salmon River of the Pitka Fork Chinook salmon escapement was 8,003 fish (Appendix B12). This was the third year of operation for this project and the highest observed escapement.

Kuskokwim Bay

Middle Fork Goodnews River Weir

The Middle Fork Goodnews River weir escapements included 6,881 Chinook, 179,897 sockeye, and 54,799 chum salmon during the June 25–July 31 operational period (Appendix D4). The Middle Fork Goodnews River weir has historically operated through mid-September, but due to budget constraints, the weir was removed from the water on July 31. Chinook salmon escapement exceeded the biological escapement goal (BEG) range of 1,500–2,900 fish and was the largest run on record. Escapement of chum salmon exceeded the SEG threshold of 12,000 fish. Sockeye salmon exceeded the SEG range of 18,000–40,000 fish.

AERIAL SURVEYS

Aerial survey based escapement goals do not represent the entire spawning populations in the respective streams. The surveys are conducted once each season during a window of time when the maximum numbers of fish are expected to be on the spawning grounds. The estimates of salmon observed during aerial surveys represent minimum escapements. 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 not conducted on lower river tributaries (Appendix A13) in 2017. Weather and stream conditions in the lower river were not conducive for the survey flights. An SEG range of 400–1,200 Chinook salmon has been established for the Kisaralik River and the goal was not assessed in 2017 (Appendix B16).

Upper Kuskokwim River

Aerial surveys for Chinook salmon were conducted on the Aniak, Kipchuk, Holokuk, Holitna, Gagarayah, Cheenetnuk, Oskawaluk, Bear (Pitka), Upper Pitka, and Salmon (Pitka Fork) rivers in 2017 (Appendices A13 and B16). Escapement goals have been established for Aniak, Salmon, Gagarayah, Cheenetnuk, Holitna, and Salmon (Pitka Fork) rivers. Survey conditions allowed staff to fly all of the systems in this section of the drainage. Index estimates from the upper Kuskokwim River tributaries were above average yet the established SEG range was not achieved at the Holitna River (676 fish, 970–2,100 range). Established SEG ranges were achieved at the Salmon (Pitka Fork) River (687 fish; 470–1,600 range), Salmon (Aniak) River

(423 fish; 330–1,200 range), Aniak River (1,781 fish; 1,200–2,300 range), Cheeneetnu River (660 fish; 340–1,300 range) and the Gagarayah River (453 fish; 300–830 range; Appendix B16).

KUSKOKWIM BAY

Kuskokwim Bay

The Kanektok River aerial Chinook salmon SEG range of 3,500–8,000 fish and the sockeye salmon SEG range of 14,000–34,000 fish were not assessed in 2017 due to weather and staff availability (Appendix C5). The North Fork Goodnews River aerial Chinook salmon SEG range of 640–3,300 fish and the sockeye salmon SEG range of 5,500–19,500 fish were not assessed in 2017 due to weather and staff availability (Appendix D5).

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) (Appendix E1). This area supports a significant subsistence Pacific herring *Clupea pallasii* fishery and 5 commercial herring sac roe districts.

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 includes 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 includes 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 short tons (st); Goodnews Bay, 1,200 st; Cape Avinof, 500 st; Nelson Island, 3,000 st; and Nunivak Island, 1,500 st. 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 st of the 20% exploitation rate for subsistence (5 AAC 27.895).

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

Security Cove and Goodnews Bay Districts

The Kuskokwim Area commercial herring fishery was initiated in 1977 in Security Cove and Goodnews Bay Districts with the first documented deliveries in 1978 (Security Cove District) and 1979 (Goodnews Bay District). In 1978, purse seines were allowed in the Security Cove District; however, since that time the fishery has been limited to gillnets. 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. In addition, a minimum herring abundance threshold of 800–1,000 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 set at 1,200 st 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.

Nelson and Nunivak Islands Districts

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 an adequate subsistence harvest, an orderly commercial fishery, and to allow periodic re-assessments of herring biomass. A minimum threshold herring abundance of 1,100–1,700 st 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 Atrnak 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 feet. 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 fishermen holding permits in 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 st, 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 st 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).

Cape Avinof District

In 1988, commercial herring fishing was initiated in the Cape Avinof District. A minimum threshold herring abundance of 500 st 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 feet, and a superexclusive use designation was established.

Kuskokwim Area herring fisheries developed rapidly in response to the relatively strong market for herring sac roe. During 1981–1984, an average of 206 fishermen harvested 1,400 st of herring and 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 st of herring and an average value of \$1.33 million during 1985–1989. 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 st of herring valued at \$3.5 million. Although harvest levels remained high during 1997–1999 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, when 32 fishermen harvested 390 st of herring valued at \$70,000. The decline in markets for herring sac roe continued and no commercial fishing occurred from 2007 through 2012. The 2013 season saw a small commercial effort and 28 permit holders harvested 646 st of herring (Appendix E2).

2017 COMMERCIAL HERRING FISHERY

There was no commercial herring fishery within Kuskokwim Area in 2017.

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 from 1975 to 1996 and 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 suggests that Nelson Island villages harvest approximately 110 st of herring annually (Burkey et al. 1998).

STOCK ASSESSMENT

The remoteness of the Kuskokwim Area herring fishing districts present challenges in assessing abundance and implementing and monitoring fisheries. Although the fisheries typically occur in a northward progression, herring fisheries and spawn timing are quite similar.

When the market conditions were strong and the Kuskokwim Area herring fisheries were 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 and 2014, Coastal Villages Seafood's provided the necessary funding needed to conduct aerial surveys and test fishing within the Kuskokwim Management Area.

As a result of the declining interest in the commercial sac roe herring market, the ADF&G test fishery program has been reduced from as many as 6 field camp projects in the 1990s, to only 2 test fishery projects in 2010 and 2013, 1 test fishery project in 2014, and no test fishery projects in 2011, 2012, 2015, 2016, and 2017.

Test fishing with variable mesh gillnets (VMG) was 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 to determine herring stock status and to make 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.

2017 STOCK ASSESSMENT

There was no aerial survey assessment of the herring biomass in the Kuskokwim Management Area during the 2017 season.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the Commercial and Subsistence staff of the Bethel and Anchorage offices of the Alaska Department of Fish and Game for their contributions to this report.

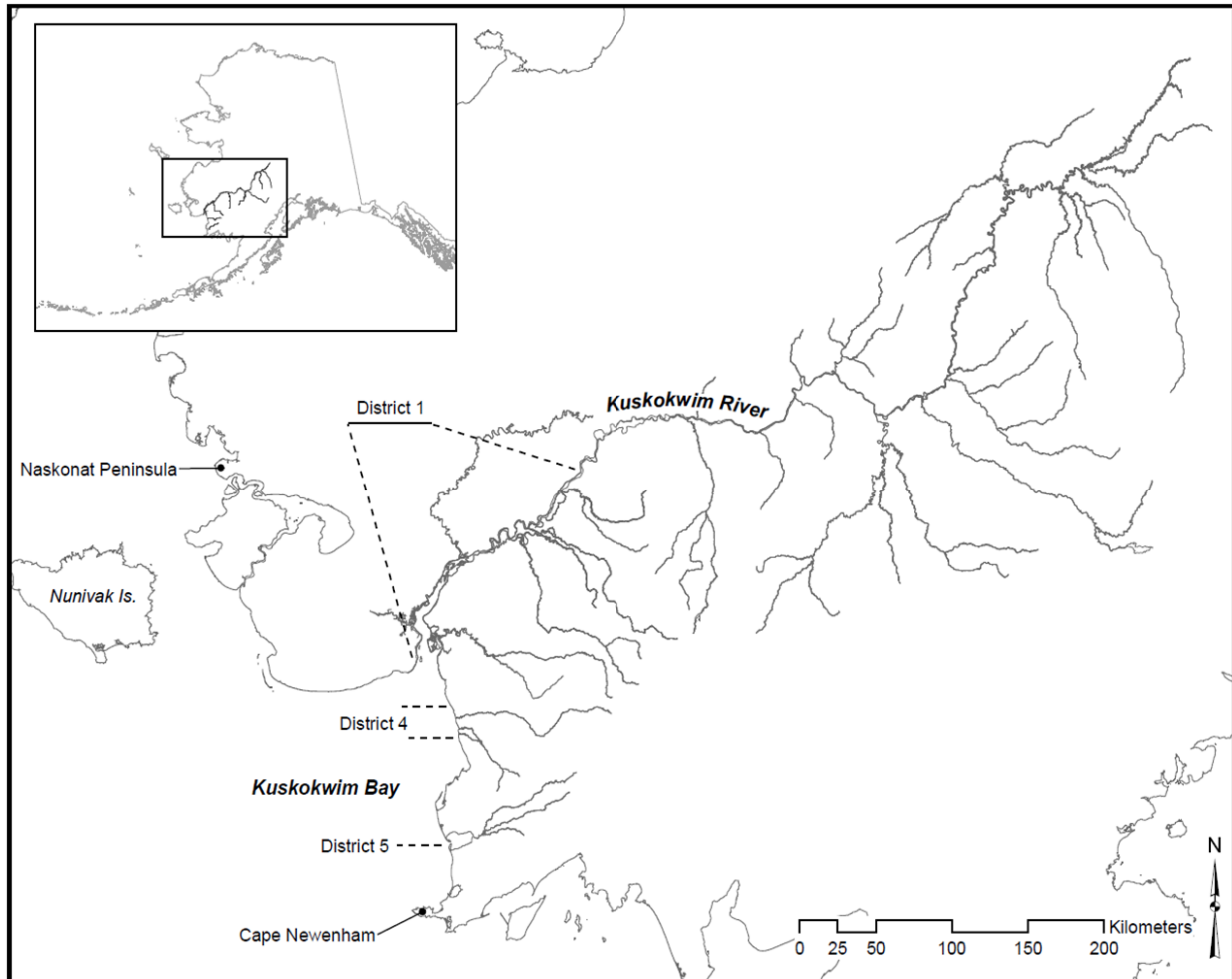
We also wish to thank the Kuskokwim River Salmon Management Working Group members, who are dedicated and volunteer their services in the cooperative management process. We also extend our thanks to the following organizations: the U.S. Fish and Wildlife Service, the Orutsararmiut Native Council, Kuskokwim Native Association, the Association of Village Council Presidents, the Office of Subsistence Management, and all the communities of the Kuskokwim Area.

REFERENCES CITED

- Bue, B. G., K. L. Schaberg, Z. W. Liller, and D. B. Molyneaux. 2012. Estimates of the historic run and escapement for the Chinook salmon stock returning to the Kuskokwim River, 1976-2011. Alaska Department of Fish and Game, Fishery Data Series No. 12-49, Anchorage.
- Burkey, C., Jr., C. Anderson, T. Cappiello, M. Coffing, D. Huttunen, J. Menard, D. B. Molyneaux, C. Utermohle, and T. Vania. 1998. Annual management report for the subsistence and commercial fisheries of the Kuskokwim area. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A98-11, Anchorage.
- Burkey, C., Jr., M. Coffing, D. B. Molyneaux, and P. Salmone. 2000. Kuskokwim River Chinook salmon stock status and development of management/action plan options, 2000. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A00-40, Anchorage.
- Coffing, M. W. 1991. Kwethluk subsistence: contemporary land use patterns, wild resource harvest and use, and the subsistence economy of a lower Kuskokwim River area community, Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 157, Juneau.
- Conitz, J. M., K.G. Howard, and M. J. Evenson. 2015. Escapement goal recommendations for select Arctic-Yukon-Kuskokwim Region salmon stocks, 2016. Alaska Department of Fish and Game, Fishery Manuscript No. 15-08, Anchorage.
- Estensen, J. L., D. B. Molyneaux, and D. J. Bergstrom. 2009. Kuskokwim River salmon stock status and Kuskokwim area fisheries, 2009: a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 09-21, Anchorage.
- Francisco, K. R., K. Schultz, D. J. Schneiderhan, D. Huttunen, C. Burkey Jr., H. Hamner, R. Walker. 1989. Annual management report Kuskokwim Area, 1988. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B89-08, Anchorage.
- Hamazaki, T., M. J. Evenson, S. J. Fleischman and K. L. Schaberg. 2012. Spawner-recruit analysis and escapement goal recommendation for Chinook salmon in the Kuskokwim River Drainage. Alaska Department of Fish and Game, Fishery Manuscript Series No. 12-08, Anchorage.
- Head, J. H., and Z. W. Liller. 2017. Salmon escapement monitoring in the Kuskokwim Area, 2016. Alaska Department of Fish and Game, Fishery Data Series No. 17-29, Anchorage.
- Huttunen, D. C. 1984. 1982-1983 Kuskokwim River test fishing projects. Alaska Department of Fish and Game, Division of Commercial Fisheries, Kuskokwim River Salmon Test Fishing Report No. 13, Juneau.
- Kuskokwim Fishermen's Cooperative. 1991. Kuskokwim River salmon management working group, subsistence survey final report, 1990. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3B91-01, Anchorage.
- Linderman, J. C. Jr., and D. J. Bergstrom. 2006. Kuskokwim River Chinook and chum salmon stock status and Kuskokwim area fisheries; a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 06-35, Anchorage.
- Shelden, C. A., T. Hamazaki, M. Horne-Brine, and G. Roczicka. 2016. Subsistence salmon harvests in the Kuskokwim area, 2015. Alaska Department of Fish and Game, Fishery Data Series No. 16-55, Anchorage.
- Tiernan, A., and A. Poetter. 2015. 2013 Kuskokwim area management report. Alaska Department of Fish and Game, Fishery Management Report No. 15-46, Anchorage.
- Whitmore, C., M. Martz, D. G. Bue, J. C. Linderman and R. L. Fisher. 2005. Annual management report for the subsistence and commercial fisheries of the Kuskokwim Area, 2003. Alaska Department of Fish and Game, Fishery Management Report No. 05-72, Anchorage.

APPENDIX A

Appendix A1.—The Kuskokwim Management Area and commercial fishing districts.



Appendix A2.–Historical events in the Kuskokwim Management Area, 1913–2015.

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

-continued-

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	<p>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).</p> <p>The BOF made a positive finding for customary and traditional use for all salmon in the entire Kuskokwim Area.</p>
1994	<p>Working Group commissioned and Dr. Mundy started “Recommendations for Strengthening the Cooperative Management Process of the Kuskokwim River Salmon Management Working Group.”</p> <p>Upstream boundary of District 1 moved upstream to Bogus Creek.</p>
1995	<p>BSFA operates a chum salmon radiotelemetry project on the Kuskokwim River.</p> <p>Takotna Community School and ADF&G operate a salmon counting tower on the Takotna River (1995–1998).</p> <p>AVCP and BSFA operate the Lower Kuskokwim test fishery in cooperation with ADF&G; the project is a modification of the Eek test fishery.</p>
1996	<p>ADF&G genetic sampling for late spawning chum salmon and 1 mixed-stock sample from District 1.</p> <p>Near record low water levels during June and early August coupled with record high water temperatures.</p> <p>Irregular fishing schedule in District 1 during June and July due to limited market interest for chum salmon.</p> <p>Record early coho run coupled with record high harvest and escapement at Kogruklu River.</p> <p>AVCP and ADF&G operate a salmon counting tower on the Kwethluk River (1996–1999).</p> <p>KNA and ADF&G operate a salmon weir on the George River (1996–present).</p> <p>Aniak River sonar is relocated to allow for full channel ensonification and configurable sonar technology is employed (1996–present).</p> <p>Native Village of Kwinhagak (NVK) begins development of a salmon counting tower on the Kanektok River.</p>
1997	<p>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 Kogruklu River weir.</p> <p>Second summer of record low water levels in the Kuskokwim River basin during the summer and fall coupled with record high water temperatures.</p> <p>Anomalous Bering Sea conditions: warm water, odd plankton blooms, sea bird die-offs, etc.</p> <p>Aniak chum salmon return vastly exceeded expectations based on 1992–1993 spawning abundance estimates.</p> <p>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.</p> <p>Aniak processor does not operate due to depressed salmon market (1997–present).</p>

-continued-

Year	Event
1997 (cont.)	<p>Sale of salmon roe is prohibited in Districts 1 and 2 (effective beginning December 1997).</p> <p>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).</p> <p>NVK and ADF&G operate a salmon counting tower on the Kanektok River (1997–1998).</p>
1998	<p>Kuskokwim River declared an economic disaster area for second straight year due to low chum and coho salmon returns, harvests, and exvessel prices.</p> <p>KNA and ADF&G operate a salmon weir on the Tatlawiksuk River (1998–present).</p> <p>Second year of anomalous Bering Sea conditions: warm water, odd plankton blooms, sea bird die-offs, etc.</p> <p>High water levels severely restrict operational period of many Kuskokwim Area escapement projects.</p> <p>Record low average water temperature measured at the Bethel test fishery site.</p>
1999	<p>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.</p> <p>Federal government assumes control of subsistence fishery management in federal waters on October 1.</p> <p>KNA-operated salmon weirs on the Tatlawiksuk and George rivers converted to resistance board (floating) weirs and operations extended through coho run.</p> <p>Kuskokwim River sonar project begins redevelopment using split-beam sonar and is relocated to a new site 1 mile above upstream end of Church Slough.</p>
2000	<p>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.</p> <p>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.</p> <p>ADF&G and Federal Office of Subsistence Management (FOSM) restrict subsistence Chinook salmon fishery.</p> <p>Takotna Community Schools and ADF&G operate a resistance board weir on the Takotna River (2000-present).</p> <p>Kwethluk IRA and USFWS operate a resistance board weir on the Kwethluk River (2000 to present).</p> <p>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 1 subdistrict. Due to limited processing capacity, only 1 subdistrict is opened at a time to reduce harvest.</p> <p>Commercial fishermen required to identify vessels with either ADF&G or CFEC permit number.</p>

-continued-

Year	Event
2000 (cont.)	<p>ADF&G Division of Sport Fish creates Lower Yukon–Kuskokwim Management Area and stations Area Management Biologist in Bethel.</p> <p>Line attached to a pole (rod and reel) added to legal gear for subsistence fishing in AVCP area (prior to 2000 fishing season).</p> <p>Use of rod and reel for subsistence extended throughout the Kuskokwim Area (2000–2001 BOF meeting).</p>
2001	<p>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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Native Community of Tuluksak and USFWS operate a resistance board weir on the Tuluksak River.</p> <p>NVK and ADF&G operate a salmon counting weir on the Kanektok River.</p> <p>ADF&G/CF and KNA operate fish wheels at Kalskag and Birch Tree Crossing to tag salmon and then make salmon population estimates.</p>
2002	<p>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.</p> <p>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.</p> <p>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 is overriding conservation or subsistence concerns. In this instance there were no overriding conservation or subsistence concerns.</p> <p>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.</p> <p>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.</p>

-continued-

Year	Event
2002 (cont.)	<p>ADF&G/SF and KNA operated salmon radiotelemetry projects on the Kuskokwim mainstem and on the Holitna River to estimate salmon abundance.</p> <p>Second consecutive season of no chum salmon (June or July) directed commercial fishery.</p>
2003	<p>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.</p> <p>Third consecutive season of no chum salmon (June or July) directed commercial fishery.</p> <p>ADF&G/SF and KNA operated salmon radiotelemetry projects on the Kuskokwim mainstem and on the Holitna River to estimate salmon abundance.</p> <p>Record high coho salmon escapements throughout the Kuskokwim Area.</p>
2004	<p>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.</p> <p>The Alaska Board of Fisheries provided a commercial guideline harvest level of 0–50,000 sockeye salmon for the Kuskokwim River.</p> <p>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.</p> <p>The northern boundary of District W-4 (Quinhagak) was relocated approximately 1 mile north from Oyak Creek to the northernmost edge of the mouth of Weelung Creek.</p> <p>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.</p> <p>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.</p> <p>The Goodnews Bay District herring superexclusive use regulations were repealed.</p> <p>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).</p> <p>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.</p> <p>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.</p>

-continued-

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	<p>Chum escapements were at record highs at nearly all monitoring projects with the exception of George River where escapement was near average.</p> <p>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.</p> <p>Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.</p> <p>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.</p>
2006	<p>Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.</p> <p>Chum salmon escapements were at record highs at the Kwethluk, George, and Takotna river monitoring projects.</p> <p>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.</p>
2007	<p>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.</p> <p>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.</p> <p>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.</p> <p>A lack of processing capacity, commercial interest, and continued poor chum salmon market conditions resulted in no commercial openings in June and July.</p> <p>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.</p>
2008	<p>Commercial salmon fishing opportunity in District 1 reduced in July because of poor chum salmon market conditions.</p> <p>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.</p>

-continued-

Year	Event
2010	<p>Kuskokwim River Chinook salmon spawning escapements were among the lowest on record and only the KogrukluK achieved the lower end of the escapement goal.</p> <p>Kuskokwim River Tributaries, Kwethluk, and Tuluksak were closed to subsistence and sport harvest of Chinook salmon for most of the season by the USFWS.</p> <p>Kuskokwim River chum salmon catch was the largest since 1998.</p> <p>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.</p> <p>Telaquana Lake weir passed over 70,000 sockeye salmon.</p> <p>High water levels were sustained through most of August on the Kuskokwim River.</p> <p>Coho salmon fishery closed on August 12 due to low abundance and the commercial catch was the lowest since 1999.</p> <p>District W-4 highest exvessel value since 1988, primarily attributed to record sockeye salmon harvest.</p> <p>District W-5 had its highest exvessel value since 1994.</p>
2011	<p>Kuskokwim River Chinook salmon spawning escapements continued to be below average and only KogrukluK met the escapement goal.</p> <p>Preseason management actions were taken in an effort to achieve escapement goals.</p> <p>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.</p> <p>Subsistence fishing was closed in District 1 from June 16 to June 19 and June 23 to June 28.</p> <p>Subsistence fishing was restricted to 6 in or smaller mesh from June 29 to July 7.</p> <p>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.</p> <p>Kuskokwim River chum salmon catch was the largest since 1998.</p>
2012	<p>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.</p> <p>High water plagued escapement projects throughout the season and Chinook salmon escapement goals that were assessed were not achieved.</p> <p>Kuskokwim River declared an economic disaster due to low exvessel value and very small Chinook salmon subsistence harvest.</p> <p>District 4 and Kanektok River had the lowest catch and escapement of Chinook salmon on record.</p> <p>District 5 had highest sockeye salmon catch since 1994.</p>
2013	<p>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 assess run abundance. This information would be evaluated inseason using the Bethel test fishery (BTF) catch per unit effort (CPUE) and subsistence harvest reports.</p>

-continued-

Year	Event
(2013 cont.)	<p>ANS ranges were adjusted at the January 2013 BOF meeting:</p> <ul style="list-style-type: none"> 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. <p>Kuskokwim River Chinook salmon run was the smallest on record. This resulted in 17 days of restrictions on the mainstem Kuskokwim River.</p> <p>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.</p> <p>Chinook salmon escapements at tributary weirs were the lowest on record with escapements at the George and Kogrugluk rivers weirs being below their respective SEG range.</p> <p>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.</p>
2014	<p>In March 2014 two emergency petitions to BOF were submitted and adopted into regulation.</p> <p>An emergency petition to add dip nets as legal gear for the taking of salmon other than Chinook salmon during times of Chinook salmon conservation was submitted. The BOF found that this petition met the criteria for the finding of an emergency and adopted it as an emergency regulation. This allows the department to open subsistence fishing periods with dip net gear and all Chinook salmon caught must be returned immediately to the water alive. This will be used to provide more opportunity to harvest chum and sockeye salmon while conserving Chinook salmon.</p> <p>An emergency petition to provide the department the ability to restrict the length of subsistence gillnets from 50 fathoms to 25 fathoms (150 feet) during times of Chinook salmon conservation was submitted. The BOF found that this petition met the criteria for the finding of an emergency and adopted it as an emergency regulation. This gives the department more flexibility to open subsistence fishing periods during times of Chinook salmon conservation. Gillnets may be over 25 fathoms in total length, but must be tied and/or bagged in such a way that only 25 fathoms can be used to fish.</p> <p>Kuskokwim river Chinook salmon run was below average and resulted in 31 days of restrictions on the mainstem Kuskokwim River.</p> <p>The tributaries of Kwethluk, Kasigluk, Kisarolik, Tuluksak, and Aniak rivers were closed to subsistence harvest of Chinook salmon with gillnets.</p> <p>Kuskokwim River coho salmon runs were strong and escapements were some of the largest recorded.</p>

-continued-

Year	Event
2015	<p>In March 2015 the BOF deliberated and adopted 3 proposals for Kuskokwim Area subsistence salmon fishing. The first adopted proposal addressed the use of 4-inch mesh gillnets during times of Chinook salmon conservation. Four inch or smaller mesh gillnets be operated as set gillnets only, not exceed 60 feet in length, and no part of which may be operated more than 100 feet of the ordinary high water mark. The intent is to keep these gillnets close to the bank and out of the channel.</p> <p>The second proposal that gave the department authority to specify the length of gillnets used during subsistence salmon fishing periods.</p> <p>Fish wheels may also be operated with chutes during times of Chinook salmon conservation.</p> <p>The Chinook salmon fishery, within the boundaries of the Yukon Delta National Wildlife Refuge, was managed by USFW under special actions. On May 21, USFWS enacted a special action to close the Kuskokwim River Chinook salmon fishery to non-Federally qualified users. Subsistence fishing was restricted to 3 days per week with the use of set gillnets with 4-inch or less mesh size not to exceed 60-feet in length beginning May 21 downstream of Tuluksak, and on May 28 between Tuluksak and Aniak. This restriction was also implemented by ADF&G from Aniak to the Holitna River mouth beginning June 4. On June 11, these same restrictions were enacted from the Holitna River mouth to the headwaters of the Kuskokwim River. Fishing for Chinook salmon with hook and line gear was closed drainagewide beginning June 11. An area at the mouth of the Kuskokwim River (east of the Ishkowik River to the northern boundary of District W-4) was also closed to subsistence fishing on May 28, by ADF&G, in order to provide additional protection to Chinook salmon entering the Kuskokwim River. USFWS instituted a community harvest permit program from June 10–June 30 that allowed the harvest of up to 7,000 Chinook salmon within the Yukon Delta NWR boundaries.</p> <p>The first 6-inch mesh fishing period on June 20, upstream of the refuge boundary at Aniak, was restricted to Alaska residents 60 years of age or older and gillnets no longer than 10 fathoms in length. This was the first time ADF&G had provided an “Elder fishery”.</p> <p>On July 2, ADF&G resumed management of the entirety of the Kuskokwim River and implemented restrictions in conjunction with those in place upstream of the Yukon Delta NWR boundary to conserve Chinook salmon. Additional limited fishing opportunities on chum and sockeye salmon were allowed as those runs progressed. The chum salmon run however, was assessed to be poor based on low BTF CPUE’s. Restrictions continued until August 4 when all restrictions were rescinded.</p> <p>Subsistence fishing was restricted a total of 74 days from May 21 through August 3.</p>
2016	<p>The Alaska Board of Fisheries (BOF) met in Fairbanks January 12–16, 2016 to consider proposals concerning the Arctic-Yukon-Kuskokwim areas. An early season Chinook salmon subsistence fishing closure, similar to the approach taken in 2014 and 2015, was suggested and agreed to by a group of Kuskokwim River residents that were in attendance. The BOF passed language that would annually suspend directed subsistence fishing for Chinook salmon in the Kuskokwim River until after June 11. Additionally, beach seine specifications were adopted.</p> <p>Preseason management actions including early season subsistence fishing closures, tributary closures, time and area restrictions, gillnet mesh size and length restrictions, and live release requirements were jointly recommended by the Alaska Department of Fish and Game (ADF&G), and the United States Fish and Wildlife Service (USFWS) in an effort to achieve escapement goals. The Kuskokwim River Salmon Management Working Group (Working Group) voted to support the management actions.</p>

-continued-

Year	Event
(2016 cont.)	<p>The early season subsistence fishing closure was initiated on May 20 from the mouth of the Kuskokwim River to the Holitna River and upstream of the Holitna River beginning June 1. With the closure came additional restrictions including tributary closures and live release of Chinook salmon requirements.</p> <p>Beginning June 1, the Federal Subsistence Board adopted a Special Action to close the Kuskokwim Chinook and chum salmon fishery to non-Federally qualified users within the boundary of the Yukon Delta National Wildlife Refuge (NWR). The USFWS managed the subsistence fishery within the Yukon Delta NWR through 6:00 p.m. July 7 at which time ADF&G resumed management of the entirety of the Kuskokwim River.</p> <p>Subsistence management under ADF&G consisted of a June 12, 48 hour 6-inch or less mesh, 25 fathom gillnet opportunity from the refuge boundary at Aniak to the Holitna River and removal of subsistence restrictions in waters upstream of the Holitna River. Beginning June 16, ADF&G removed all subsistence fishing restrictions upstream of the refuge boundary at Aniak except for the Aniak River gillnet closure which remained in effect. Final removal of all subsistence restrictions for the entire Kuskokwim River drainage occurred on July 27.</p>
2017	<p>Preseason management actions including early season subsistence fishing closures, tributary closures, time and area restrictions, gillnet mesh size and length restrictions, and live release requirements were jointly recommended by the Alaska Department of Fish and Game (ADF&G), and the United States Fish and Wildlife Service (USFWS) in an effort to achieve escapement goals. The Kuskokwim River Salmon Management Working Group (Working Group) voted to support the management actions.</p> <p>The early season subsistence fishing closure was initiated on May 20 from the mouth of the Kuskokwim River to the Holitna River and proceeded upstream at 5 day increments between each subsistence section. With the closure came additional restrictions including tributary closures and live release of Chinook salmon requirements.</p> <p>Beginning June 12, the Federal Subsistence Board adopted a Special Action to close the Kuskokwim Chinook salmon fishery to non-Federally qualified users within the boundary of the Yukon Delta National Wildlife Refuge (NWR). The USFWS managed the subsistence fishery within the Yukon Delta NWR through 6:00 p.m. July 8 at which time ADF&G resumed management of the entirety of the Kuskokwim River.</p> <p>Subsistence management under ADF&G consisted of a June 12, 12-hour, 6.0 inch or less mesh, 25-fathom gillnet opportunity from the refuge boundary at Aniak to the Holitna River and removal of subsistence restrictions in waters upstream of the Holitna River. Subsequent 6.0 inch or less mesh, 25 fathom gillnet opportunities were provided on June 13, June 24, July 3, and July 8, at which point fishing was opened until further notice with the afore mentioned gear. Final removal of all subsistence restrictions for the Kuskokwim River mainstem occurred on July 27 and tributary restrictions were lifted on August 18.</p>

Appendix A3.–Commercial salmon harvest, excluding personal use, Kuskokwim Area, 1960–2017.

Year	Commercial harvest					Total
	Chinook	Sockeye	Coho	Pink	Chum	
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

-continued-

Appendix A3.–Page 2 of 2.

Year	Commercial harvest					
	Chinook	sockeye	Coho	Pink	Chum	Total
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
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
2014	2,470	82,114	222,063	3	37,046	343,696
2015	8,254	56,260	148,349	0	21,068	233,931
2016	b	b	b	b	b	b
2017	b	b	b	b	b	b
Average 2006–2015	15,276	114,528	170,199	5	125,399	425,407

^a Includes harvests from District 3.

^b Confidential information.

Appendix A4.–Estimated exvessel value of the commercial salmon harvest and permits fished, Kuskokwim Management Area, 1987–2017.

Year	District 1		District 2		District 4		District 5		Total value	Total permits
	Value of catch	Permits fished ^a	Value of catch	Permits fished ^a	Value of catch	Permits fished ^a	Value of catch	Permits fished ^a		
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	\$12,726,198	813
1989	\$3,883,321	743	\$131,168	30	\$746,071	227	\$378,962	88	\$5,139,522	824
1990	\$3,385,636	742	\$121,329	22	\$1,013,472	390	\$360,664	82	\$4,881,101	823
1991	\$2,971,767	749	\$111,651	23	\$592,436	346	\$274,919	72	\$3,950,773	819
1992	\$3,764,804	741	\$147,992	22	\$993,664	349	\$405,447	111	\$5,311,907	814
1993	\$2,860,795	737	\$90,906	20	\$898,255	408	\$441,135	114	\$4,291,091	804
1994	\$3,581,992	706	\$129,555	17	\$837,157	307	\$649,747	116	\$5,198,451	793
1995	\$2,766,882	712	\$107,913	21	\$1,047,188	382	\$286,398	87	\$4,208,381	798
1996	\$2,117,245	620	\$11,015	8	\$534,726	218	\$222,589	54	\$2,885,575	714
1997	\$2,288,766	604	\$2,944	4	\$497,071	289	\$122,868	53	\$2,911,649	702
1998	\$983,633	615	\$617	3	\$467,843	203	\$184,265	50	\$1,636,358	707
1999	\$169,769	509	\$0	0	\$279,091	218	\$103,662	73	\$552,522	604
2000	\$514,930	532	\$3,039	4	\$436,561	230	\$213,014	46	\$1,167,544	623
2001	\$424,199	412	c	c	\$228,615	159	\$98,849	32	\$751,663	514
2002	\$126,361	318	c	c	\$167,749	114	\$24,802	30	\$318,912	407
2003	\$453,187	359	c	c	\$304,553	114	\$135,107	34	\$892,847	438
2004	\$943,766	390	c	c	\$405,345	116	\$135,246	29	\$1,484,357	467
2005	\$448,853	403	c	c	\$571,965	145	\$134,295	29	\$1,155,113	484
2006	\$451,390	373	c	c	\$551,182	132	\$141,265	24	\$1,143,837	453
2007	\$380,840	366	c	c	\$660,865	125	\$222,330	28	\$1,264,035	456
2008	\$538,310	374	c	c	\$750,731	146	\$198,070	25	\$1,487,111	462
2009	\$502,848	342	c	c	\$747,325	179	\$192,031	39	\$1,442,204	434
2010	\$765,606	433	c	c	\$1,655,321	241	\$470,661	48	\$2,891,588	530
2011	\$764,358	413	c	c	\$1,176,436	219	\$346,022	48	\$2,286,816	510
2012	\$597,998	379	c	c	\$824,435	179	\$617,765	58	\$2,040,198	477
2013	\$1,184,847	378	c	c	\$761,537	197	\$452,651	71	\$2,399,035	469
2014	\$843,356	358	c	c	\$858,638	194	\$584,654	61	\$2,286,648	457
2015	\$246,016	283	c	c	\$498,564	189	\$131,616	61	\$876,196	396
2016	^b	^b	c	c	^c	^c	^c	^c	^b	^b
2017	^b	^b	c	c	^c	^c	^c	^c	^b	^b
Avg 2006–2015	\$627,557	370			\$848,503	180	\$335,707	46	\$1,811,767	464

^a Number of permits that made at least one delivery.

^b Confidential information.

^c No commercial fishery occurred.

Appendix A5.—Commercially harvested salmon average weights and prices paid, Kuskokwim Management Area, 1967–2017.

Year	Average weight (lb)					Average price (\$)				
	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

-continued-

Appendix A5.–Page 2 of 2.

Year	Average weight (lb)					Average price (\$)				
	Chinook	Sockeye	Coho	Pink	Chum	Chinook	Sockeye	Coho	Pink	Chum
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
2014	10.5	5.7	7.0	4.3	6.6	1.00	1.25	0.96	0.00	0.60
2015	10.1	6.1	8.0	0.0	6.4	0.50	0.50	0.49	0.00	0.50
2016 ^d	–	–	–	–	–	–	–	–	–	–
2017 ^d	–	–	–	–	–	–	–	–	–	–
Average 2006–2015	13.3	6.4	7.1	2.5	6.7	0.8	0.8	0.6	0.0	0.4

^a Information unavailable

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

^c Information was not available for District 4.

^d Confidential Information

Appendix A6.–Emergency order summary Kuskokwim Management Area, 2017.

Emergency No. 3-S-WR-01-17

Effective date: May 20, 2017

Closes the subsistence salmon fishing season:

Beginning 12:01 a.m. Saturday, May 20, 2017, the Kuskokwim River Drainage from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River to ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth;

Beginning 12:01 a.m. Thursday, May 25, 2017, from the ADF&G markers approximately one-half mile upstream of the Tuluksak River mouth to the Yukon Delta Refuge boundary near Aniak;

Beginning 12:01 a.m. Thursday, June 1, 2017, from the Yukon Delta Refuge boundary near Aniak to the ADF&G regulatory markers near the Holitna River mouth; and

Beginning 12:01 a.m. Sunday, June 4, 2017, upstream of the ADF&G regulatory markers located near the Holitna River mouth to the headwaters of the Kuskokwim River.

Immediately reopens the subsistence salmon fishing season with the following restrictions:

Dip nets and beach seines may be used until further notice. All Chinook salmon must be returned alive to the water.

Fish wheels may be operated with a live box with no less than 45 cubic feet of water and must be checked at least every 6 hours. Fish wheels can also be equipped with a chute and must be closely attended while in operation. All Chinook salmon must be returned alive to the water.

Hook and line subsistence fishing for Chinook salmon will be closed until further notice.

In addition, this emergency order closes the following tributaries of the Kuskokwim River to subsistence fishing with gillnets effective May 20, 2017:

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 regulatory 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.

Emergency No. 3-S-WR-02-17

Effective date: May 27, 2017

This emergency order established a subsistence fishing period in the Kuskokwim River mainstem within the Yukon Delta Refuge boundaries with 4-inch or less mesh size set gillnets from 9:00 a.m. until 9:00 p.m. Saturday, May 27, 2017. Gillnets may not exceed 60 feet in length or 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark.

-continued-

Emergency No. 3-S-WR-03-17

Effective date: June 3, 2017

This emergency order established a subsistence fishing period in the Kuskokwim River mainstem from the Yukon Delta Refuge boundary at the mouth of the Kuskokwim River to the ADF&G regulatory markers downstream of the mouth of the Holitna River with 4-inch or less mesh size set gillnets from 9:00 a.m. until 9:00 p.m. Saturday, June 3, 2017. Gillnets may not to exceed 60 feet in length or 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark.

Emergency No. 3-S-WR-04-17

Effective date June 10, 2017

This emergency order established a subsistence fishing period in the Kuskokwim River mainstem from the Yukon Delta Refuge boundary at the mouth of the Kuskokwim River to the Kuskokwim River headwaters with 4-inch or less mesh size set gillnets from 10:00 a.m. until 10:00 p.m. Saturday, June 10, 2017. Gillnets may not to exceed 60 feet in length or 45 meshes in depth and may not be operated more than 100 feet from the ordinary high water mark.

Emergency No. 3-S-WR-05-17

Effective date June 12, 2017

This emergency order establishes a 6-inch or smaller mesh 25 fathom gillnet subsistence salmon fishing period in the mainstem of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak to the ADF&G markers downstream of the mouth of the Holitna River, from 12:00 p.m. noon, Monday, June 12 until 12:00 p.m. noon, Tuesday, June 13, 2017.

This emergency order also established a 6-inch or smaller mesh 25 fathom gillnet subsistence salmon fishing period from the ADF&G markers downstream of the mouth of the Holitna River to the Kuskokwim River headwaters from 12:00 p.m. noon, Monday, June 12, 2017 until further notice.

Emergency No. 3-S-WR-06-17

Effective date June 12-13, 2017

This emergency order rescinds the portion of emergency order 3-S-WR-01-17 that requires the live release of king salmon from dip nets, fish wheels, and hook and line within the Kuskokwim River from the Yukon Delta NWR boundary at Aniak to the ADF&G markers downstream of the mouth of the Holitna River, from 12:00 p.m. noon, Monday, June 12 until 12:00 p.m. noon, Tuesday, June 13, 2017; and from the ADF&G markers downstream of the mouth of the Holitna River to the Kuskokwim River headwaters from 12:00 p.m. noon, Monday, June 12, 2017 until further notice.

Emergency No. 3-S-WR-07-17

Effective date June 13, 2017

This emergency order establishes the requirement for live release of king salmon from dip nets, fish wheels equipped with either a live box or chute, beach seines, and hook and line within the Kuskokwim River from the Yukon Delta NWR boundary at Aniak to the ADF&G markers downstream of the mouth of the Holitna River, from 12:00 p.m. noon, Tuesday, June 13, 2017 until further notice.

-continued-

Emergency No. 3-S-WR-08-17

Effective date June 24, 2017

This emergency order establishes a 6-inch or smaller mesh 25 fathom gillnet subsistence salmon fishing period in the mainstem of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak to the ADF&G markers downstream of the mouth of the Holitna River, from 12:01 p.m. until 11:59 p.m., Saturday, June 24, 2017.

Emergency No. 3-S-WR-09-17

Effective date July 3, 2017

This emergency order establishes a 6-inch or smaller mesh 25 fathom gillnet subsistence salmon fishing period in the mainstem of the Kuskokwim River from the Yukon Delta NWR boundary at Aniak to the ADF&G markers downstream of the mouth of the Holitna River, from 12:01 p.m. until 11:59 p.m., Monday, July 3, 2017.

This emergency order also establishes a closed waters area to subsistence salmon fishing with gillnets in the Kuskokwim River from the Yukon Delta NWR boundary at Aniak upstream to a line formed between two points lat 61° 35.308' N, long 159° 29.167' W and lat 61° 34.731' N, long 159° 28.939' W from 12:01 p.m. until 11:59 p.m., Monday, July 3, 2017.

Emergency No. 3-S-WR-10-17

Effective date July 8, 2017

This emergency order establishes a 6-inch or less mesh, 45 meshes deep, 25 fathom gillnet subsistence salmon fishing in the mainstem of the Kuskokwim River from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River to the ADF&G markers downstream of the mouth of the Holitna River, from 12:01 p.m., Saturday, July 8, 2017 until further notice.

This emergency order also establishes a closed waters area to subsistence salmon fishing with gillnets in the Kuskokwim River from the Yukon Delta NWR boundary at Aniak upstream to a line formed between two points lat 61° 35.308' N, long 159° 29.167' W and lat 61° 34.731' N, long 159° 28.939' W from 12:01 p.m., Saturday, July 8, 2017 until further notice.

Emergency No. 3-S-WR-11-17

Effective date July 13, 2017

This emergency order establishes subsistence fishing in the Kuskokwim River drainage, from the Yukon Delta NWR boundary at the mouth of the Kuskokwim River up to the confluence of the Johnson River (Section 1) with 6-inch or less mesh, 45 meshes deep, and 50 fathoms in length gillnets, from 12:01 p.m., Thursday, July 13, 2017 until further notice.

This emergency order rescinds that portion of Emergency Order number 3-S-WR-10-17, which established a gillnet length restriction of 25 fathoms in Section 1 of the Kuskokwim River Drainage. All other portions of that Emergency Order remain in effect.

-continued-

Emergency No. 3-S-WR-12-17

Effective date July 27, 2017 until further notice

This emergency order supersedes all previous subsistence salmon emergency orders and establishes unrestricted subsistence salmon fishing within the mainstem of the Kuskokwim River beginning 12:01 p.m. Thursday, July 27, 2017.

Also, this emergency order closes the following tributaries to subsistence fishing with gillnets and hook and line from 12:01 p.m. Thursday, July 27, 2017 until further notice: The Kwethluk River drainage to its confluence with Kuskokuak Slough, the Kasigluk and Kisaralik river drainages to their confluence with Old Kuskokuak Slough, the Tuluksak River drainage including its confluence with the Kuskokwim River and downstream approximately 1-mile to ADF&G regulatory markers, and the Aniak River drainage to ADF&G regulatory markers at its confluence with the Kuskokwim River.

Emergency No. 3-S-WR-13-17

Effective date July 30, 2017

This emergency order establishes a commercial fishing period in Kuskokwim River Subdistrict 1-A for 6 hours from 2:00 p.m. until 8:00 p.m. Sunday, July 30, 2017.

Emergency No. 3-S-WR-14-17

Effective date August 14, 2017

This emergency order establishes a commercial fishing period in Kuskokwim River Subdistrict 1-A for 6 hours from 2:00 p.m. until 8:00 p.m. Monday, August 14, 2017.

Emergency No. 3-S-WR-15-17

Effective date August 17, 2017

This emergency order establishes a commercial fishing period in Kuskokwim River Subdistrict 1-A for 6 hours from 2:00 p.m. until 8:00 p.m. Thursday, August 17, 2017.

Appendix A7.—Subsistence Chinook salmon harvest estimates by community, Kuskokwim Management Area, 1990–2017.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	1,559	729	929	680	1,281	1,095	1,108	1,376	1,128	1,153
N. Kuskokwim Bay	1,559	729	929	680	1,281	1,095	1,108	1,376	1,128	1,153
Tuntutuliak	4,174	4,156	3,750	3,905	5,019	3,928	4,256	3,159	3,797	3,412
Eek	4,923	2,617	2,057	2,496	2,976	3,679	2,786	2,009	2,215	1,730
Kasigluk	3,300	2,875	3,150	3,609	3,351	3,208	3,294	3,480	2,617	5,473
Nunapitchuk	4,192	4,004	4,123	3,852	4,580	4,543	3,479	3,605	4,502	4,215
Atmautluak	2,895	1,661	1,239	1,715	1,856	2,016	1,752	1,648	1,397	1,372
Napakiak	4,427	2,573	4,147	3,822	3,355	3,515	3,842	2,908	3,436	2,265
Napaskiak	6,586	4,008	5,299	5,566	6,521	4,862	5,261	4,756	4,901	3,633
Oscarville	1,263	1,476	1,501	1,496	1,390	1,046	995	1,056	754	1,543
Bethel	34,925	18,041	22,220	19,800	31,251	32,463	32,116	20,100	24,877	22,751
Kwethluk	10,657	7,298	6,949	9,280	9,546	9,907	9,786	6,319	7,502	6,366
Akiachak	8,395	5,607	8,130	7,678	7,622	6,410	5,689	6,699	6,026	5,210
Akiak	5,966	3,168	3,452	4,478	4,653	4,401	4,851	3,196	2,943	2,377
Tuluksak	2,022	3,114	2,330	3,662	4,414	4,175	3,309	5,456	3,554	2,239
Lower Kuskokwim River	93,725	60,598	68,347	71,359	86,534	84,153	81,416	64,391	68,521	62,586
Lower Kalskag	2,946	4,022	2,338	3,603	4,087	4,541	3,513	3,103	1,954	1,726
Upper Kalskag	1,618	1,031	1,321	1,682	1,297	1,447	1,304	941	1,394	1,670
Aniak	3,589	3,562	3,976	4,651	3,714	3,506	3,343	3,640	3,466	2,603
Chuathbaluk	1,718	998	986	1,443	1,013	2,461	914	1,204	730	1,035
Middle Kuskokwim River	9,871	9,613	8,621	11,379	10,111	11,955	9,074	8,888	7,544	7,034
Crooked Creek	971	916	583	707	1,126	874	890	963	768	702
Red Devil	297	154	400	449	409	412	359	404	243	141
Sleetmute	777	887	782	1,795	1,295	964	1,265	1,171	978	414
Stony River	574	614	247	445	391	534	596	874	293	46
Lime Village	399	70	162	40	195	180	141	57	241	145
McGrath	896	902	1,586	550	1,026	804	1,223	995	872	1,033
Takotna	74	0	6	0	0	11	7	3	2	0
Nikolai	635	337	818	426	449	938	398	212	380	284
Telida	—	—	—	—	—	—	—	—	—	—
Upper Kuskokwim River	4,623	3,880	4,584	4,412	4,891	4,717	4,879	4,679	3,777	2,765
Kuskokwim River Total	109,778	74,820	82,481	87,830	102,817	101,921	96,477	79,334	80,969	73,538
Quinhagak	3,881	3,753	4,394	3,634	3,977	2,864	3,506	3,186	3,774	2,815
Goodnews Bay	358	852	548	590	672	789	392	441	735	759
Platinum	202	20	67	75	74	24	41	14	57	69
South Kuskokwim Bay	4,441	4,625	5,009	4,299	4,723	3,677	3,939	3,641	4,566	3,643
Total Estimate	109,778	74,820	82,481	87,830	102,817	101,921	96,477	79,334	80,969	73,538

-continued-

Appendix A7.–Page 2 of 3.

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	1,285	1,612	1,349	2,003	2,663	1,536	1,729	1,865	2,233	1,243
N. Kuskokwim Bay	1,285	1,612	1,349	2,003	2,663	1,536	1,729	1,865	2,233	1,243
Tuntutuliak	2,826	2,958	3,907	2,657	3,912	4,545	4,469	4,614	4,266	3,067
Eek	2,140	2,035	2,514	2,075	2,954	3,133	2,501	2,512	2,966	1,982
Kasigluk	3,857	5,054	4,685	4,711	7,859	5,242	4,905	5,167	2,471	2,464
Nunapitchuk	3,425	3,328	4,503	3,179	4,921	4,103	4,121	4,661	4,234	3,468
Atmautluak	1,191	754	1,479	547	2,153	1,927	1,758	1,890	1,298	1,567
Napakiak	2,073	2,408	2,702	2,438	2,839	3,060	5,125	3,245	1,903	2,387
Napaskiak	4,175	4,596	3,922	3,390	4,058	4,485	5,877	6,392	4,555	5,372
Oscarville	1,259	1,779	1,115	1,153	1,325	1,069	1,052	1,360	1,351	754
Bethel	20,629	24,684	22,892	24,584	29,443	28,293	27,805	30,422	27,800	26,170
Kwethluk	5,174	6,460	6,880	4,206	7,157	6,089	7,258	6,466	8,451	7,130
Akiachak	6,311	6,978	6,946	2,493	7,131	5,411	5,561	7,621	9,719	7,361
Akiak	2,335	3,528	3,390	3,905	3,775	3,860	4,423	4,297	4,090	3,247
Tuluksak	2,464	2,520	2,860	3,286	3,766	2,655	2,372	3,266	2,937	3,212
Lower Kuskokwim River	57,859	67,082	67,795	58,624	81,293	73,872	77,228	81,914	76,040	68,181
Lower Kalskag	1,691	2,432	1,535	1,556	1,991	1,417	3,494	1,937	1,748	2,525
Upper Kalskag	1,234	1,149	1,545	1,328	2,498	2,533	1,569	1,383	2,435	1,696
Aniak	3,100	2,684	4,576	1,837	3,022	1,977	2,412	3,417	3,100	2,130
Chuathbaluk	281	700	505	405	1,460	913	887	973	772	877
Middle Kuskokwim River	6,306	6,965	8,161	5,126	8,971	6,840	8,362	7,710	8,055	7,228
Crooked Creek	592	689	859	582	946	948	736	647	488	608
Red Devil	95	174	293	31	156	181	232	301	148	258
Sleetmute	412	505	604	600	906	522	750	861	933	693
Stony River	178	167	415	118	688	311	288	530	514	704
Lime Village	69	251	178	34	69	171	103	95	29	75
McGrath	656	444	970	395	587	910	689	495	288	600
Takotna	0	5	10	0	16	8	0	10	0	8
Nikolai	144	280	535	224	493	564	696	471	184	298
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,146	2,515	3,864	1,984	3,861	3,615	3,494	3,409	2,584	3,244
Kuskokwim River Total	67,596	78,174	81,169	67,737	96,788	85,863	90,812	94,898	88,912	79,896
Quinhagak	3,053	3,177	2,649	2,563	4,563	3,505	5,163	4,686	3,125	3,312
Goodnews Bay	564	863	723	807	863	869	713	647	898	569
Platinum	99	57	154	45	122	74	45	66	42	61
South Kuskokwim Bay	3,716	4,097	3,526	3,415	5,548	4,448	5,921	5,399	4,065	3,942
Total Estimate	71,312	82,271	84,695	71,152	102,336	90,311	96,733	100,297	92,977	83,838

-continued-

Appendix A7.–Page 3 of 3.

Community	2010	2011	2012	2013	2014	2015	2016	2017
Kongiganak	1,456	1,208	287	<i>641</i>	<i>964</i>	–	–	–
N. Kuskokwim Bay	1,456	1,208	287	641	964	–	–	–
Tuntutuliak	3,261	3,032	1,123	2,448	<i>574</i>	1,668	1,963	1,459
Eek	1,761	1,378	1,004	1,188	665	850	1,460	825
Kasigluk	3,014	2,823	552	2,919	205	438	951	791
Nunapitchuk	2,548	3,559	845	2,563	287	1,051	1,695	761
Atmautluak	1,088	1,236	234	1,592	108	514	763	195
Napakiak	1,674	1,963	457	1,588	311	917	1,151	505
Napaskiak	4,333	3,360	1,108	2,939	422	816	1,535	858
Oscarville	618	694	51	585	68	120	208	122
Bethel	26,157	25,093	7,321	17,246	3,089	4,918	9,462	5,336
Kwethluk	4,440	2,467	1,709	3,192	959	900	1,731	1,019
Akiachak	4,470	3,852	2,862	3,585	1,033	1,103	3,438	1,415
Akiak	3,625	2,455	<i>1,218</i>	1,449	530	610	1,274	694
Tuluksak	2,057	1,230	651	732	404	231	709	511
Lower Kuskokwim River	59,046	53,142	19,135	42,026	8,655	14,136	26,340	14,493
Lower Kalskag	1,030	1260	459	744	283	351	578	260
Upper Kalskag	1,496	1772	562	1,317	258	334	838	190
Aniak	2,262	2214	993	1,440	344	542	1,293	718
Chuathbaluk	551	409	103	155	90	90	203	100
Middle Kuskokwim River	5,339	5,655	2,117	3,656	975	1,317	2,912	1,268
Crooked Creek	240	402	124	<i>145</i>	35	78	384	110
Red Devil	33	186	225	<i>77</i>	83	52	69	38
Sleetmute	272	242	132	96	58	137	169	36
Stony River	189	134	<i>151</i>	51	24	25	33	109
Lime Village	<i>47</i>	<i>118</i>	29	<i>43</i>	32	–	35	33
McGrath	262	829	68	95	173	75	384	118
Takotna	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	3	0	0
Nikolai	402	450	276	283	235	301	367	177
Telida	–	–	–	–	–	–	–	–
Upper Kuskokwim River	1,445	2,361	1,005	790	640	671	1,441	620
Kuskokwim River Total	67,286	62,366	22,544	47,113	11,234	16,124	30,693	16,380
Quinhagak	2,793	2,588	2,396	3,143	3,723	3,082	4,822	5,217
Goodnews Bay	480	834	389	413	431	220	654	457
Platinum	17	62	24	39	46	11	99	96
South Kuskokwim Bay	3,290	3,484	2,809	3,595	4,200	3,313	5,575	5,770
Total Estimate	70,576	65,850	25,353	50,708	15,434	19,437	36,268	22,151

Note: Dash means that harvest was not estimated. Italic font means Bayesian estimates.

Appendix A8.—Subsistence sockeye salmon harvest estimates by community, Kuskokwim Management Area, 1990–2017.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	552	498	923	583	743	658	951	976	878	908
N. Kuskokwim Bay	552	498	923	583	743	658	951	976	878	908
Tuntutuliak	2,132	1,768	1,846	1,063	3,289	1,082	1,561	1,724	1,227	2,070
Eek	1,293	479	669	363	452	308	526	503	375	595
Kasigluk	843	1,376	1,690	1,608	976	1,179	1,127	1,315	1,012	3,287
Nunapitchuk	1,520	2,193	2,329	2,743	1,633	870	1,877	2,082	2,029	3,258
Atmautluak	1,696	830	1,193	1,313	837	1,173	1,408	681	982	1,743
Napakiak	1,548	1,187	1,663	1,217	1,533	887	1,106	1,526	1,487	2,018
Napaskiak	1,660	2,850	3,116	3,508	1,933	1,573	3,180	2,209	1,457	1,929
Oscarville	287	726	938	957	398	301	208	442	249	1,724
Bethel	11,787	11,428	9,225	9,501	11,370	8,802	10,556	10,233	8,464	12,094
Kwethluk	4,271	3,746	1,958	3,802	3,864	2,536	3,963	3,288	3,785	3,485
Akiachak	3,461	4,029	3,970	4,990	3,241	1,942	2,767	2,737	2,395	3,066
Akiak	1,873	1,696	1,769	3,537	1,740	809	1,544	1,327	1,640	1,151
Tuluksak	1,225	3,427	2,063	2,452	1,390	1,270	1,108	1,514	1,413	1,412
Lower Kuskokwim River	33,596	35,735	32,428	37,054	32,656	22,732	30,931	29,581	26,515	37,832
Lower Kalskag	1,007	1,080	503	2,286	989	679	1,387	1,277	546	583
Upper Kalskag	284	314	354	346	288	82	284	216	238	586
Aniak	1,539	2,073	1,213	1,609	751	955	1,295	1,078	1,132	1,302
Chuathbaluk	1,157	1,471	497	822	924	465	687	796	223	441
Middle Kuskokwim River	3,987	4,938	2,567	5,063	2,952	2,181	3,653	3,367	2,139	2,912
Crooked Creek	1,607	968	738	752	558	177	311	350	717	710
Red Devil	455	391	355	662	336	576	914	637	692	497
Sleetmute	1,153	1,347	794	1,643	1,120	1,109	1,341	1,458	1,282	879
Stony River	933	1,966	1,389	1,485	758	1,281	1,267	1,626	1,023	1,018
Lime Village	2,125	1,110	1,304	2,743	1,733	857	1,225	642	2,782	2,619
McGrath	1,489	416	2,494	1,465	1,501	1,652	111	52	146	0
Takotna	0	0	1	0	0	2	1	1	0	0
Nikolai	0	1	0	5	25	65	23	0	16	43
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	7,762	6,199	7,075	8,755	6,031	5,719	5,193	4,766	6,658	5,766
Kuskokwim River Total	45,897	47,370	42,993	51,455	42,382	31,290	40,728	38,690	36,190	47,418
Quinhagak	1,710	1,818	1,448	1,228	962	597	499	460	1,368	1,433
Goodnews Bay	982	1,061	1,293	733	646	202	387	480	499	715
Platinum	163	134	238	48	90	32	56	143	80	106
South Kuskokwim Bay	2,855	3,013	2,979	2,009	1,698	831	942	1,083	1,947	2,254
Total Estimate	48,752	50,383	45,972	53,464	44,080	32,121	41,669	39,773	38,137	49,672

-continued-

Appendix A8.–Page 2 of 3.

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	1,770	1,546	1,347	929	1,809	1,103	1,464	960	1,502	1,018
N. Kuskokwim Bay	1,770	1,546	1,347	929	1,809	1,103	1,464	960	1,502	1,018
Tuntutuliak	1,180	1,702	1,045	1,148	1,620	2,145	1,834	1,763	2,120	932
Eek	883	1,085	759	586	567	1,033	684	558	834	1,019
Kasigluk	3,805	3,213	2,111	2,429	1,668	1,634	2,248	1,786	1,041	1,215
Nunapitchuk	2,194	2,529	1,500	1,714	1,659	1,821	1,871	2,147	2,549	1,538
Atmautluak	1,540	988	1,150	679	1,103	1,444	1,012	1,041	1,250	624
Napakiak	1,916	1,917	1,688	1,453	1,351	2,122	1,845	1,962	1,244	917
Napaskiak	2,525	3,377	1,296	1,643	1,148	1,344	1,784	1,738	2,620	1,579
Oscarville	1,115	1,451	400	806	436	278	778	712	677	332
Bethel	11,613	14,264	8,850	12,198	11,679	14,297	12,816	13,902	15,247	11,272
Kwethluk	3,859	4,191	2,100	1,903	3,302	2,457	2,770	3,536	4,920	2,432
Akiachak	3,687	4,680	2,507	1,607	3,109	2,372	2,661	3,269	4,354	2,407
Akiak	1,036	2,005	1,214	995	1,258	1,920	2,000	3,695	2,881	1,290
Tuluksak	2,201	1,862	1,205	875	1,670	987	2,247	1,845	2,133	1,691
Lower Kuskokwim River	37,554	43,264	25,825	28,036	30,570	33,854	34,550	37,955	41,869	27,248
Lower Kalskag	824	918	347	515	775	439	1,434	780	1,583	1,044
Upper Kalskag	588	319	508	431	686	945	563	417	1,000	369
Aniak	1,136	2,167	1,059	756	996	1,015	692	1,261	1,585	923
Chuathbaluk	476	614	313	274	526	369	508	484	363	564
Middle Kuskokwim River	3,024	4,018	2,227	1,976	2,983	2,768	3,197	2,942	4,531	2,900
Crooked Creek	514	640	449	571	732	693	544	523	220	329
Red Devil	109	360	109	309	88	272	510	318	359	477
Sleetmute	725	1,008	706	504	980	673	1,181	1,303	1,164	684
Stony River	654	163	602	158	896	688	746	1,019	1,476	977
Lime Village	1,409	1,453	1,186	374	874	1,368	1,216	1,406	659	1,080
McGrath	43	273	407	112	194	454	149	375	417	965
Takotna	0	0	0	1	0	1	0	1	3	3
Nikolai	0	0	22	2	1	10	20	14	13	66
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	3,454	3,897	3,481	2,031	3,765	4,160	4,365	4,960	4,310	4,581
Kuskokwim River Total	45,802	52,725	32,880	32,973	39,127	41,885	43,577	46,817	52,213	35,747
Quinhagak	1,368	1,054	909	805	1,375	1,745	3,128	1,755	2,097	1,960
Goodnews Bay	951	908	855	705	873	1,213	995	920	1,739	902
Platinum	188	83	257	64	183	90	63	121	156	186
South Kuskokwim Bay	2,507	2,045	2,021	1,574	2,431	3,048	4,186	2,796	3,992	3,048
Total Estimate	48,309	54,770	34,901	34,547	41,558	44,933	47,763	49,613	56,205	38,795

-continued-

Appendix A8.–Page 3 of 3.

Community	2010	2011	2012	2013	2014	2015	2016	2017
Kongiganak	1,869	1,266	<i>1,307</i>	<i>1,031</i>	<i>1,230</i>	–	–	–
N. Kuskokwim Bay	1,869	1,266	1,307	1,031	1,230	–	–	–
Tuntutuliak	2,068	1,274	1,516	1,183	<i>1,774</i>	1,999	1,707	1,438
Eek	1,241	664	1,490	1,319	1,450	1,111	888	1,266
Kasigluk	1,441	1,269	1,451	1,470	1,990	1,442	1,543	1,703
Nunapitchuk	1,902	2,223	2,396	1,806	2,059	2,851	2,508	1,570
Atmautluak	731	827	1,623	1,316	1,531	1,173	1,562	1,535
Napakiak	1,183	1,351	1,141	1,105	1,573	1,179	2,132	916
Napaskiak	1,979	1,587	2,065	2,069	2,514	2,022	2,086	1,404
Oscarville	250	228	323	347	679	282	329	260
Bethel	11,103	16,946	18,282	12,616	14,828	11,951	16,730	17,477
Kwethluk	2,534	2,357	2,884	2,705	5,921	1,955	2,464	3,257
Akiachak	2,433	2,647	3,443	2,594	3,047	2,551	2,726	3,316
Akiak	1,161	2,576	<i>1,818</i>	1,731	2,418	1,855	3,772	3,398
Tuluksak	2,483	1,699	1,380	1,541	622	1,037	1,249	1,256
Lower Kuskokwim River	30,509	35,648	39,812	31,802	40,406	31,408	39,696	38,796
Lower Kalskag	507	802	891	977	1,040	487	284	630
Upper Kalskag	460	938	770	662	839	718	1,176	509
Aniak	1,165	1,168	1,375	1,466	1,578	2,407	8,380	5,277
Chuathbaluk	403	300	297	480	481	382	210	631
Middle Kuskokwim River	2,535	3,208	3,333	3,585	3,938	3,994	10,050	7,047
Crooked Creek	302	243	234	<i>514</i>	391	303	264	508
Red Devil	475	502	511	270	151	88	238	206
Sleetmute	1,024	693	715	362	541	497	458	514
Stony River	372	303	<i>469</i>	447	137	91	95	138
Lime Village	932	739	780	<i>831</i>	888	–	541	325
McGrath	650	630	233	538	451	0	199	892
Takotna	2	0	2	2	3	0	5	1
Nikolai	65	13	0	0	236	400	34	35
Telida	–	–	–	–	–	–	–	–
Upper Kuskokwim River	3,822	3,123	2,945	2,964	2,798	1,379	1,834	2,619
Kuskokwim River Total	38,735	43,245	47,396	39,382	48,372	36,781	51,580	48,462
Quinhagak	1,719	1,582	2,015	2,158	2,939	1,065	1,691	3,850
Goodnews Bay	1,093	1,328	1,197	1,113	1,370	797	975	677
Platinum	175	135	173	181	349	148	381	533
South Kuskokwim Bay	2,987	3,045	3,385	3,452	4,658	2,010	3,047	5,060
Total Estimate	41,722	46,290	50,781	42,834	53,030	38,791	54,627	53,522

Note: Dash means that harvest was not estimated. Italic font means Bayesian estimates.

Appendix A9.—Subsistence coho salmon harvest estimates by community, Kuskokwim area, 1990–2017.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	474	490	605	448	569	662	579	514	204	203
N. Kuskokwim Bay	474	490	605	448	569	662	579	514	204	203
Tuntutuliak	1,287	733	693	820	364	339	1,335	558	858	277
Eek	1,800	387	502	160	399	387	437	63	314	242
Kasigluk	922	1,723	1,388	372	532	90	519	170	330	3,906
Nunapitchuk	746	1,131	2,242	318	749	629	1,444	732	345	368
Atmautluak	398	237	333	380	402	634	534	485	283	190
Napakiak	1,470	599	1,570	586	871	344	602	161	739	459
Napaskiak	1,139	798	1,108	780	2,016	584	506	592	488	316
Oscarville	57	147	151	0	48	0	15	0	0	779
Bethel	32,988	17,677	24,908	12,310	17,082	22,007	21,982	17,077	12,058	11,565
Kwethluk	3,928	2,311	2,419	1,809	1,880	1,690	2,995	1,104	1,583	2,883
Akiachak	1,910	2,337	3,058	1,102	1,281	628	903	383	409	662
Akiak	1,789	2,193	1,072	1,373	1,099	481	920	798	521	259
Tuluksak	978	1,854	1,629	408	223	522	1,175	418	812	298
Lower Kuskokwim River	49,412	32,127	41,074	20,418	26,946	28,335	33,367	22,541	18,740	22,204
Lower Kalskag	445	500	526	823	881	715	1,246	572	345	285
Upper Kalskag	346	527	972	353	178	257	348	661	834	155
Aniak	1,669	1,171	1,933	1,104	1,768	1,244	2,723	1,428	1,284	1,419
Chuathbaluk	826	87	368	366	741	79	409	196	50	138
Middle Kuskokwim River	3,286	2,285	3,799	2,646	3,568	2,295	4,726	2,857	2,513	1,997
Crooked Creek	922	279	712	396	646	358	175	261	394	529
Red Devil	914	1,038	1,284	1,673	1,074	1,539	1,135	1,455	504	424
Sleetmute	1,036	1,588	937	912	626	1,104	870	419	267	210
Stony River	474	513	727	511	477	1,023	529	455	378	423
Lime Village	486	390	345	606	1,467	223	607	270	776	701
McGrath	466	477	2,146	563	998	604	824	745	734	338
Takotna	0	0	4	0	0	6	6	2	3	0
Nikolai	90	65	204	285	94	499	36	130	97	73
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	4,388	4,350	6,358	4,946	5,382	5,356	4,182	3,737	3,153	2,698
Kuskokwim River Total	57,560	39,252	51,836	28,458	36,465	36,648	42,854	29,649	24,611	27,102
Quinhagak	3,799	3,230	3,291	2,029	2,544	2,480	1,734	1,105	1,537	1,781
Goodnews Bay	1,630	1,704	1,671	1,118	428	268	330	348	323	421
Platinum	95	36	290	27	87	11	46	55	75	147
South Kuskokwim Bay	5,524	4,970	5,252	3,174	3,059	2,759	2,110	1,508	1,935	2,349
Total Estimate	63,084	44,222	57,088	31,632	39,524	39,407	44,964	31,157	26,546	29,451

-continued-

Appendix A9.–Page 2 of 3.

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	339	919	1,138	236	937	740	657	883	557	561
N. Kuskokwim Bay	339	919	1,138	236	937	740	657	883	557	561
Tuntutuliak	3,264	335	1,239	2,092	1,189	1,074	948	703	1,620	359
Eek	493	241	821	747	1,018	378	773	459	661	176
Kasigluk	9,726	1,058	2,195	1,762	5,034	1,304	3,070	1,753	867	629
Nunapitchuk	355	425	821	627	555	807	692	1,752	508	286
Atmautluak	227	375	612	283	744	530	254	424	262	67
Napakiak	453	667	793	992	1,648	742	2,363	1,244	1,006	420
Napaskiak	836	455	717	983	655	602	1,640	639	903	786
Oscarville	216	90	161	19	304	60	175	180	62	67
Bethel	13,478	14,108	15,489	15,062	17,040	12,994	18,810	12,972	15,839	12,895
Kwethluk	3,435	1,773	2,706	1,787	3,430	3,048	1,245	1,624	7,262	4,333
Akiachak	2,555	1,912	1,690	1,627	2,397	1,817	1,714	2,355	4,311	1,790
Akiak	479	594	1,136	1,094	1,342	1,847	379	1,325	1,358	661
Tuluksak	520	1,136	1,349	921	1,007	484	498	1,131	635	857
Lower Kuskokwim River	36,037	23,169	29,729	27,996	36,363	25,687	32,561	26,561	35,293	23,326
Lower Kalskag	403	597	281	314	368	319	1,415	515	76	318
Upper Kalskag	286	536	1,069	462	1,500	594	1,799	381	2,350	181
Aniak	1,911	2,006	3,737	1,164	2,355	2,032	1,018	3,003	2,883	2,223
Chuathbaluk	462	733	610	259	284	346	727	419	525	96
Middle Kuskokwim River	3,062	3,872	5,697	2,199	4,507	3,291	4,959	4,318	5,834	2,818
Crooked Creek	137	97	440	375	713	312	401	289	952	283
Red Devil	161	426	499	351	65	331	171	193	307	126
Sleetmute	525	428	806	731	505	581	671	360	228	403
Stony River	348	397	662	214	679	468	322	336	552	634
Lime Village	556	559	680	46	231	372	132	443	695	210
McGrath	881	436	1,508	997	1,228	799	894	279	247	1,175
Takotna	20	31	25	6	51	8	0	8	6	28
Nikolai	30	131	93	379	171	166	407	95	53	203
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,658	2,505	4,713	3,099	3,643	3,037	2,998	2,005	3,040	3,062
Kuskokwim River Total	42,096	30,465	41,277	33,531	45,450	32,755	41,175	33,766	44,724	29,767
Quinhagak	1,042	1,719	1,133	1,868	1,435	1,558	1,315	1,550	1,869	1,824
Goodnews Bay	380	548	198	1,228	1,542	634	605	468	769	261
Platinum	100	118	96	144	266	223	116	106	114	81
South Kuskokwim Bay	1,522	2,385	1,427	3,240	3,243	2,415	2,036	2,124	2,752	2,166
Total Estimate	43,618	32,850	42,704	36,771	48,693	35,170	43,211	35,890	47,476	31,933

-continued-

Appendix A9.–Page 3 of 3.

Community	2010	2011	2012	2013	2014	2015	2016	2017
Kongiganak	483	613	356	412	561	–	–	–
N. Kuskokwim Bay	483	613	356	412	561	–	–	–
Tuntutuliak	698	250	565	450	794	362	456	472
Eek	315	280	612	483	555	629	410	797
Kasigluk	1,043	430	303	418	851	446	394	390
Nunapitchuk	195	407	319	226	1,305	1,154	492	1,103
Atmautluak	36	263	383	203	176	311	81	415
Napakiak	877	927	402	634	740	1,117	506	379
Napaskiak	1,029	471	269	772	1,153	1,353	726	1,011
Oscarville	12	43	38	37	128	25	134	82
Bethel	20,426	18,141	13,280	12,662	19,364	12,277	16,772	17,852
Kwethluk	1,495	1,097	1,013	1,555	4,422	1,677	682	2,361
Akiachak	1,181	1,440	714	1,106	1,845	1,924	2,007	1,771
Akiak	475	505	455	454	1,501	1,423	2,403	3,566
Tuluksak	330	163	341	473	808	623	482	668
Lower Kuskokwim River	28,112	24,417	18,694	19,473	33,642	23,321	25,545	30,867
Lower Kalskag	96	684	1,107	529	907	419	228	347
Upper Kalskag	92	998	360	636	938	384	722	188
Aniak	2,533	2,215	3,365	3,102	9,566	7,705	7,530	4,883
Chuathbaluk	76	109	179	319	291	166	149	149
Middle Kuskokwim River	2,797	4,006	5,011	4,586	11,702	8,674	8,629	5,567
Crooked Creek	87	297	149	255	198	275	298	256
Red Devil	88	130	238	318	792	214	166	106
Sleetmute	458	426	784	219	993	752	524	61
Stony River	201	333	358	120	177	77	29	86
Lime Village	146	596	117	384	226	–	123	81
McGrath	1,053	1,331	2,257	523	1,189	173	769	663
Takotna	20	3	22	0	0	53	90	0
Nikolai	135	20	214	119	256	400	614	99
Telida	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,188	3,136	4,139	1,938	3,831	1,944	2,613	1,352
Kuskokwim River Total	33,580	32,172	28,200	26,409	49,736	33,939	36,787	37,786
Quinhagak	1,599	1,369	1,380	1,087	2,240	2,238	2,014	1,734
Goodnews Bay	319	259	382	295	371	552	378	289
Platinum	197	143	124	50	240	87	180	273
South Kuskokwim Bay	2,115	1,771	1,886	1,432	2,851	2,877	2,572	2,296
Total Estimate	35,695	33,943	30,086	27,841	52,587	36,816	39,359	40,082

Note: Dash means that harvest was not estimated. Italic font means Bayesian estimates.

Appendix A10.—Subsistence chum salmon harvest estimates by community, Kuskokwim area, 1990–2017.

Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Kongiganak	1,009	978	1,584	708	1,414	1,269	1,763	753	1,579	1,049
N. Kuskokwim Bay	1,009	978	1,584	708	1,414	1,269	1,763	753	1,579	1,049
Tuntutuliak	6,592	4,697	6,245	3,325	5,346	3,509	6,119	2,435	3,640	1,709
Eek	3,014	790	1,324	250	591	899	999	556	795	484
Kasigluk	3,877	3,013	4,076	2,522	2,663	2,774	4,047	1,951	2,543	4,777
Nunapitchuk	6,448	5,840	9,195	4,895	4,560	4,264	6,255	2,465	4,885	4,428
Atmautluak	4,676	2,241	2,614	1,300	1,420	3,768	2,660	1,395	1,875	1,552
Napakiak	9,714	2,351	5,474	2,269	3,819	2,820	4,352	1,430	3,605	1,495
Napaskiak	11,334	6,703	7,817	3,653	5,797	4,137	6,200	2,318	3,771	2,529
Oscarville	1,400	1,147	1,598	561	676	740	1,548	348	378	1,530
Bethel	34,257	16,781	17,231	8,608	15,722	17,416	21,706	8,078	12,522	9,918
Kwethluk	11,451	5,714	8,001	3,499	6,340	6,114	12,043	3,266	4,508	3,582
Akiachak	10,565	5,921	9,532	3,308	5,998	3,992	5,019	1,615	2,218	2,696
Akiak	9,226	6,575	6,679	7,577	4,483	2,007	4,967	1,639	1,894	1,210
Tuluksak	5,863	5,454	4,632	3,774	2,395	2,698	3,208	2,790	3,044	1,480
Lower Kuskokwim River	118,417	67,227	84,418	45,541	59,810	55,138	79,123	30,286	45,678	37,390
Lower Kalskag	4,980	2,958	2,807	2,938	2,856	1,438	4,070	1,298	968	733
Upper Kalskag	1,406	3,139	3,040	591	836	1,326	1,565	349	464	649
Aniak	10,160	3,511	7,687	2,926	2,538	3,454	8,569	1,678	4,964	1,753
Chuathbaluk	4,408	2,138	2,644	2,879	1,495	1,701	2,175	1,135	925	698
Middle Kuskokwim River	20,954	11,746	16,178	9,334	7,725	7,919	16,379	4,460	7,321	3,833
Crooked Creek	2,977	1,326	1,242	664	757	332	355	313	2,527	830
Red Devil	1,613	1,133	1,500	927	1,318	882	727	499	462	169
Sleetmute	2,006	1,880	2,961	692	1,520	1,683	1,250	417	870	340
Stony River	1,234	638	1,165	775	881	1,311	443	600	395	296
Lime Village	2,350	830	1,299	497	1,600	789	306	244	964	1,015
McGrath	2,326	1,083	4,472	578	1,264	1,525	211	138	1,510	242
Takotna	64	0	15	0	6	1	0	0	15	0
Nikolai	875	396	914	334	293	297	229	60	519	87
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	13,445	7,286	13,568	4,467	7,639	6,820	3,521	2,271	7,262	2,979
Kuskokwim River Total	153,825	87,237	115,748	60,050	76,588	71,146	100,786	37,770	61,840	45,251
Quinhagak	3,161	1,631	2,287	1,053	1,401	669	943	572	1,375	1,587
Goodnews Bay	200	136	1,311	177	406	140	221	135	295	232
Platinum	149	4	137	0	51	3	26	0	51	33
South Kuskokwim Bay	3,510	1,771	3,735	1,230	1,858	812	1,190	707	1,721	1,852
Total Estimate	157,335	89,008	119,483	61,280	78,446	71,958	101,975	38,477	63,561	47,103

-continued-

Appendix A10.–Page 2 of 3.

Community	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Kongiganak	1,839	2,399	3,247	897	2,958	1,960	2,420	2,353	1,755	1,420
N. Kuskokwim Bay	1,839	2,399	3,247	897	2,958	1,960	2,420	2,353	1,755	1,420
Tuntutuliak	2,622	2,585	4,150	1,288	2,546	3,568	4,024	3,350	3,375	3,330
Eek	636	402	1,228	578	688	877	1,075	783	788	782
Kasigluk	4,689	5,158	5,513	3,581	5,064	4,194	5,461	4,309	1,502	1,857
Nunapitchuk	4,865	4,724	8,002	2,865	5,053	4,167	5,150	6,619	4,705	3,468
Atmautluak	1,848	1,397	2,514	849	2,271	1,940	2,337	2,193	2,177	1,665
Napakiak	2,859	1,793	3,421	1,560	2,328	3,238	8,143	3,628	1,313	1,638
Napaskiak	2,757	2,364	4,010	2,061	2,705	2,205	4,323	3,032	2,400	1,451
Oscarville	1,237	1,831	1,319	804	828	686	1,151	932	847	534
Bethel	10,149	10,757	17,731	11,452	13,448	14,273	20,953	16,540	15,853	10,055
Kwethluk	5,232	4,601	8,019	2,294	4,288	4,328	6,328	6,291	5,729	4,111
Akiachak	4,719	3,170	5,173	2,650	3,880	2,428	4,333	4,782	6,856	2,872
Akiak	2,617	2,240	2,571	2,928	3,499	3,528	3,095	4,141	3,522	1,350
Tuluksak	2,492	2,068	3,719	894	2,433	2,183	3,094	3,202	2,920	1,570
Lower Kuskokwim River	46,722	43,090	67,370	33,804	49,031	47,615	69,466	59,803	51,988	34,683
Lower Kalskag	1,534	1,498	1,445	1,087	1,316	997	4,703	1,997	1,004	930
Upper Kalskag	1,550	1,502	2,460	516	1,656	1,201	2,469	294	2,432	329
Aniak	1,933	1,934	4,367	820	2,535	2,952	3,722	4,108	2,830	2,602
Chuathbaluk	654	2,711	1,458	2,502	2,352	530	1,451	1,541	593	937
Middle Kuskokwim River	5,671	7,645	9,730	4,925	7,859	5,680	12,345	7,940	6,859	4,798
Crooked Creek	809	1,211	1,417	750	1,583	1,064	1,513	813	352	519
Red Devil	54	334	384	63	135	214	41	186	188	244
Sleetmute	371	379	1,293	468	1,054	422	1,475	818	373	367
Stony River	320	172	696	361	754	324	790	540	1,247	771
Lime Village	451	651	869	110	199	573	316	419	297	405
McGrath	188	247	969	513	290	470	999	464	676	825
Takotna	0	10	1	0	0	4	0	0	0	0
Nikolai	56	53	187	191	277	230	308	223	54	292
Telida	–	–	–	–	–	–	–	–	–	–
Upper Kuskokwim River	2,249	3,057	5,816	2,456	4,292	3,301	5,442	3,464	3,187	3,423
Kuskokwim River Total	56,480	56,191	86,163	42,082	64,140	58,555	89,674	73,560	63,789	44,324
Quinhagak	895	808	2,011	559	1,383	994	2,754	2,249	1,794	1,557
Goodnews Bay	251	187	349	200	240	192	555	395	586	138
Platinum	82	60	95	19	42	21	108	77	106	28
South Kuskokwim Bay	1,228	1,055	2,455	778	1,665	1,207	3,417	2,720	2,486	1,723
Total Estimate	57,708	57,246	88,618	42,860	65,805	59,762	93,091	76,281	66,275	46,047

-continued-

Appendix A10.–Page 3 of 3.

Community	2010	2011	2012	2013	2014	2015	2016	2017
Kongiganak	2,522	2,809	<i>1,638</i>	<i>1,397</i>	<i>1,915</i>	–	–	–
N. Kuskokwim Bay	2,522	2,809	1,638	1,397	1,915	–	–	–
Tuntutuliak	2,439	1,865	2,614	2,180	2,967	2,143	1,673	2,158
Eek	721	486	1,552	1,232	1,182	1,023	681	762
Kasigluk	2,338	2,029	3,261	2,197	3,612	2,080	1,485	2,360
Nunapitchuk	3,223	4,257	5,312	2,977	5,213	3,631	2,422	5,035
Atmautluak	1,386	1,864	2,701	2,409	3,327	2,165	1,609	2,090
Napakiak	1,759	1,546	1,711	1,185	2,392	1,508	2,091	1,726
Napaskiak	3,110	1,783	3,216	2,589	3,171	2,173	1,901	2,355
Oscarville	352	402	599	490	599	350	240	261
Bethel	9,575	15,324	26,872	12,506	18,017	10,958	13,471	17,780
Kwethluk	3,112	3,484	3,849	3,825	4,318	2,230	2,326	4,501
Akiachak	2,856	3,205	4,150	3,417	4,744	2,085	2,176	3,311
Akiak	1,163	2,421	2,925	2,212	2,982	2,348	5,803	3,026
Tuluksak	3,180	2,697	2,585	3,062	2,274	1,747	2,698	2,408
Lower Kuskokwim River	35,214	41,363	61,347	40,281	54,798	34,441	38,576	47,773
Lower Kalskag	691	1,643	3,284	1,214	1,458	1,233	624	1,019
Upper Kalskag	391	1,599	1,930	1,534	1,038	642	1,055	204
Aniak	2,515	2,391	5,667	2,880	4,695	1,395	2,422	1,604
Chuathbaluk	535	686	796	935	805	342	347	606
Middle Kuskokwim River	4,132	6,319	11,677	6,563	7,996	3,612	4,448	3,433
Crooked Creek	539	862	610	<i>1,803</i>	391	383	831	374
Red Devil	122	434	516	981	284	48	129	121
Sleetmute	524	689	1,004	542	633	337	268	147
Stony River	338	516	<i>491</i>	27	89	44	14	109
Lime Village	<i>314</i>	<i>499</i>	419	<i>909</i>	295	–	232	135
McGrath	944	476	885	598	642	7	150	145
Takotna	0	0	0	12	0	0	5	0
Nikolai	440	349	1,044	513	1,356	2,000	205	352
Telida	–	–	–	–	–	–	–	–
Upper Kuskokwim River	3,221	3,825	4,970	5,386	3,690	2,819	1,834	1,383
Kuskokwim River Total	45,089	54,316	79,631	53,627	68,398	40,872	44,858	52,589
Quinhagak	1,347	1,255	2,001	1,958	1,959	691	848	1,592
Goodnews Bay	324	349	322	153	268	197	219	90
Platinum	37	70	76	90	62	16	78	188
South Kuskokwim Bay	1,708	1,674	2,399	2,201	2,289	904	1,145	1,870
Total Estimate	46,797	55,990	82,030	55,828	70,687	41,776	46,003	54,459

Note: Dash means that harvest was not estimated. Italic font means Bayesian estimates.

Appendix A11.–Estimated subsistence salmon harvest by species and community, Kuskokwim Management Area, 2017.

Community	Households (HH)			Chinook		
	Total <i>N</i>	Total <i>N</i>	% survey	Avg harvest/HH	Est. Total harvest	CI (95%)
Kongiganak	90	0	0%	–	–	–
N. Kuskokwim Bay	90	0	0%	–	–	–
Tuntutuliak	111	64	58%	13	1,459	224
Eek	99	51	52%	8	825	264
Kasigluk	119	62	52%	7	791	172
Nunapitchuk	121	70	58%	6	761	391
Atmautluak	71	44	62%	3	195	56
Napakiak	98	52	53%	5	505	191
Napaskiak	105	58	55%	8	858	342
Oscarville	14	13	93%	9	122	56
Bethel	1844	560	30%	3	5,336	1,154
Kwethluk	173	98	57%	6	1,019	151
Akiachak	169	90	53%	8	1,415	353
Akiak	91	50	55%	8	694	166
Tuluksak	97	54	56%	5	511	171
Lower Kuskokwim	3,112	1,266	41%	5	14,493	1,403
Lower Kalskag	85	40	47%	3	260	96
Upper Kalskag	58	30	52%	3	190	82
Aniak	167	72	43%	4	718	293
Chuathbaluk	32	29	91%	3	100	21
Middle Kuskokwim	342	171	50%	4	1,268	316
Crooked Creek	33	32	97%	3	110	7
Red Devil	8	7	88%	5	38	0
Sleetmute	31	29	94%	1	36	13
Stony River	14	12	86%	8	109	100
Lime Village ^a	7	6	86%	5	33	0
McGrath	124	54	44%	1	118	76
Takotna ^b	25	25	100%	0	0	0
Nikolai	31	29	94%	6	177	62
Telida	2	0	0%	–	–	–
Upper Kuskokwim	275	194	71%	2	620	130
Kuskokwim River Total	3,729	1,631	44%	4	16,380	1,443
Quinhagak	173	95	55%	30	5,217	592
Goodnews Bay	76	37	49%	6	457	214
Platinum	19	18	95%	5	96	44
S. Kuskokwim Bay	268	150	56%	22	5,770	627
Total	4,087	1,781	44%	5	22,151	1,571

-continued-

Appendix A11.–Page 2 of 3.

Community	Chum			Sockeye		
	Avg harvest/HH	Est. Total harvest	CI (95%)	Avg harvest/HH	Est. Total harvest	CI (95%)
Kongiganak	–	–	–	–	–	–
N. Kuskokwim Bay	–	–	–	–	–	–
Tuntutuliak	19	2,158	373	13	1,438	220
Eek	8	762	209	13	1,266	314
Kasigluk	20	2,360	501	14	1,703	297
Nunapitchuk	42	5,035	839	13	1,570	287
Atmautluak	29	2,090	329	22	1,535	491
Napakiak	18	1,726	562	9	916	284
Napaskiak	22	2,355	700	13	1,404	391
Oscarville	19	261	64	19	260	59
Bethel	10	17,780	3,668	9	17,477	3,013
Kwethluk	26	4,501	936	19	3,257	766
Akiachak	20	3,311	682	20	3,316	743
Akiak	33	3,026	1,114	37	3,398	793
Tuluksak	25	2,408	648	13	1,256	496
Lower Kuskokwim	15	47,773	4,275	12	38,796	3,428
Lower Kalskag	12	1,019	514	7	630	289
Upper Kalskag	4	204	62	9	509	203
Aniak	10	1,604	237	32	5,277	478
Chuathbaluk	19	606	77	20	631	91
Middle Kuskokwim	10	3,433	562	21	7,047	591
Crooked Creek	11	374	30	15	508	45
Red Devil	15	121	0	26	206	0
Sleetmute	5	147	60	17	514	109
Stony River	8	109	86	10	138	67
Lime Village ^a	19	135	0	46	325	0
McGrath	1	145	121	7	892	693
Takotna ^b	0	0	0	0	1	1
Nikolai	11	352	174	1	35	0
Telida	–	–	–	–	–	–
Upper Kuskokwim	5	1,383	228	10	2,619	694
Kuskokwim River Total	14	52,589	4,316	13	48,462	3,545
Quinhagak	9	1,592	276	22	3,850	577
Goodnews Bay	1	90	32	9	677	261
Platinum	10	188	45	28	533	111
S. Kuskokwim Bay	7	1,871	280	19	5,060	636
Total	13	54,460	4,324	13	53,521	3,601

-continued-

Appendix A11.–Page 3 of 3.

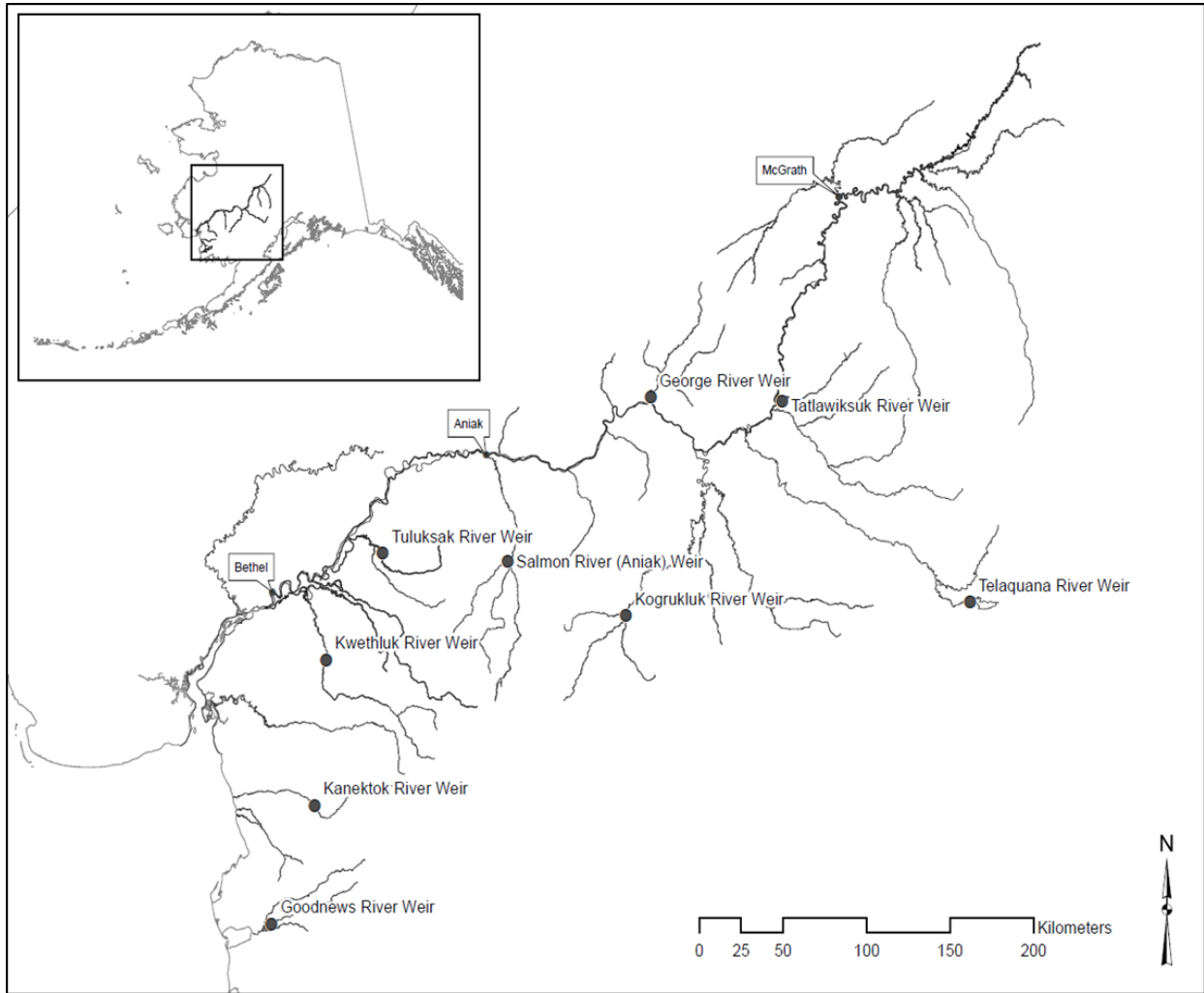
Community	Coho			Pink		
	Avg harvest/HH	Est. Total harvest	CI (95%)	Avg harvest/HH	Est. Total harvest	CI (95%)
Kongiganak	–	–	–	–	–	–
N. Kuskokwim Bay	–	–	–	–	–	–
Tuntutuliak	4	472	80	0	12	3
Eek	8	797	299	1	128	76
Kasigluk	3	390	211	0	14	12
Nunapitchuk	9	1,103	327	0	33	22
Atmautluak	6	415	232	0	4	7
Napakiak	4	379	273	0	6	7
Napaskiak	10	1,011	346	0	0	0
Oscarville	6	82	40	0	6	5
Bethel	10	17,852	3,277	0	592	227
Kwethluk	14	2,361	733	1	133	102
Akiachak	10	1,771	263	0	52	51
Akiak	39	3,566	3,760	8	764	427
Tuluksak	7	668	375	0	29	10
Lower Kuskokwim	10	30,868	5,036	1	1,773	494
Lower Kalskag	4	347	164	1	67	100
Upper Kalskag	3	188	68	0	20	0
Aniak	29	4,883	361	1	215	9
Chuathbaluk	5	149	32	0	0	0
Middle Kuskokwim	16	5,567	398	1	301	98
Crooked Creek	8	256	35	0	5	0
Red Devil	13	106	0	1	9	0
Sleetmute	2	61	18	0	0	0
Stony River	6	86	65	0	0	0
Lime Village ^a	12	81	8	1	4	0
McGrath	5	663	485	0	4	7
Takotna ^b	0	0	0	0	0	0
Nikolai	3	99	23	0	1	0
Telida	–	–	–	–	–	–
Upper Kuskokwim	5	1,353	482	0	23	7
Kuskokwim River Total	10	37,788	5,073	1	2,097	504
Quinhagak	10	1,734	319	1	140	94
Goodnews Bay	4	289	126	0	6	6
Platinum	14	273	50	3	48	19
S. Kuskokwim Bay	9	2,296	343	1	194	95
Total	10	40,084	5,084	1	2,291	513

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 a dash because Bayesian estimation method was not possible for these communities or pink salmon because there was little to no historical data.

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

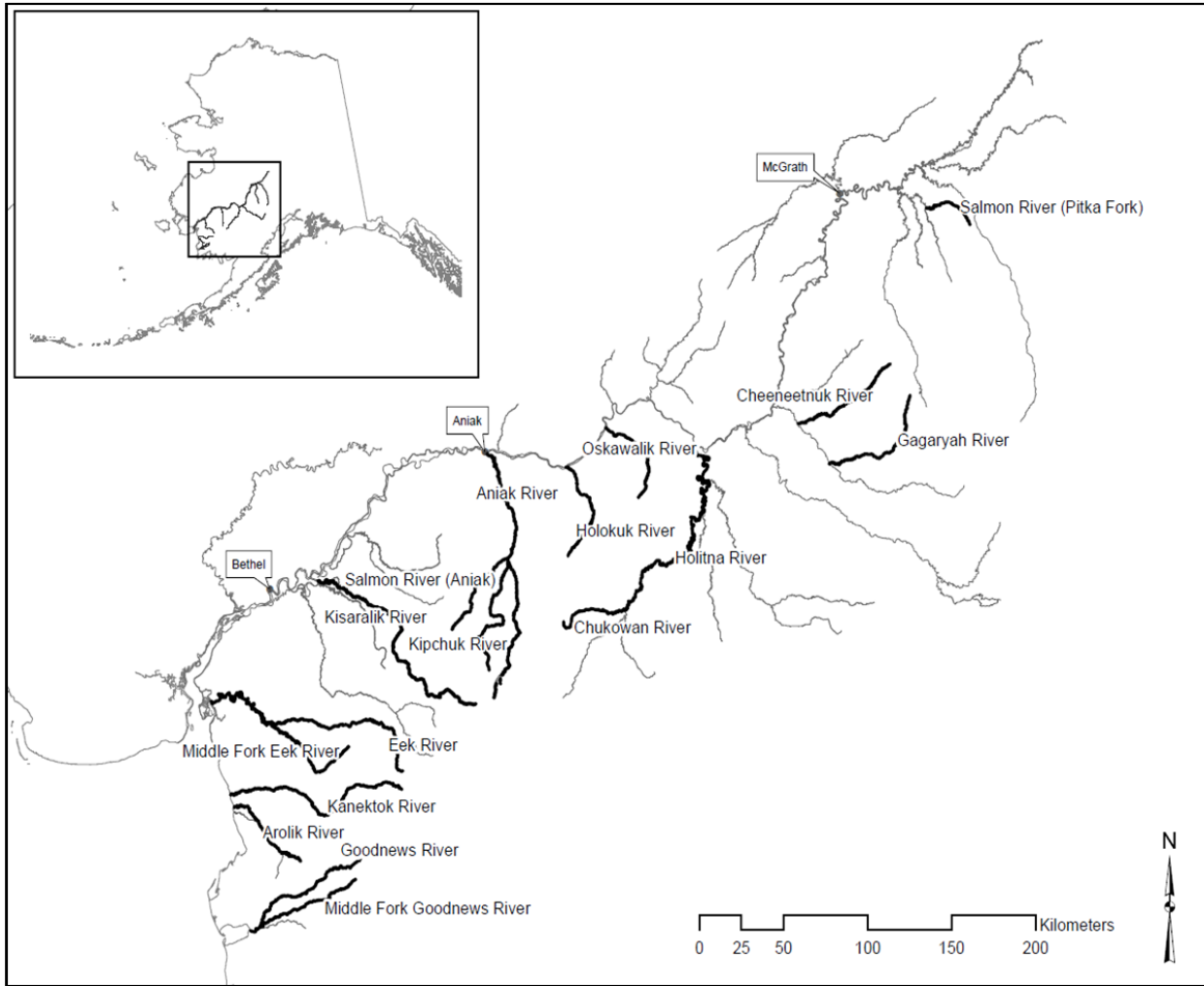
^b Takotna is not surveyed, but harvest is estimated to be zero based on harvest practices.

Appendix A12.–Weir project location within the 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.

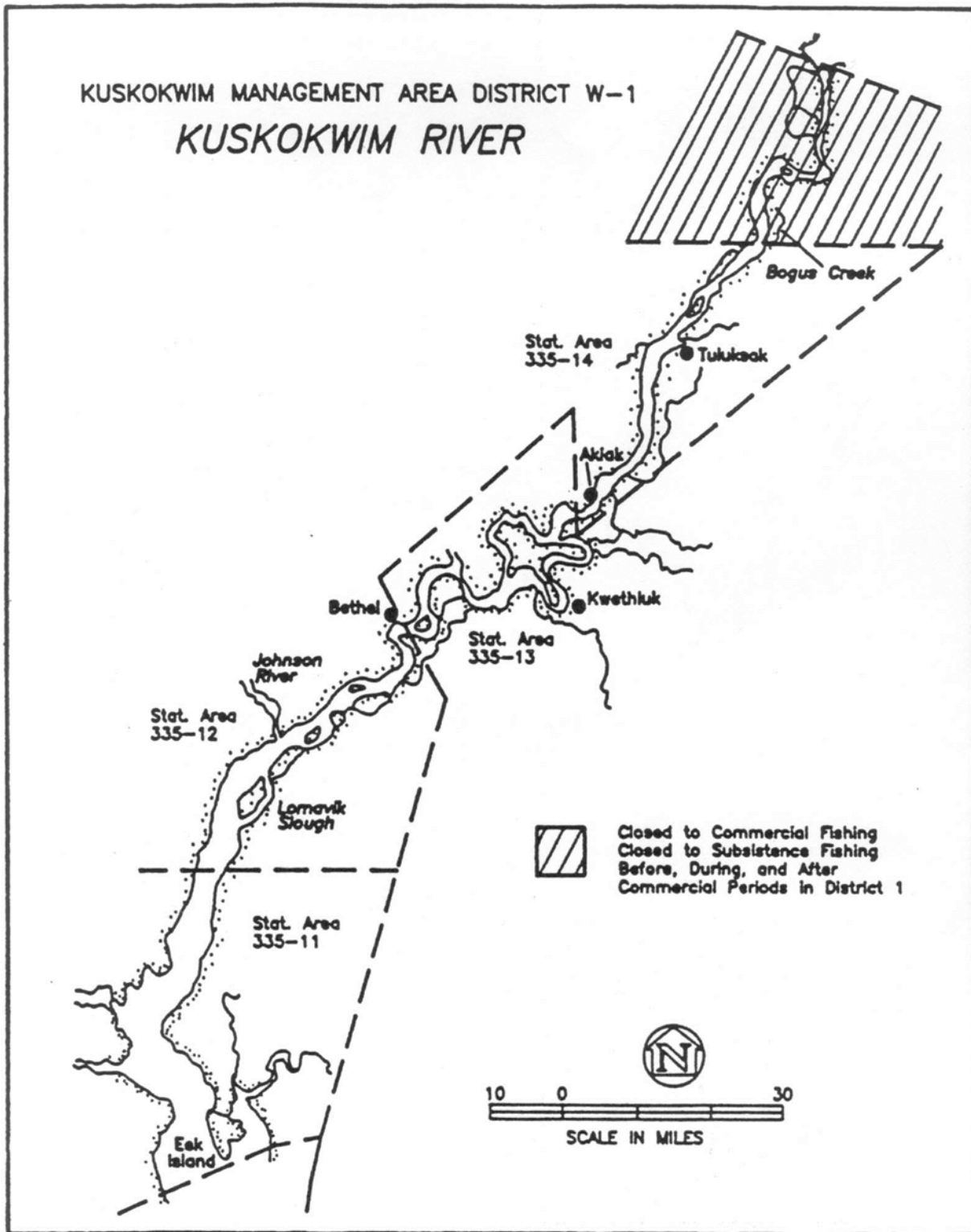
Appendix A13.–Map of aerial survey streams, Kuskokwim Management Area.



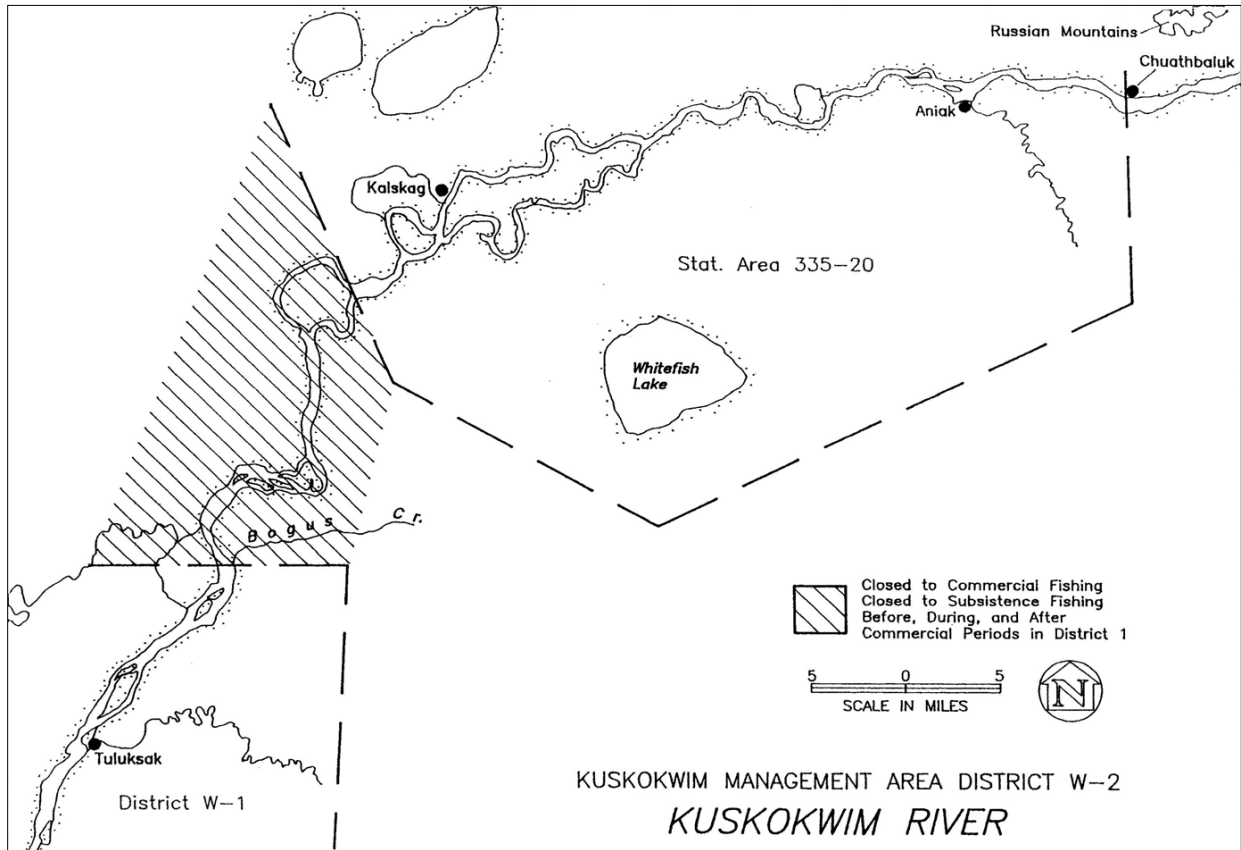
Note: Bold rivers represent aerial survey rivers.

APPENDIX B

Appendix B1.-Map of commercial fishing District W-1, Kuskokwim Management Area.



Appendix B2.—Map of commercial fishing District W-2, Kuskokwim Management Area.



Appendix B3.–Chinook salmon utilization, Kuskokwim River, 1990–2017.

Year	Harvest					Total
	Commercial ^a	Subsistence	Test fish ^b	Sport		
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 ^c	96,788	19	857		99,969
2005	4,784 ^c	85,863	2	572		91,221
2006	2,777 ^c	90,812	0	444		94,033
2007	179 ^c	94,898	0	1,478		96,555
2008	8,865 ^c	88,912	0	708		98,485
2009	6,664 ^c	79,896	0	904		87,464
2010	2,732 ^c	67,286	0	354		70,372
2011	747 ^c	62,366	0	579		63,692
2012	627 ^c	22,544	0	0		23,171
2013	174 ^c	47,113	0	0		47,287
2014	0	11,234	0	0		11,234
2015	8	16,124	0	0		16,132
2016	0	30,676	0	0		30,676
2017	–	16,380 ^d	–	–		–
Average 2007–2016	2,000	52,105	0	402		54,507

^a Does not include personal use.

^b Test fishery sales do not include donations.

^c Districts 1 and 2.

^d Preliminary estimate.

Appendix B4.–Commercial salmon harvest in Districts 1 and 2 combined including personal use, 1960–2017.

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
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	0	10,783	152,714
2008	8,865	15,601	142,877	15	30,798	198,156

-continued-

Appendix B4.–Page 2 of 2.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
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	0	65,195	155,073
2013	174	768	114,069	1	52,236	167,248
2014	35	2,720	117,588	3	19,080	139,426
2015	8	130	65,034	0	507	65,679
2016 ^c	–	–	–	–	–	–
2017 ^c	–	–	–	–	–	–
Average 2006–2015	2,281	9,700	108,935	5	51,194	172,115

^a Includes harvests from District 3.

^b Even years only.

^c No commercial fishery occurred.

Appendix B5.–District 1 commercial salmon harvest and exvessel value, 1993–2017.

Year	Chinook		Sockeye		Coho	
	Number	Value	Number	Value	Number	Value
1993	8,735	\$ 72,659	27,008	\$ 140,000	610,739	\$ 2,535,321
1994	16,211	\$ 126,892	49,365	\$ 188,691	724,689	\$ 2,875,803
1995	30,846	\$ 280,287	92,500	\$ 448,530	471,461	\$ 1,313,742
1996	7,419	\$ 23,665	33,878	\$ 97,176	937,299	\$ 1,824,683
1997	10,441	\$ 36,843	21,989	\$ 64,922	130,803	\$ 2,167,491
1998	17,359	\$ 74,387	60,906	\$ 209,860	210,481	\$ 516,024
1999	4,705	\$ 22,266	16,976	\$ 86,442	23,593	\$ 44,633
2000	444	\$ 3,044	4,130	\$ 14,272	261,379	\$ 489,644
2001	90	\$ 534	84	\$ 265	192,998	\$ 422,573
2002	72	\$ 212	84	\$ 196	83,463	\$ 124,763
2003	158	\$ 846	282	\$ 803	284,064	\$ 450,451
2004	2,305	\$ 9,815	8,532	\$ 19,549	435,407	\$ 907,791
2005	4,784	\$ 29,040	27,645	\$ 109,063	142,319	\$ 287,635
2006	2,777	\$ 16,192	12,618	\$ 41,891	185,598	\$ 378,318
2007	179	\$ 1,607	703	\$ 2,411	141,049	\$ 373,789
2008	8,865	\$ 70,988	15,601	\$ 59,777	142,862	\$ 396,329
2009	6,664	\$ 61,452	25,673	\$ 101,445	104,546	\$ 263,457
2010	2,731	\$ 53,134	22,428	\$ 167,575	58,031	\$ 382,452
2011	49	\$ 411	13,482	\$ 79,370	74,108	\$ 334,452
2012	14	\$ 225	2,857	\$ 16,154	86,389	\$ 323,687
2013	1	\$ 6	768	\$ 5,226	114,069	\$ 833,327
2014			2,720	\$ 19,943	117,588	\$ 751,850
2015	2	\$ 9	130	\$ 395	65,034	\$ 244,045
2016 ^a	–	–	–	–	–	–
2017 ^a	–	–	–	–	–	–
Average 2006–2015	2,365	22,669	9,698	49,419	108,927	428,171

-continued-

Appendix B5.–Page 2 of 2.

Year	Pink		Chum		Total	
	Number	Value	Number	Value	Number	Value
1993	64	\$ 59	43,337	\$ 112,756	689,883	\$ 2,860,795
1994	30,930	\$ 8,967	271,115	\$ 381,639	1,092,310	\$ 3,581,992
1995	335	\$ 50	605,918	\$ 724,273	1,201,060	\$ 2,766,882
1996	1,621	\$ 744	207,877	\$ 170,977	1,188,094	\$ 2,117,245
1997	2	\$ 1	17,026	\$ 19,509	180,261	\$ 2,288,766
1998	92	\$ 55	207,809	\$ 183,307	496,647	\$ 983,633
1999	2	\$ -	23,006	\$ 16,428	68,282	\$ 169,769
2000	7	\$ 3	11,570	\$ 7,967	277,530	\$ 514,930
2001			1,272	\$ 827	194,444	\$ 424,199
2002			1,900	\$ 1,190	85,519	\$ 126,361
2003			2,764	\$ 1,087	287,268	\$ 453,187
2004			20,150	\$ 6,611	466,394	\$ 943,766
2005			69,139	\$ 23,115	243,887	\$ 448,853
2006	1	\$ 1	44,070	\$ 14,988	245,064	\$ 451,390
2007			10,763	\$ 3,033	152,694	\$ 380,840
2008	15	\$ 4	30,516	\$ 11,212	197,859	\$ 538,310
2009	2	\$ -	76,790	\$ 76,494	213,675	\$ 502,848
2010			93,148	\$ 162,445	176,338	\$ 765,606
2011	1	\$ -	118,256	\$ 350,124	205,896	\$ 764,357
2012			65,171	\$ 257,932	154,431	\$ 597,998
2013			52,236	\$ 346,288	167,074	\$ 1,184,847
2014	3	\$ -	19,080	\$ 71,563	139,391	\$ 843,356
2015			507	\$ 1,567	65,673	\$ 246,016
2016	-	-	-	-	-	-
2017	-	-	-	-	-	-
Average 2006–2015	4	1	51,054	129,565	171,810	627,557

Note: No commercial fishery in 2016 or 2017.

Appendix B6.–Sockeye salmon utilization, Kuskokwim River 1990–2017.

Year	Harvest				Total
	Commercial ^a	Subsistence	Test fish ^b	Sport fish	
1990	84,414 ^c	45,897	456	61	130,828
1991	108,946 ^c	47,370	383	38	156,737
1992	92,218 ^c	43,514	1,264	131	137,127
1993	27,008 ^c	51,616	4,706	348	83,678
1994	49,365 ^c	42,362	2,561	359	94,647
1995	92,500 ^c	30,905	1,992	95	125,492
1996	33,878 ^c	40,591	623	315	75,407
1997	21,989 ^c	38,744	584	423	61,740
1998	60,906	36,103	625	178	97,812
1999	16,976	47,360	562	54	64,952
2000	4,130	45,942	410	46	50,528
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 ^c	39,127	44	400	48,103
2005	27,645 ^c	41,885	7	636	70,173
2006	12,618 ^c	43,577	0	231	56,426
2007	703 ^c	46,817	4	322	47,846
2008	15,601 ^c	52,213	0	273	68,087
2009	25,673 ^c	35,747	0	162	61,582
2010	22,428 ^c	38,735	0	419	61,582
2011	13,482 ^c	43,245	0	98	56,825
2012	2,857 ^c	47,396	1	132	50,386
2013	768 ^c	39,382	0	85	40,235
2014	2,720	48,372	0	270	51,362
2015	130	37,419	0	14	37,563
2016	0	51,552	0	175	51,727
2017	–	48,462 ^d	–	–	–
Average 2007–2016	8,436	44,088	1	195	52,720

^a Does not include personal use.

^b Test fishery sales do not include donations.

^c Districts 1 and 2.

^d Preliminary estimate.

Appendix B7.–Coho salmon utilization, Kuskokwim River, 1990–2017.

Year	Harvest				Total
	Commercial ^a	Subsistence	Test fish ^b	Sport fish	
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	33,259	570	3,244	321,137
2004	435,407 ^c	45,450	464	4,996	486,317
2005	142,319 ^c	32,755	454	3,539	179,067
2006	185,598 ^c	41,175	169	1,474	228,416
2007	141,049 ^c	33,766	446	2,355	177,616
2008	142,862 ^c	44,724	0	3,755	191,341
2009	104,546 ^c	29,767	0	3,257	137,570
2010	58,031 ^c	33,580	0	1,482	93,093
2011	74,108 ^c	32,172	0	896	107,176
2012	86,389 ^c	28,200	151	974	115,714
2013	114,069 ^c	26,409	0	1,147	141,625
2014	117,588	49,736	0	1,059	168,383
2015	65,034	33,939	0	1,412	100,385
2016	–	36,787	0	1,686	38,473
2017	–	37,788 ^d	–	–	–
Average 2007–2016	100,408	34,908	60	1,802	127,138

^a Does not include personal use.

^b Test fishery sales do not include donations.

^c Districts 1 and 2.

^d Preliminary estimate.

Appendix B8.—Chum salmon utilization, Kuskokwim River, 1990–2017.

Year	Harvest				Total
	Commercial ^a	Subsistence	Test Fish ^b	Sport Fish	
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 ^c	64,140	113	84	84,487
2005	69,139 ^c	58,555	96	500	128,290
2006	44,152 ^c	89,674	0	13	133,839
2007	10,783 ^c	73,560	53	391	84,787
2008	30,798 ^c	63,789	0	121	94,708
2009	76,956 ^c	44,324	0	285	121,565
2010	93,917 ^c	45,089	0	85	139,091
2011	118,316 ^c	54,316	0	83	172,715
2012	65,195 ^c	79,631	93	80	144,999
2013	52,236 ^c	53,627	0	31	105,894
2014	19,080 ^c	68,398	0	36	87,514
2015	507 ^c	42,612	0	102	43,221
2016	–	44,857	0	72	44,929
2017	–	52,589 ^d	–	–	–
Average 2007–2016	51,976	57,020	15	129	103,942

^a Does not include personal use.

^b Test fishery sales do not include donations.

^c Districts 1 and 2.

^d Preliminary estimate.

Appendix B9.–District W-1 commercial salmon harvest by period, 2016.

Date	Permits	Landings	Subdistrict	Number of salmon				
				Chinook	Sockeye	Coho	Chum	Total
Jul 30	1	1	1-A	–	–	–	–	–
Aug 14	1	1	1-A	–	–	–	–	–
Aug 17	1	1	1-A	–	–	–	–	–
Total	1	3	-	–	–	–	–	–

Note: The number of salmon harvested is confidential due to the level of participation.

Appendix B10.—Daily mean tidal CPUE, cumulative mean tidal CPUE, and percent passage for the Bethel test fishery, 2017.

Date	Chinook			Sockeye			Coho			Chum		
	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage
6/1	1	1	0	0	0	0	0	0	0	0	0	0
6/2	0	1	0	0	0	0	0	0	0	0	0	0
6/3	1	3	1	0	0	0	0	0	0	0	0	0
6/4	3	5	1	0	0	0	0	0	0	0	0	0
6/5	0	5	1	0	0	0	0	0	0	0	0	0
6/6	0	5	1	0	0	0	0	0	0	3	3	0
6/7	3	8	2	0	0	0	0	0	0	3	5	0
6/8	0	8	2	0	0	0	0	0	0	3	8	0
6/9	1	9	3	0	0	0	0	0	0	3	11	0
6/10	3	12	3	0	0	0	0	0	0	13	24	0
6/11	6	18	5	0	0	0	0	0	0	3	27	0
6/12	3	21	5	3	3	0	0	0	0	14	41	1
6/13	3	23	6	0	3	0	0	0	0	19	59	1
6/14	4	27	7	12	15	1	0	0	0	6	65	1
6/15	8	36	9	8	23	1	0	0	0	26	92	1
6/16	8	43	12	35	58	2	0	0	0	38	130	2
6/17	0	43	12	13	71	3	0	0	0	18	148	2
6/18	4	47	13	13	84	3	0	0	0	58	206	3
6/19	24	71	19	23	108	4	0	0	0	120	326	5
6/20	9	81	21	16	124	5	0	0	0	19	345	5
6/21	13	94	25	11	135	5	0	0	0	43	388	6
6/22 ^a	15	109	29	52	187	7	0	0	0	94	482	7
6/23	12	121	32	78	265	10	0	0	0	84	565	8
6/24	27	148	39	51	316	12	0	0	0	133	698	10
6/25	13	161	43	26	341	13	0	0	0	62	760	11
6/26	8	168	45	31	373	14	0	0	0	170	930	14
6/27	28	196	52	83	456	17	0	0	0	387	1,317	19
6/28	19	216	57	48	504	19	0	0	0	355	1,671	25
6/29	12	228	61	110	614	23	0	0	0	371	2,042	30
6/30	14	242	64	78	692	26	0	0	0	140	2,183	32
7/1	12	254	67	100	793	29	0	0	0	272	2,454	36
7/2	3	257	68	17	810	30	0	0	0	120	2,574	38
7/3	9	266	71	108	917	34	0	0	0	170	2,744	40
7/4 ^a	13	278	74	65	982	37	0	0	0	105	2,849	42
7/5	6	284	75	117	1,100	41	0	0	0	182	3,030	45
7/6	5	289	77	208	1,308	49	0	0	0	316	3,346	49

-continued-

Appendix B10.–Page 2 of 3.

Date	Chinook			Sockeye			Coho			Chum		
	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage
7/7	7	296	79	55	1,363	51	0	0	0	345	3,691	54
7/8	7	304	81	230	1,593	59	0	0	0	397	4,088	60
7/9	8	311	83	83	1,676	62	0	0	0	509	4,597	68
7/10	1	312	83	36	1,712	64	0	0	0	344	4,941	73
7/11	9	321	85	72	1,784	66	0	0	0	245	5,187	76
7/12	7	328	87	181	1,966	73	0	0	0	256	5,443	80
7/13	3	331	88	84	2,049	76	0	0	0	73	5,515	81
7/14	8	338	90	95	2,144	80	0	0	0	125	5,640	83
7/15	^b 5	344	91	111	2,256	84	2	2	0	82	5,723	84
7/16	2	345	92	56	2,312	86	2	4	0	52	5,775	85
7/17	0	345	92	8	2,320	86	0	4	0	169	5,944	88
7/18	5	350	93	20	2,340	87	0	4	0	113	6,056	89
7/19	6	356	95	33	2,373	88	5	9	0	157	6,213	92
7/20	0	356	95	58	2,431	90	3	12	0	25	6,239	92
7/21	0	356	95	30	2,460	91	7	19	1	43	6,281	93
7/22	2	358	95	17	2,477	92	14	33	1	44	6,326	93
7/23	2	360	96	15	2,492	93	8	41	1	84	6,410	94
7/24	3	363	96	11	2,503	93	17	58	2	63	6,473	95
7/25	0	363	96	9	2,512	93	35	94	3	76	6,549	97
7/26	2	365	97	20	2,532	94	26	119	4	17	6,566	97
7/27	0	365	97	22	2,554	95	17	136	4	28	6,594	97
7/28	2	366	97	7	2,561	95	30	166	5	18	6,612	97
7/29	2	368	98	11	2,572	96	29	195	6	11	6,622	98
7/30	0	368	98	12	2,584	96	37	232	7	0	6,622	98
7/31	0	368	98	9	2,593	96	14	246	8	7	6,629	98
8/1	2	370	98	15	2,607	97	72	318	10	8	6,637	98
8/2	0	370	98	10	2,617	97	99	418	13	14	6,651	98
8/3	2	371	99	14	2,632	98	112	529	16	12	6,664	98
8/4	0	371	99	7	2,639	98	84	613	19	2	6,666	98
8/5	2	373	99	13	2,652	99	109	722	22	12	6,677	98
8/6	0	373	99	10	2,663	99	101	823	25	13	6,690	99
8/7	0	373	99	7	2,669	99	128	951	29	13	6,704	99
8/8	0	373	99	3	2,673	99	120	1,071	33	24	6,728	99
8/9	0	373	99	4	2,676	99	93	1,165	36	12	6,740	99
8/10	0	373	99	0	2,676	99	107	1,271	39	14	6,754	100

-continued-

Appendix B10.–Page 3 of 3.

Date	Chinook			Sockeye			Coho			Chum		
	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage	Daily mean tidal CPUE	Cumulative mean tidal CPUE	Percent passage
8/11	0	373	99	2	2,678	98	124	1,395	43	2	6,756	100
8/12	0	373	99	5	2,683	98	276	1,671	51	0	6,756	100
8/13	0	373	99	0	2,683	99	146	1,817	56	2	6,757	100
8/14	0	373	99	2	2,685	99	117	1,934	60	0	6,757	100
8/15	2	375	100	2	2,686	99	42	1,976	61	0	6,757	100
8/16	0	375	100	0	2,686	99	135	2,112	65	4	6,761	100
8/17	0	375	100	2	2,688	99	104	2,216	68	9	6,770	100
8/18	0	375	100	0	2,688	100	199	2,415	74	0	6,770	100
8/19	0	375	100	0	2,688	100	183	2,598	80	0	6,770	100
8/20	0	375	100	0	2,688	100	158	2,756	85	3	6,773	100
8/21	0	375	100	2	2,690	100	173	2,928	90	2	6,775	100
8/22	0	375	100	0	2,690	100	128	3,056	94	3	6,778	100
8/23	2	376	100	0	2,690	100	126	3,183	98	7	6,785	100
8/24	0	376	100	0	2,690	100	62	3,245	100	0	6,785	100
Totals	376			2,690			3,245			6,785		

Note: The boxes represent the central 50% of the run and the shaded cells represent the median passage date of the run.

^a Estimated CPUE index used to represent data missing from one tide not fished on that date.

^b The use of the 8.0-inch mesh gillnet was discontinued after July 15.

Appendix B11.–Bethel test fishery cumulative CPUE by species, 1984–2017.

Year	Chinook	Sockeye	Coho	Chum
1984	272	579	3,126	2,387
1985	114	1,654	1,778	1,327
1986	201	2,445	4,471	4,066
1987	582	2,762	1,960	4,900
1988	361	1,501	3,437	5,189
1989	523	799	2,609	2,607
1990	445	1,114	2,307	2,718
1991	172	581	1,527	1,262
1992	349	1,109	2,707	3,058
1993	472	1,705	2,697	2,585
1994	362	1,475	2,938	4,797
1995	443	1,367	1,911	3,985
1996	458	1,794	5,630	8,255
1997	478	1,424	2,080	1,955
1998	344	1,455	1,326	2,332
1999	130	1,247	416	548
2000	95	1,048	5,236	2,592
2001	122	1,211	2,914	3,395
2002	410	566	4,289	6,794
2003	649	1,718	4,819	4,803
2004	1,134	2,108	6,771	5,240
2005	883	3,019	3,678	18,177
2006	664	2,136	3,164	13,925
2007	513	1,520	3,328	10,654
2008	623	1,708	5,494	6,737
2009	706	1,521	4,495	8,245
2010	461	1,374	2,024	7,651
2011	578	1,517	3,234	10,028
2012	419	1,171	2,376	6,890
2013	261	1,146	2,865	5,701
2014	650	1,367	4,697	6,338
2015	625	2,158	2,736	2,942
2016	687	2,463	3,530	3,894
2017	376	2,690	6,785	3,245
Average 2008–2016	557	1,603	3,495	6,492

Appendix B12.—Chinook salmon escapements at Kuskokwim River weir projects, 2003–2017.

Year	Chinook salmon escapement						Salmon (Pitka Fork)
	Kwethluk	Tuluksak	Salmon (Aniak)	George	Kogrukluk	Tatlawiksuk	
2003	14,474	1,064	a	b	12,008	b	a
2004	28,605	1,475	a	5,488	19,819	2,833	a
2005	a	2,653	a	3,845	21,819	2,864	a
2006	17,619	1,043	7,075	4,355	20,205	1,700	a
2007	12,927	374	6,255	4,011	b	2,032	a
2008	5,276	701	2,376	2,563	9,750	1,075	a
2009	5,744	362	1,656	3,663	9,528	1,071	a
2010	1,668	201	a	1,498	5,812	546	a
2011	4,079	284	a	1,547	6,731	992	a
2012	a	560	b	2,201	b	1,116	a
2013	a	193	625	1,292	1,819	495	a
2014	3,187	320	1,757	2,993	3,732	1,904	a
2015	8,162	709	2,404	2,282	8,081	2,104	6,736
2016	3,555	909	b	1,663	7,056	2,494	6,326
2017	7,429	936	2,800	3,685	9,992	2,156	8,003
SEG	4,100–7,500			1,800–3,300	4,800–8,800		
Average 2007–2016	5,575	461	2,512	2,371	6,564	1,383	6,531

^a Weir did not operate or counts were incomplete.

^b Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B13.—Sockeye salmon escapements at Kuskokwim River weir projects, 2003–2017.

Year	Sockeye salmon escapement						Telaquana
	Kwethluk	Tuluksak	Salmon (Aniak)	George	Kogrukluk	Tatlawiksuk	
2003	2,928	288	a	14	9,302	a	a
2004	3,490	136	a	177	6,895	10	a
2005	a	642	a	272	37,787	74	a
2006	6,733	985	7,086	146	61,382	38	a
2007	5,262	352	2,189	65	17,211	25	a
2008	2,451	188	1,181	92	19,675	39	a
2009	4,230	686	1,366	54	22,826	39	a
2010	4,239	437	a	113	17,139	28	72,021
2011	2,031	126	a	43	7,974	15	35,105
2012	a	187	924	79	b	9	22,994
2013	a	394	966	150	7,808	37	27,806
2014	3,778	514	894	156	6,413	9	23,820
2015	8,975	824	1,669	159	6,411	0	95,516
2016	20,495	1,509	254	2,807	20,087	240	82,706
2017	29,940	4,094	a	912	27,315	59	145,287
SEG					4,400–17,000		
Average 2007–2016	6,433	522	1,180	372	13,949	44	51,424

^a Weir did not operate or counts were incomplete.

^b Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B14.–Coho salmon escapements at Kuskokwim River weir projects, 2003–2017.

Year	Coho salmon escapement					
	Kwethluk	Tuluksak	Salmon	George	Kogrukluk	Tatlawiksuk
2003	109,163	41,071	b	32,873	74,915	a
2004	64,216	20,336	b	12,499	26,078	16,446
2005	a	11,324	b	8,294	25,407	7,076
2006	25,664	6,111	a	12,705	16,268	a
2007	20,256	2,807	a	28,398	26,423	8,500
2008	49,972	7,457	10,974	21,931	29,237	11,022
2009	21,911	8,137	6,351	12,490	22,289	10,148
2010	a	1,216	b	12,639	14,689	3,733
2011	a	a	b	29,120	21,800	14,184
2012	19,960	4,407	a	14,478	13,421	8,015
2013	a	6,490	2,797	15,308	21,207	12,764
2014	43,945	13,672	8,254	35,771	52,975	19,814
2015	24,443	6,611	a	35,812	32,493	17,701
2016	28,852	1,857	b	b	b	11,897
2017	46,594	28,922	a	25,384	b	a
SEG	>19,000				13,000–28,000	
Average 2007–2016	29,906	5,850	7,094	22,883	26,059	11,778

^a Weir did not operate or counts were incomplete.

^b Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B15.–Chum salmon escapements at Kuskokwim River weir projects, 2003–2017.

Year	Chum salmon escapement					
	Kwethluk	Tuluksak	Salmon (Aniak)	George	Kogrukluk	Tatlawiksuk
2003	41,812	11,725	a	33,648	23,779	b
2004	38,646	11,796	a	15,012	24,405	21,245
2005	a	35,696	a	14,835	194,887	55,599
2006	47,491	25,652	42,825	42,318	188,003	32,776
2007	54,913	17,286	25,340	61,531	52,961	83,484
2008	20,030	12,550	9,459	29,396	44,744	30,129
2009	32,191	13,671	9,392	7,944	82,483	19,975
2010	19,235	13,042	a	26,275	69,258	37,737
2011	18,329	9,828	a	46,650	76,823	88,202
2012	a	16,981	b	33,310	b	44,569
2013	a	12,911	7,723	37,879	65,644	32,249
2014	17,941	8,724	2,890	17,148	30,763	12,455
2015	23,039	6,337	5,657	17,551	33,201	10,379
2016	22,914	5,868	817	20,834	45,329	10,564
2017	53,745	22,405	10,173	40,028	94,387	29,876
SEG					15,000–49,000	
Average 2007–2016	26,074	11,720	8,754	29,852	55,690	36,974

^a Weir did not operate or counts were incomplete.

^b Historical run timing indicates that more than 40% of the run was missed; annual escapement was not determined.

Appendix B16.–Kuskokwim River drainage Chinook salmon aerial survey estimates, 2003–2017.

Year	Kwethluk						Salmon (Aniak)
	Eek	Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk	
2003	1,525	2,661	654	94	3,514	1,493	1,242
2004	4,653	6,801	5,157	1,196	5,362	1,868	2,177
2005	b	5,059	2,206	672	b	1,679	4,097
2006	b	b	4,734	b	5,639	1,618	b
2007	b	b	692	173	3,984	2,147	1,458
2008	b	487	1,074	b	3,222	1,061	589
2009	b	b	b	b	b	b	b
2010	b	b	235	b	b	b	b
2011	263	b	b	b	b	116	79
2012	b	b	588	b	b	193	49
2013	240	1,165	599	83	754	261	154
2014	189	b	622	b	3,201	1,220	497
2015	b	b	709	b	b	917	810
2016	b	b	622	b	718	898	b
2017	b	b	b	b	1,781	889	423
Escapement Goal			400- 1,200		1,200- 2,300		330- 1,200
10-yr Avg	231	826	643	128	2,376	852	519

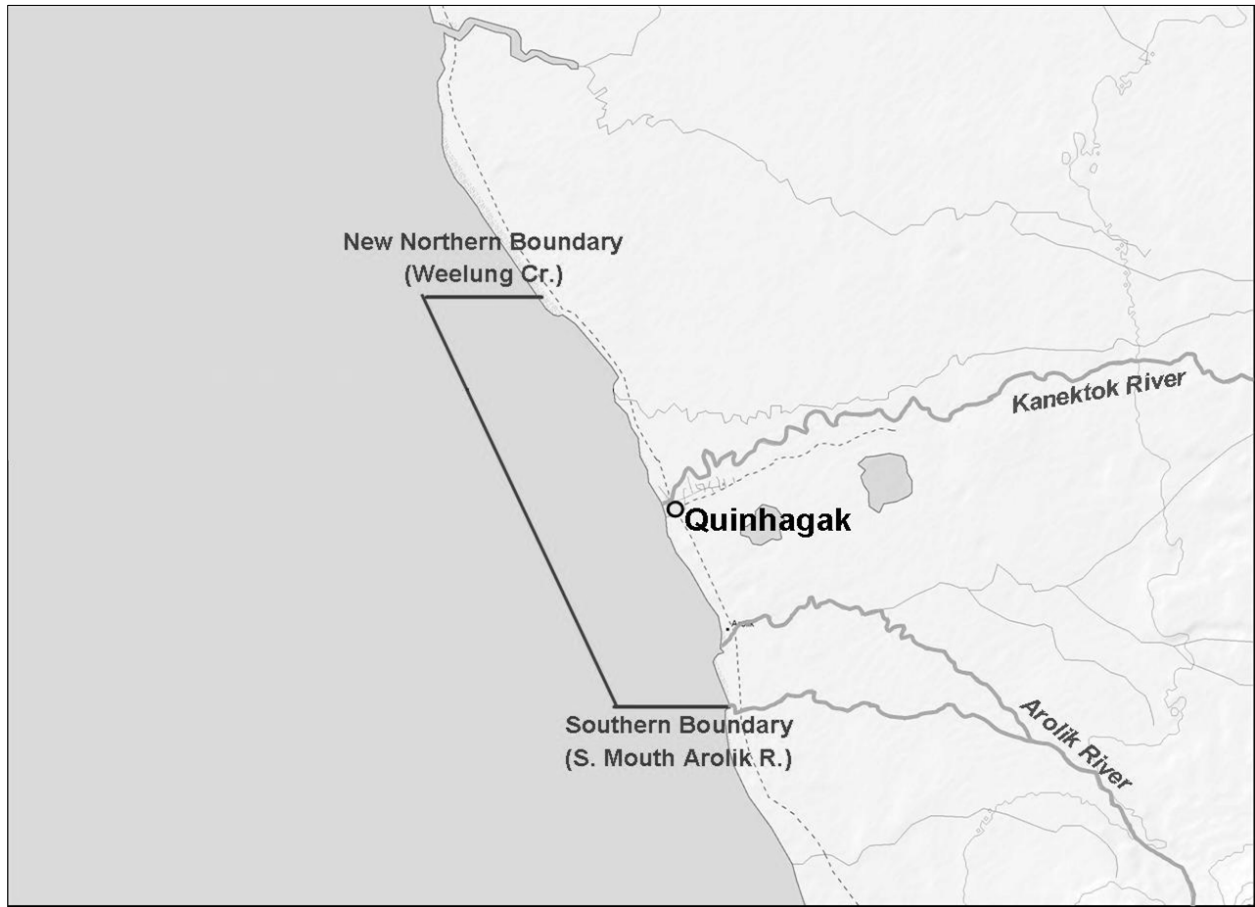
Year						Bear	Salmon	Upper
	Holokuk	Oskawaluk	Holitna	Gagarayah	Cheeneetnuk	(Pitka)	(Pitka)	Pitka Fork
2003	1,096	844	b	1,093	810	176	b	197
2004	539	293	4,051	670	918	206	1,138	290
2005	510	582	1,760	b	b	367	1,801	744
2006	705	386	1,866	531	1,015	347	862	170
2007	b	b	b	1,035	b	165	943	131
2008	418	213	b	177	290	245	1,033	248
2009	565	379	b	303	323	209	632	187
2010	229	b	b	62	b	75	135	67
2011	61	26	b	96	249	145	767	85
2012	36	51	b	178	229	b	670	b
2013	b	38	532	74	138	64	469	b
2014	80	200	b	359	340	b	1,865	b
2015	77	b	662	19	b	1,381	2,016	b
2016	100	47	1,157	135	217	580	1,578	b
2017	140	136	676	453	660	492	687	234
Escapement Goal			970- 2,100	300- 830	340- 1,300		470- 1,600	
10-yr Avg	196	136	784	244	255	358	1,011	144

^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 C

Appendix C1.-Map of commercial fishing District W-4, Kuskokwim Management Area.



Appendix C2.–District 4 commercial salmon harvest, including personal use, 1960–2017.

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
2004	25,462	34,627	82,398	0	25,820	168,307
2005	24,195	68,801	51,708	19	13,529	158,252

-continued-

Appendix C2.–Page 2 of 2.

Year	Chinook	Sockeye	Coho	Pink	Chum	Total
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
2014	2,265	58,879	52,317	0	14,563	128,024
2015	7,547	30,269	76,621	0	16,051	130,152
2016 ^a	–	–	–	–	–	–
2017 ^a	–	–	–	–	–	–
Average 2006–2015	11,465	72,768	42,934	0	60,997	188,130

^a No commercial fishery occurred.

Appendix C3.–District 4 commercial salmon fishing exvessel value, 1990–2017.

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
2014	\$22,940	\$408,008	\$367,817	\$0	\$59,873	\$858,638
2015	\$37,565	\$89,262	\$312,472	\$0	\$50,265	\$489,564
2016 ^a	–	–	–	–	–	–
2017 ^a	–	–	–	–	–	–
Average 2006–2015	\$122,453	\$347,502	\$195,436	\$0	\$182,212	\$847,603

^a No commercial fishery occurred.

Appendix C4.–Kanektok River salmon escapement, 1996–2017.

Year	Operating period ^a	Chinook	Sockeye	Coho	Pink ^b	Chum
<u>Kanektok River</u>						
<i>Counting tower</i>						
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				
<i>Weir</i>						
2001	08/10 to 10/03	2,795 ^c	9,912 ^c	32,720	14	9,021 ^c
2002	07/01 to 09/20	5,360 ^d	60,733 ^d	24,840	85,057	41,912 ^d
2003	06/24 to 09/18	8,290	129,449	72,448	2,301	40,086
2004	06/29 to 09/20	19,745	106,409	87,827	89,138	46,008
2005	06/25 to 09/18	14,233	270,379	13,700 ^e	3,511	55,340
2006		Not operational				
2007	06/19 to 09/18	14,120	308,351	26,452	3,032	131,055
2008	07/17 to 08/21	9,799 ^d	86,245 ^e	24,490 ^d	140,468	53,605 ^d
2009	07/05 to 08/11	7,065	305,756 ^d	2,336 ^c	1,246	55,846 ^d
2010	06/28 to 08/05	6,537	204,954	330 ^c	114,074	68,186
2011	06/27 to 08/15	5,170	88,177	5,779 ^c	530	53,050
2012	07/06 to 08/15	1,561 ^a	115,021 ^e	4,248 ^c	62,141	28,726 ^a
2013	06/25 to 08/15	3,569	128,761	3,116 ^c	532	43,040
2014	06/25 to 08/15	3,594	259,406	4,786 ^c	25,718	18,602
2015	06/25 to 08/15	10,416	106,751	2,493 ^c	1,058	15,048
2016		Not operational				
2017		Not operational				
Average						
2006–2015		8,088	195,254	26,452	35,231	54,903

^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 C5.—Kanektok River salmon aerial survey estimates, 1962–2017.

Year	Chinook	Sockeye	Coho	Chum
1962	a	a	a	a
1963	a	a	a	a
1964	a	a	a	a
1965	a	a	a	a
1966	3,718	a	28,800	a
1967	a	a	a	a
1968	a	a	14,000	a
1969	a	a	a	a
1970	3,112	a	a	a
1971	a	a	a	a
1972	a	a	a	a
1973	a	a	a	a
1974	a	a	a	a
1975	a	a	a	a
1976	a	a	8,697	a
1977	5,787	6,404	32,157	a
1978	19,180	42,890	229,290 ^b	a
1979	a	a	a	a
1980	6,172	112,501	a	a
1981	a	a	25,950	69,325
1982	a	a	71,840	a
1983	8,890	a	a	a
1984	12,182	30,840	9,360	a
1985	13,465	15,570	53,060	46,830
1986	3,643	12,090	14,385	a
1987	4,213	51,753	16,790	a
1988	11,180	30,440	9,420	20,056
1989	7,914	14,735	20,583	a
1990	a	a	6,270	a
1991	a	a	2,475	a
1992	a	a	a	4,330
1993	a	a	25,675	a
1994	7,386	a	1,285	a
1995	a	a	10,000	a
1996	a	a	a	23,656
1997	a	a	a	a
1998	a	a	a	a
1999	a	a	a	a
2000	a	a	a	a
2001	a	a	11,440	a
2002	a	a	a	a
2003	6,206	21,335	a	a
2004	28,375	77,780	a	a
2005	14,202	11,730	a	a
2006	8,433	385,800	a	a

-continued-

Appendix C5.–Page 2 of 2.

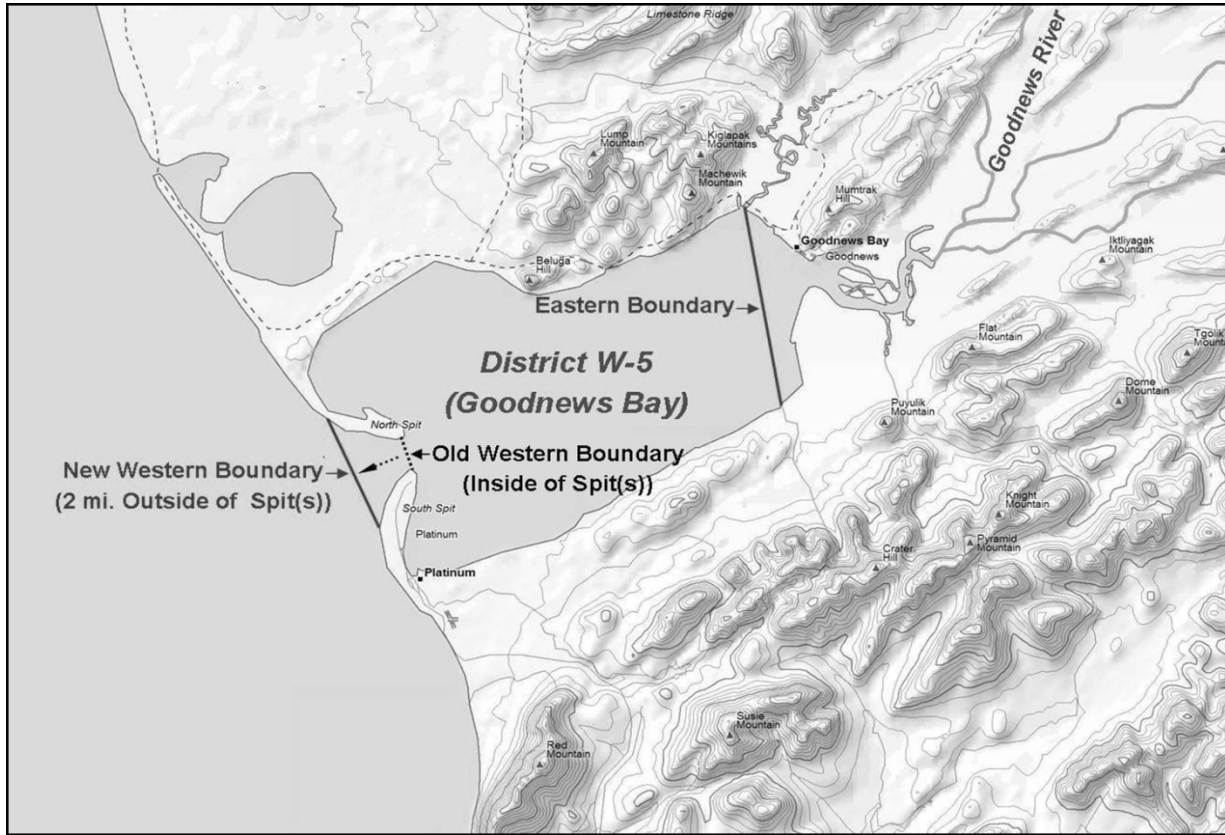
Year	Chinook	Sockeye	Coho	Chum
2007	a	a	a	a
2008	3,659	38,900	a	a
2009	a	a	a	a
2010	1,228	16,950	a	a
2011	a	a	a	a
2012	a	a	a	a
2013	2,346	64,802	a	a
2014	1,871	148,800	a	a
2015	4,919	39,970	a	a
2016	5,631	68,978	a	a
2017	a	a	a	a
SEG	3,500–8,000	14,000–34,000		

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.

APPENDIX D

Appendix D1.—Map of commercial fishing District W-5, Kuskokwim Management Area.



Appendix D2.–District 5 commercial salmon harvest including personal use, 1968–2017.

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
2014	205	20,515	52,158	0	3,403	76,281
2015	705	25,861	7,030	0	4,510	38,106
2016 ^b	–	–	–	–	–	–
2017 ^b	–	–	–	–	–	–
Average 2006–2015	1,561	32,060	18,363	1	13,208	65,192

^a No harvest information available.

^b No commercial fishery occurred.

Appendix D3.–District 5 commercial salmon fishing exvessel value, 1990–2017.

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	\$150,668	\$0	\$147,401	\$617,765
2013	\$8,546	\$169,318	\$185,332	\$0	\$89,455	\$452,651
2014	\$3,065	\$152,446	\$415,009	\$0	\$14,134	\$584,654
2015	\$3,823	\$81,851	\$30,737	\$0	\$15,205	\$131,616
2016 ^a	–	–	–	–	–	–
2017 ^a	–	–	–	–	–	–
Average 2006–2015	\$17,186	\$166,185	\$110,145	\$0	\$42,191	\$335,707

^a No commercial fishery occurred.

Appendix D4.–Middle Fork Goodnews River salmon escapement, 1981–2017.

Year	Operating period ^a	Chinook	Sockeye	Coho	Pink ^b	Chum
Middle Fork Goodnews River						
Escapement goals:		1,500–2,900	18,000–40,000	>12,000		>12,000
<i>Counting tower</i>						
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
<i>Weir</i>						
1991	06/29 to 08/24	2,080	41,656 ^d	2,410 ^c	1,428	27,632
1992	06/29 to 08/25	1,445 ^d	28,074	151 ^c	21,523	21,096
1993	06/22 to 08/18	2,132	24,957 ^e	1,593 ^c	318	14,581
1994	06/23 to 08/08	3,061	56,503	256 ^c	38,710	35,652 ^d
1995	06/19 to 08/28	4,678	37,776	11,556 ^c	312	33,559
1996	06/19 to 08/23	3,282 ^d	64,185	17,753 ^c	14,509	46,108 ^d
1997	06/11 to 09/17	2,897	34,322	13,404	940	17,151
1998	07/04 to 09/13	3,553	38,493 ^d	33,368	10,376	26,996
1999	06/26 to 09/26	3,703	49,323	11,500	910	21,818
2000	07/02 to 09/22	2,670 ^e	40,828 ^e	15,880 ^e	2,528	14,405 ^e
2001	06/26 to 09/30	5,351 ^e	21,197 ^e	18,539 ^e	1,326	26,820 ^e
2002	06/22 to 09/18	3,025	21,329	27,643	3,034	29,905
2003	06/18 to 09/18	2,248	37,933	52,504	1,864	21,778
2004	06/21 to 09/20	4,438	54,047	47,916	21,628	32,443
2005	06/26 to 09/20	4,781	118,969	20,168	5,926	26,501
2006	06/26 to 09/18	4,572	127,245	26,909	18,432	54,689
2007	06/25 to 09/19	3,914	73,768	19,442 ^d	4,919	50,232
2008	07/02 to 09/16	2,223	43,879 ^d	37,690	9,807	39,548 ^d
2009	06/28 to 09/22	1,669	27,495	19,699	714	19,237
2010	06/25 to 09/18	2,176	36,574	26,287 ^d	3,444	24,789
2011	06/24 to 09/18	2,045	19,643	24,668	1,394	19,974
2012	06/29 to 09/03	524 ^d	29,531 ^a	11,371 ^a	6,316	9,065 ^d
2013	06/25 to 09/18	1,187	23,545	1,189 ^d	530	27,682
2014	06/25 to 08/30	750	41,473	7,594	0	11,518
2015	06/25 to 08/31	1,494	57,809	15,084	1,159	11,517
2016	06/25 to 07/31	3,767	170,574	33 ^f	11,267	41,815
2017	06/25 to 07/31	6,881	179,897	10 ^f	0	54,799
Average						
2007–2016		1,975	52,429	16,306	3,955	25,538

^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.

^f Escapement was unable to be assessed due to project not being in operation.

Appendix D5.–Goodnews River drainage salmon aerial survey estimates, 1980–2017.

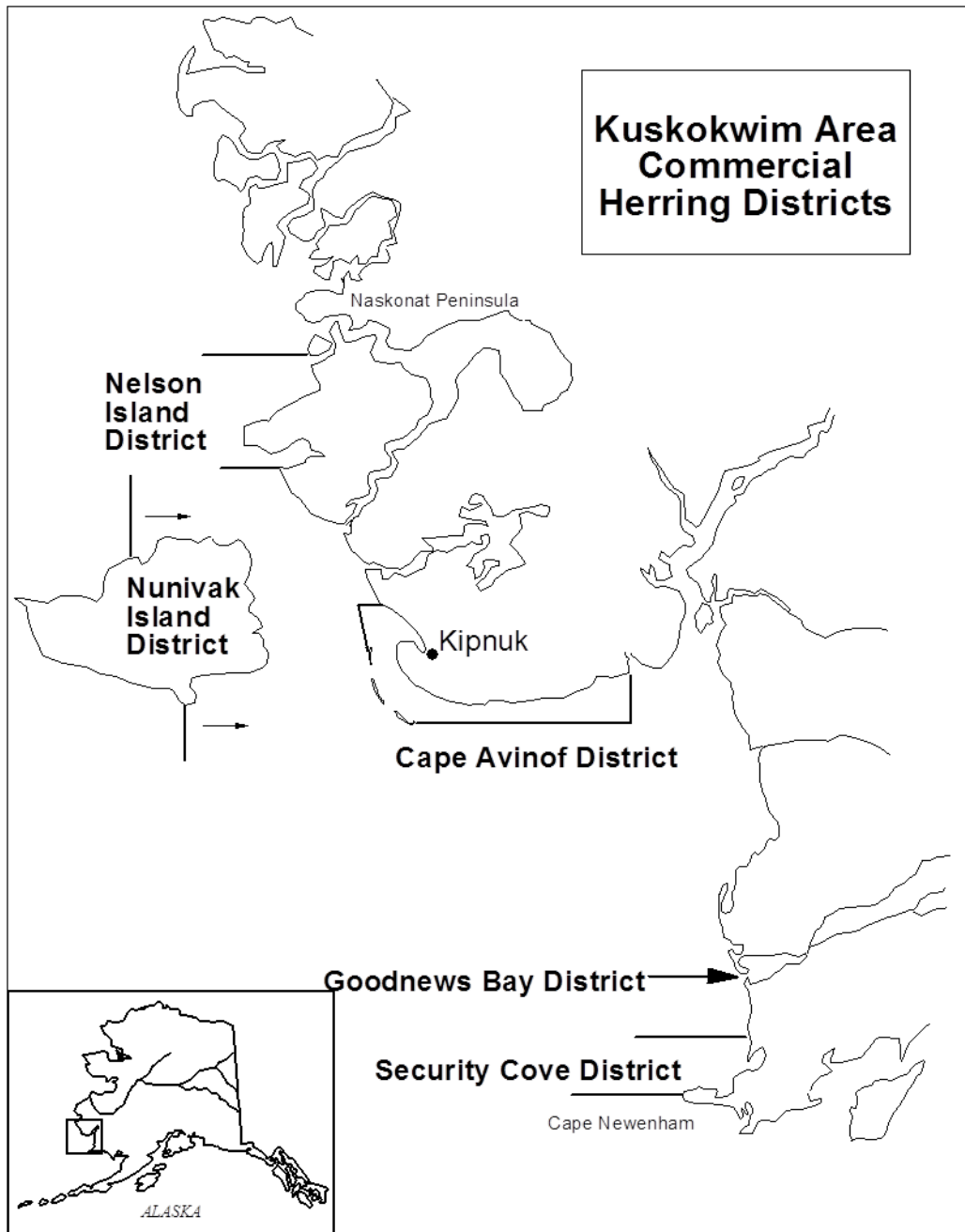
Year	Goodnews River and Lakes			Middle Fork Goodnews River and Lakes		
	Chinook	Sockeye	Chum	Chinook	Sockeye	Chum
1980	1,228	75,639	1,975	1,164	a	3,782
1981	a	a	a	a	a	a
1982	a	a	9,700	a	a	6,300
1983	2,600	9,650	a	a	a	a
1984	2,062	12,807	17,250	905	8,546	9,172
1985	3,535	4,620	4,415	2,050	7,401	3,593
1986	1,068	8,960	11,850	1,249	16,990	7,645
1987	2,244	19,786	12,148	2,222	25,340	9,789
1988	a	a	a	a	a	a
1989	651	a	a	1,277	30,382	a
1990	658	27,689	a	a	a	a
1991	a	a	a	a	a	a
1992	875	a	1,950	a	a	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	a	a	a	a	a	a
1998	578	3,497	2,743	731	11,393	3,619
1999	a	a	a	a	a	a
2000	a	a	a	a	a	a
2001	a	a	7,330	a	a	6,945
2002	1,470	a	3,075	1,195	2,627	1,208
2003	3,935	50,140	a	2,131	29,150	a
2004	7,482	31,695	a	2,617	33,670	a
2005	a	a	a	a	a	a
2006	a	a	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	378	16,710	a	355	a	a
2013	a	a	a	a	a	a
2014	630	a	a	612	12,262	a
2015	991	38,390	a	515	24,780	a
2016	1,120	90,060	a	1,301	68,978	a
2017	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

Appendix E1.—Commercial herring districts, Kuskokwim Management Area.



Appendix E2.—Estimated biomass, commercial effort, and harvest value of Pacific herring in Kuskokwim Management Area, 1981–2017.

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value	Average income per permit
2017 ^a	Security Cove	5,270	0	0	0		\$0	\$0
	Goodnews Bay	5,258	0	0	0		\$0	\$0
	Cape Avinof	2,042	0	0	0		\$0	\$0
	Nelson Is.	5,275	0	0	0		\$0	\$0
	Nunivak Is.	4,980	0	0	0		\$0	\$0
2016 ^a	Security Cove	6,980	0	0	0		\$0	\$0
	Goodnews Bay	7,448	0	0	0		\$0	\$0
	Cape Avinof	4,189	0	0	0		\$0	\$0
	Nelson Is.	9,258	0	0	0		\$0	\$0
	Nunivak Is.	3,712	0	0	0		\$0	\$0
2015	Security Cove	12,876	0	0	0		\$0	\$0
	Goodnews Bay	18,532	0	0	0		\$0	\$0
	Cape Avinof	10,423 ^a	0	0	0		\$0	\$0
	Nelson Is.	30,228	0	0	0		\$0	\$0
	Nunivak Is.	5,657 ^a	0	0	0		\$0	\$0
2014	Security Cove	15,874	0	0	0		\$0	\$0
	Goodnews Bay	14,162	0	0	0		\$0	\$0
	Cape Avinof	10,423 ^a	0	0	0		\$0	\$0
	Nelson Is.	58,285	0	0	0		\$0	\$0
	Nunivak Is.	2,280 ^a	0	0	0		\$0	\$0
2013	Security Cove	9,313	0	0	0		\$0	\$0
	Goodnews Bay	7,945	255	5	348.0		\$38,235	\$7,647
	Cape Avinof	1,415 ^a	36	11	72.0		\$5,430	\$494
	Nelson Is.	4,893	355	12	168.0		\$53,190	\$4,433
	Nunivak Is.	2,420 ^a	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

-continued-

Appendix E2.–Page 2 of 4.

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value	Average income per permit
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
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	4,748	109	25	17.0		\$10,000	\$400
	Goodnews Bay	5,529	13	5	28.5		\$1,000	\$200
	Cape Avinof	3,491	79	37	97.0		\$8,000	\$216
	Nelson Is.	6,130	950	54	80.5		\$101,000	\$1,870
	Nunivak Is.	5,422	175	29	243.0	^b	\$19,000	\$655
2001	Security Cove	5,206	1,024	56	17.5		\$110,000	\$1,964
	Goodnews Bay	5,755	45	23	16.0		\$6,000	\$261
	Cape Avinof	3,486	231	45	63.0		\$23,000	\$511
	Nelson Is.	6,057	678	49	25.5		\$66,000	\$1,347
	Nunivak Is.	5,657	0	0	0		\$0	\$0

-continued-

Appendix E2.–Page 3 of 4.

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value	Average income per permit
2000	Security Cove	5,237	284	79	16.0		\$54,386	\$688
	Goodnews Bay	6,348	20	57	27.0		\$3,318	\$58
	Cape Avinof	3,210	366	86	59.0		\$68,532	\$797
	Nelson Is.	4,672	813	86	20.0		\$154,280	\$1,794
	Nunivak Is.	3,487	40	34	93.0	b	\$11,880	\$349
1999	Security Cove	5,261	1,072	97	9.0		\$338,000	\$3,485
	Goodnews Bay	6,896	1,366	94	49.0		\$301,000	\$3,202
	Cape Avinof	3,555	533	117	51.0		\$185,000	\$1,581
	Nelson Is.	6,655	1,366	94	22.0		\$430,000	\$4,574
	Nunivak Is.	3,319	0	0	0		\$0	\$0
1998	Security Cove	4,017	1,012	78	28.5		\$202,340	\$2,594
	Goodnews Bay	4,064	831	84	79.0		\$166,220	\$1,979
	Cape Avinof	4,287	656	109	44.0		\$131,120	\$1,203
	Nelson Is.	7,136	1,250	86	76.0		\$235,900	\$2,743
	Nunivak Is.	3,778	202	7	6.0		\$440	\$63
1997	Security Cove	4,640	892	222	10.5		\$221,000	\$995
	Goodnews Bay	4,752	805	139	65.0		\$228,000	\$1,640
	Cape Avinof	4,616	687	145	26.0		\$157,000	\$1,083
	Nelson Is.	7,909	778	105	10.0		\$198,000	\$1,886
	Nunivak Is.	3,801	0	12	70.0		\$0	\$0
1996	Security Cove	6,867	1,859	326	5.5		\$1,252,270	\$3,841
	Goodnews Bay	6,315	1,204	182	45.0		\$893,900	\$4,912
	Cape Avinof	4,500	820	161	57.0		\$659,280	\$4,095
	Nelson Is.	6,638	1,031	109	25.0		\$676,624	\$6,208
	Nunivak Is.	4,197	101	24	256.0		\$38,234	\$1,593
1995	Security Cove	6,702	1,292	106	12.0		\$956,000	\$9,019
	Goodnews Bay	4,224	1,054	127	56.0		\$848,000	\$6,677
	Cape Avinof	3,627	485	93	48.0		\$363,000	\$3,903
	Nelson Is.	7,754	1,113	100	28.0		\$710,000	\$7,100
	Nunivak Is.	4,579	41	13	387.0		\$22,000	\$1,692
1994	Security Cove	7,638	0	0	0		\$0	\$0
	Goodnews Bay	5,679	1,062	103	38.0		\$391,000	\$3,796
	Cape Avinof	2,827	427	85	62.0		\$156,000	\$1,835
	Nelson Is.	5,564	717	104	26.0		\$235,000	\$2,260
	Nunivak Is.	4,921	14	12	6.0		\$4,000	\$333
1993	Security Cove	6,995	5	9	24.5		\$2,000	\$222
	Goodnews Bay	6,211	954	63	123.0		\$293,000	\$4,651
	Cape Avinof	2,837	215	97	106.0		\$75,000	\$773
	Nelson Is.	4,944	739	73	63.5		\$198,000	\$2,712
	Nunivak Is.	5,176	0	0	0		\$0	\$0
1992	Security Cove	7,773	834	58	34.0		\$285,000	\$4,914
	Goodnews Bay	5,572	740	78	29.0		\$286,000	\$3,667
	Cape Avinof	3,446	452	121	12.0		\$178,000	\$1,471
	Nelson Is.	5,275	246	85	10.0		\$78,000	\$918
	Nunivak Is.	5,703	27	14	6.0		\$4,000	\$286
1991	Security Cove	4,434	570	52	12.0		\$208,000	\$4,000
	Goodnews Bay	4,387	263	103	4.0		\$93,000	\$903
	Cape Avinof	2,083	267	137	28.0		\$94,000	\$686
	Nelson Is.	2,385	0	0	0		\$0	\$0
	Nunivak Is.	3,903	59	17	12.0		\$9,000	\$529

-continued-

Appendix E2.–Page 4 of 4.

Year	District	Estimated biomass (st)	Harvest (st)	Number of permits	Hours fished	CPUE (st)	Estimated value	Average income per permit
1990	Security Cove	2,650	234	52	7.0		\$94,000	\$1,808
	Goodnews Bay	2,577	455	126	32.0		\$314,000	\$2,492
	Cape Avinof	2,020	50	101	3.0		\$35,000	\$347
	Nelson Is.	2,705	0	0	0		\$0	\$0
	Nunivak Is.	422	0	0	0		\$0	\$0
1989	Security Cove	2,830	554	104	4.0		\$256,000	\$2,462
	Goodnews Bay	4,044	616	138	50.0		\$335,000	\$2,428
	Cape Avinof	2,777	129	147	194.0		\$54,000	\$367
	Nelson Is.	3,316	233	162	15.0		\$57,000	\$352
	Nunivak Is.	617	116	45	186.0		\$42,000	\$933
1988	Security Cove	4,906	324	31	23.5		\$362,000	\$11,677
	Goodnews Bay	4,479	483	60	40.0		\$463,000	\$7,717
	Cape Avinof	4,108	348	98	88.5		\$264,000	\$2,694
	Nelson Is.	7,152	775	174	7.5		\$713,000	\$4,098
	Nunivak Is.	2,800	0	0	0		\$0	\$0
1987	Security Cove	2,300	313	65	13.0		\$242,000	\$3,723
	Goodnews Bay	2,000	321	117	11.0		\$133,000	\$1,137
	Nelson Is.	8,100	923	235	6.0		\$661,000	\$2,813
	Nunivak Is.	4,400	414	61	39.0		\$231,000	\$3,787
1986	Security Cove	3,700	751	88	73.0		\$535,000	\$6,080
	Goodnews Bay	3,000	557	104	53.0		\$325,000	\$3,125
	Nelson Is.	7,300	886	163	40.0		\$428,000	\$2,626
	Nunivak Is.	6,000	511	36	156.0		\$213,000	\$5,917
1985	Security Cove	4,900	733	107	125.0		\$335,000	\$3,131
	Goodnews Bay	4,300	724	83	130.0		\$309,000	\$3,723
	Nelson Is.	9,500	977	143	44.0		\$527,000	\$3,685
	Nunivak Is.	5,700	358	37	228.0		\$146,000	\$3,946
1984	Security Cove	5,100	335	38	345.0		\$110,000	\$2,895
	Goodnews Bay	4,100	717	130	139.0		\$168,000	\$1,292
1983	Security Cove	6,400	1,073	94	87.0		\$443,000	\$4,713
	Goodnews Bay	3,200	435	84	278.0		\$185,000	\$2,202
1982	Security Cove	5,100	813	107	302.0		\$271,000	\$2,533
	Goodnews Bay	2,600	486	84	314.0		\$188,000	\$2,238
1981	Security Cove	8,300	1,173	113	90.0		\$347,000	\$3,071
	Goodnews Bay	4,300	657	175	133.0		\$196,000	\$1,120

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