Fishery Management Report No. 17-06

2014–2015 Annual Management Report and 2016 Sport Fisheries Overview for Northern Kenai Peninsula: Fisheries under Consideration by the Alaska Board of Fisheries, 2017

by

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February 2017

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

FISHERY MANAGEMENT REPORT NO. 17-06

2014–2015 ANNUAL MANAGEMENT REPORT AND 2016 SPORT FISHERIES OVERVIEW FOR NORTHERN KENAI PENINSULA: FISHERIES UNDER CONSIDERATION BY THE ALASKA BOARD OF FISHERIES, 2017

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

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ABSTRACT

This report provides information on fisheries in the Northern Kenai Peninsula Management Area. An overview of information for the 2014-2015 sport fisheries is included, and updated fishery data along with inseason provisional data from 2016 for fisheries under consideration by the Alaska Board of Fisheries in February 2017 is provided. Summary information is provided for estimates of effort, catch, and harvest through 2015. The following sport fisheries are included: Kenai River Chinook salmon (*Oncorhynchus tshawytscha*) early and late runs, Kasilof River Chinook salmon early and late runs, Russian River sockeye salmon (*O. nerka*) early and late runs, Kenai River sockeye salmon late run, areawide coho salmon (*O. kisutch*) and pink salmon (*O. gorbuscha*), and resident species including rainbow trout and steelhead (*O. mykiss*), Dolly Varden (*Salvelinus malma*), lake trout (*Salvelinus namaycush*), Arctic grayling (*Thymallus arcticus*), and illegally introduced northern pike (*Esox lucius*). The educational fisheries, guided sport fisheries, various habitat concerns, and Kenai and Kasilof rivers sockeye salmon personal use fisheries are also discussed.

Key words: Northern Kenai Peninsula Management Area, Kenai River, Kasilof River, Russian River, Chinook salmon, *Oncorhynchus tshawytscha*, sockeye salmon, *Oncorhyncus nerka*, coho salmon, *Onchoryncus kisutch*, rainbow trout, *Onchorynchus mykiss*, Dolly Varden, *Salvelinus malma*, northern pike, *Esox lucius*, personal use dip net fisheries, Alaska Board of Fisheries

INTRODUCTION

MANAGEMENT OVERVIEW

This report provides information on the following fisheries under consideration by the Alaska Board of Fisheries (BOF) in February 2017.

- Kenai River early-run Chinook salmon sport fisheries
- Kenai River late-run Chinook salmon sport fisheries
- Kasilof River early-run Chinook salmon sport fisheries
- Kasilof River late-run Chinook salmon sport fisheries
- Russian River early-run sockeye salmon sport fisheries
- Russian River late-run sockeye salmon sport fisheries
- Kenai River late-run sockeye salmon sport fisheries
- Kenai River coho salmon sport fisheries
- Northern Kenai Peninsula Management Area coho salmon sport fisheries
- Kenai River resident species sport fisheries
- Northern Kenai Peninsula Management Area sockeye salmon personal use fisheries
- Northern Kenai Peninsula Management Area fisheries for illegally introduced northern pike

An overview of the area, sport, and personal use fisheries from 2014 to 2015, as well as a provisional summary of the 2016 Northern Kenai Peninsula Management Area sport fisheries are incorporated into this document.

MANAGEMENT AREA DESCRIPTION

The Northern Kenai Peninsula Management Area (NKPMA) includes all Kenai Peninsula freshwater drainages from the north bank of Ingram Creek south to the south bank of the Kasilof River (Figure 1). Marine waters of NKPMA are all waters from the latitude of East Foreland

south to the latitude of the Kasilof River. This area is administered from the Soldotna office of the Alaska Department of Fish and Game (ADF&G).

Larger communities located within the NKPMA include Kenai and Soldotna. Smaller communities are Cooper Landing, Hope, Moose Pass, Nikiski, and Sterling. This management area is linked to the State of Alaska highway system via the Sterling and Seward highways, which provide sport anglers access to many of the area's major fisheries. Remote areas of the NKPMA (west side of Cook Inlet) can be accessed via wheel or float equipped aircraft, or boat.

MANAGEMENT PLANS AFFECTING FISHERIES

Upper Cook Inlet fisheries (commercial, sport, personal use, and subsistence) have been the focus of intensive, allocative debates for many years. These controversial issues have prompted the Alaska Board of Fisheries (BOF) to establish numerous management plans and regulatory policies that allocate the area's fisheries resources among various user groups. These plans provide for the sustained yield of fishery resources and establish management actions (in specific situations) and guidelines for ADF&G fisheries managers.

Management plans and their associated Alaska Administrative Code (AAC) germane to NKPMA fisheries are as follows:

- *Upper Cook Inlet Salmon Management Plan* (5 AAC 21.363)
- *Kenai River and Kasilof River Early-run King Salmon Management Plan (5 AAC 57.160)*
- *Kenai River Late-run King Salmon Management Plan* (5 AAC 21.359)
- *Kenai River Late-run Sockeye Salmon Management Plan* (5 AAC 21.360)
- *Russian River Sockeye Salmon Management Plan* (5 AAC 57.150)
- *Kasilof River Salmon Management Plan* (5 AAC 21.365)
- *Upper Cook Inlet Personal Use Salmon Fishery Management Plan* (5 AAC 77.540)
- *Riparian Habitat Fishery Management Plan for the Kenai Peninsula Area (5 AAC 56.180*)
- *Riparian Habitat Fishery Management Plan for the Kenai River Drainage Area (5 AAC 57.180*)
- *Kenai River Coho Salmon Management Plan* (5 AAC 57.170)

FISHERIES RESOURCES

The NKPMA offers diverse fishing opportunities for sport anglers. Anglers can target 4 species of Pacific salmon: Chinook (*Oncorhynchus tshawytscha*), sockeye (*O. nerka*), coho (*O. kisutch*), and pink (*O. gorbuscha*) salmon. Fisheries for these species occur primarily in fresh water and to a lesser degree in the salt waters of Cook Inlet. Anglers can also target salmon, rainbow trout (*O. mykiss*), Arctic char (*Salvelinus alpinus*), and Arctic grayling (*Thymallus arcticus*) stocked by the ADF&G Division of Sport Fish (SF) into various landlocked lakes. Popular fisheries for resident stocks of rainbow trout, Dolly Varden (*Salvelinus malma*), and lake trout (*S. namaycush*) also occur. Fisheries target naturalized stocks of Arctic grayling and illegally introduced stocks of northern pike (*Esox lucius*) as well. The area's anadromous stocks of Dolly Varden, steelhead (*O. mykiss*), and eulachon (*Thaleichthys pacificus*) also provide NKPMA sport fishing opportunities.

The NKPMA has limited opportunities for marine sport fisheries. Small numbers of anglers target halibut (*Hippoglossus stenolepis*), razor clams (*Siliqua patula*), and several species of hardshell clams in the waters adjacent to the mouths of the Kenai and Kasilof rivers and Cook Inlet waters within the NKPMA management area.

Two runs of wild (nonenhanced) Kenai River Chinook salmon combine to support the largest sport fishery for this species in Alaska. Stocked and naturally-produced (a population consisting of both wild fish and naturalized hatchery fish) Chinook salmon returns to Crooked Creek support an early-run fishery in the Kasilof River. A late run composed of wild Chinook salmon also provides sport fishing opportunity at the Kasilof River. Chinook salmon have also been stocked into 1 roadside landlocked lake to provide additional fishing opportunity, primarily during winter months.

The Russian River supports both early and late sockeye salmon runs. These wild stocks maintain the second largest sockeye salmon sport fishery in the state. As a result of changes to the management of Kenai River sockeye salmon and increased inriver run goals, the Kenai River sport fishery for sockeye salmon has grown into the largest sport fishery for this species in Alaska.

The NKPMA also supports personal use sockeye salmon dip net fisheries at the mouths of the Kenai and Kasilof rivers and a personal use gillnet fishery at the mouth of the Kasilof River. The personal use fisheries on both the Kenai and Kasilof rivers are managed with established seasons and provide sockeye salmon harvest opportunities for Alaska residents.

Wild coho salmon runs to the Kenai River support the largest freshwater coho salmon sport fishery in Alaska. The Kasilof River and numerous smaller streams also support smaller coho salmon sport fisheries. Additional fishing opportunity for coho salmon is provided through a program of stocking landlocked lakes on the Kenai Peninsula.

Pink salmon return in large numbers to NKPMA drainages during even-numbered years. A significant sport fishery for this species occurs on the Kenai River. Harvests in the Kenai River have increased during even years because of liberalized bag and possession limits (6 pink salmon daily). Chum salmon (*O. keta*) runs to NKPMA streams on the east side of Cook Inlet are quite small and provide only minor sport fishing opportunity.

Wild rainbow trout populations occur in numerous lakes and streams throughout the NKPMA. Flowing waters that support major rainbow trout fisheries include the Kenai River, Russian River, and the streams and lakes of the Swanson River and Moose River drainages. The Kenai River supports the largest freshwater sport fishery for rainbow trout in Alaska. To provide alternative fishing opportunities, several landlocked lakes are also stocked with rainbow trout.

Steelhead currently provide sport fishing opportunity in the Kasilof River. Steelhead production is thought to originate from 2 primary sources: 1) a stocked return of this species developed in the 1980s using wild stocks indigenous to Crooked Creek, which was discontinued in 1996 due to excessive straying of hatchery trout into the Kenai River system, and 2) natural production of steelhead in Crooked Creek since 1995. Tributaries of Tustumena Lake (Nikolai and Shantalilik creeks) also maintain wild production and steelhead are also present in the Kenai River.

Dolly Varden are found in most freshwater drainages of the NKPMA. This species supports a major fishery in the Kenai River drainage. Numerous smaller streams and lakes also support

Dolly Varden. Isolated populations of Arctic char are common in several lakes. These species provide additional sport angling opportunity at roadside as well as more remote locations.

Lake trout are found primarily in 4 lakes within the NKPMA. Hidden, Kenai, Skilak, and Tustumena lakes support a modest fishery for lake trout, with Hidden Lake receiving most of the fishing effort.

Arctic grayling are present in remote areas of the Kenai River drainage. Arctic grayling were introduced during the early 1950s and now support self-sustaining populations. Estimates from the ADF&G statewide harvest survey of sport fishing anglers (SWHS; e. g., Jennings et al. 2011b) indicate Crescent Lake supports modest participation and harvest. To provide additional fishing opportunity for this species, 2 roadside landlocked lakes (Arc and Scout lakes) were stocked with Arctic grayling in 2010.

RECENT SPORT ANGLER EFFORT

This section provides generalized trends for angler participation in NKPMA fisheries. Summarized data depicting angler effort and harvest for the sport fisheries in the NPKMA are shown for the years 1977 through 2015 in Tables 1–5. SWHS data for the 2016 season will be available in mid-2017.

Since 1977, sport angler effort has been estimated annually using the Statewide Harvest Survey (SWHS), a mail survey sent to a large sample of sport fish license holders (Mills 1979-1980, 1981a, 1981b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a, 2006b, 2007, 2009a, 2009b, 2010a, 2010b, 2011a, 2011b.).

Additionally, onsite creel surveys have been selectively implemented for fisheries that require inseason or hatchery stock composition information for management purposes. The following historical summaries of sport angler effort in the NKPMA are based on estimates produced from the SWHS.

From 2012 through 2014, the NKPMA accounted for an average of about 24% of the total statewide sport fishing effort (Table 1). In 2015, participation was estimated to be 539,480 angler-days in NKPMA waters. Angler participation between 2008 and 2011 declined from 481,357 to 461,065 angler-days and has since increased from 457,856 angler-days in 2012 to a high of 577,890 angler-days in 2014 (Table 1, Figure 2).

The Kenai River accounts for the largest sport fishery in the NKPMA. From 2011 to 2015, fisheries on this river accounted for 78% to 82% of the area's total sport angling effort, or 365,863 to 455,578 angler-days annually (Table 1). Historically, as well as today, most of this effort occurs downstream from the Soldotna Bridge (i.e., Sterling Highway Bridge) to Cook Inlet (Table 2). Salmon, rainbow trout, and Dolly Varden are the most abundant species harvested in the Kenai River (Table 3).

Other fresh waters of the Kenai Peninsula support major sport fisheries (Tables 1, 4, and 5) as well. Of these, the Russian River supports the largest fishery (Table 1), with the most participation directed towards early- and late-run sockeye salmon. The Kasilof River supports a major fishery directed at early-run Chinook salmon as well as fisheries for late-run Chinook salmon and coho salmon. Other significant fisheries include the Swanson River sport fishery, which is primarily directed at coho salmon and rainbow trout; the Quartz Creek fishery for resident species, primarily Dolly Varden; and the NKPMA stocked lakes fishery, which supports

much of the area's rainbow trout harvests (Tables 4 and 5). Total sport angling effort during 2011–2015 in sport fisheries other than the Kenai River, Kasilof River, Swanson River, Quartz Creek, and the stocked lakes has declined from the years prior to 2011 (Tables 1 and 4).

Personal use salmon fisheries at the mouths of the Kenai and Kasilof rivers continue to be popular with the public. From 2014 to 2015, personal use fishing effort averaged 33,934 and 10,291 angler-days in the Kenai and Kasilof rivers personal use dip net fisheries, respectively (Table 6). Effort in the Kasilof River personal use gillnet fishery increased from 1,389 angler-days in 2014 to 1,741 angler-days in 2015 (Table 6). The harvest of salmon in the Kenai River dip net fishery and Kasilof River dip net fisheries declined while Kasilof River gillnet salmon harvest increased from 2014 to 2015. Sockeye salmon are the predominant species harvested in all NKPMA personal use fisheries (Table 6).

MAJOR RESEARCH ACTIVITIES

Several NKPMA research programs were ongoing during 2014 through 2016:

1) Annual stock assessment of both early- and late-run Kenai River Chinook salmon. This program has 3 study components: sonar estimates of abundance of Chinook salmon entering the lower river during both runs; age, gender, and size composition of the Chinook salmon stocks, determined by sampling the early- and late-run fish entering the lower river at the sonar site with drift gillnets; and creel surveys to estimate the number of Chinook salmon harvested as well as catch and fishing effort during the early- and late-run fisheries in the lower river downstream of the Soldotna Bridge. These components provide several indices of run strength that are required for inseason management of the fishery to ensure that the escapement goals, as provided by the Kenai River Chinook salmon management plans, are achieved. The data provided by this program are also used in quantitative stock assessment to construct brood tables necessary to assess spawner–recruit relationships and to evaluate escapement goals.

2) ARIS–DIDSON development. In 2002, the deployment and testing of dual-frequency identification sonar (DIDSON) in the Kenai River to assess Chinook salmon passage began as a research project. The findings of this research over the next several years indicated the dual-frequency identification sonar technology had several advantages over split-beam sonar. Importantly, it was used in 2010 through 2012 to estimate Chinook salmon passage. In 2013, an updated version of DIDSON (called adaptive resolution imaging sonar or ARIS) was also deployed at RM 13.7. The RM 8.6 site (DIDSON) was the main source of information used to assess run strength through the 2014 season while research to transition upstream to RM 13.7 with ARIS was ongoing. Beginning in 2015, assessment of run strength at RM 8.6 was discontinued and sonar passage was fully transitioned to RM 13.7 with the ARIS system.

3) Kenai River Chinook salmon tagging project. This research project was conducted from 2010 through 2015 with early-run Chinook salmon and during 2012 and 2013 with late-run Chinook salmon. The main objective was to estimate the abundance of Chinook salmon independent of the sonar. Estimates from tagging for 2013–2015 can be compared to the sonar estimates generated from the DIDSON sonar at river mile 13.7 and should provide corroborating support for sonar assessment. Important information about run timing, spawning distribution, as well as age and size composition was also documented. Early-run tagging was also conducted in 2016 to estimate the abundance of Killey River Chinook salmon, which are a major component of the tributary stocks that compose the early-run.

4) Assessment of early- and late-run Russian River sockeye salmon. A weir was used to determine the early- and late-run sockeye salmon spawning escapements. Scale samples to determine age and size composition of the sockeye salmon stocks were collected at the weir. Statewide Harvest Survey (SWHS) statistics together with weir data allow runs to be reconstructed for the development of a brood table for the early run to assess spawner–recruit relationships. The escapements obtained at the weir since 1963 provide sufficient data to estimate a biological escapement goal (BEG; a goal calculated to provide the greatest potential for maximum sustained yield) for the early-run stock and a sustainable escapement goal (SEG; a level of escapement indicated by an index or estimate) for the late-run stock. Therefore, this program remains ongoing to address inseason conservation issues for both early- and late-run Russian River sockeye salmon stocks.

5) Crooked Creek and Kasilof River early-run Chinook salmon enhancement project. Since the creel survey was discontinued after the 2010 season, this program now provides 2 main stock assessment elements: estimates of naturally-produced[1] and hatchery-produced Chinook salmon escapement composition as well as estimates of age, gender, and size composition from a weir located at the ADF&G Crooked Creek facility. This facility also allows ADF&G to hold naturally-produced broodstock to collect Chinook salmon eggs and milt for stocking. Smolt are stocked back into the stream of origin the following year to enhance the Kasilof early-run Chinook salmon sport fishery. The data provided by this continuing program are used to evaluate the escapement goal for early-run Crooked Creek Chinook salmon and to supply broodstock for several ADF&G Chinook salmon stocking programs around Kachemak Bay.

6) Invasive northern pike distribution and eradication planning. Several projects have been undertaken since 2002 to identify the distribution and reduce the abundance of northern pike and to restore lakes by eradicating northern pike in NKPMA. In addition, multi-agency planning and public scoping efforts were initiated and completed to address large scale control and eradication of northern pike from selected NKPMA drainages. In 2014, northern pike were eradicated from 4 lakes in the Soldotna Creek drainage: Union, Derks, West, and East Mackeys lakes. Beginning in the spring of 2015, intensive planning and native fish relocation efforts were undertaken for the purpose of 1) re-establishing native fish to the 4 Soldotna Creek drainage lakes treated with the piscicide rotenone in 2014 and 2) prepare for rotenone treatment of the remaining waters of the Soldotna Creek drainage. During 2016, Sevena Lake and waters of Soldotna Creek were treated with rotenone to eradicate northern pike. These projects are an ongoing priority to minimize and eliminate the negative impact of invasive northern pike to production of native fisheries resources of the NKPMA.

KENAI RIVER CHINOOK SALMON SPORT FISHERIES

The following proposals published in "The Alaska Board of Fisheries 2016/2017 *Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries targeting Chinook salmon in the Kenai River:

[1] "Naturally-produced" refers to a mix of wild and naturalized hatchery fish.

Proposal Numbers: 74, 76, 77, 78, 79, 127, 128, 129, 130, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 200

BACKGROUND AND HISTORICAL PERSPECTIVE

Information about harvest, catch, and fishing effort is available from the SWHS and creel surveys conducted in the lower portion of Kenai River (Hammarstrom 1974-1981, 1988–1991, 1992a, 1992b, 1993, 1994; Hammarstrom and Larson 1982-1984, 1986; Hammarstrom et al. 1985; Schwager-King 1993-1995; King 1996, 1997; Marsh 1999, 2000; McKinley and Fleischman 2010; Reimer et al. 2002; Reimer 2003, 2004a, 2004b, 2007; Eskelin 2007, 2009, 2010; Perschbacher 2012a, 2012b, 2012c, 2012d, 2014, 2015; J. Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication). The 2016 SWHS survey results will not be available until midyear of 2017. Chinook salmon catch and harvest data provided for the 2016 season contained in this document were estimated inseason and are considered *preliminary* (emphasis used throughout) until the SWHS results are available.

Chinook salmon return to Kenai River in 2 distinct runs: early and late. The early run usually has "fishable" numbers by mid-May and inriver abundance peaks in mid-June. The majority of the stocks have passed through the fishery by late June. Late-run fish are present in July and early August. Early-run Chinook salmon primarily spawn in tributaries to the Kenai River, and most of the spawning occurs in 2 primary tributaries: the Killey and Funny rivers. Late-run Chinook salmon primarily spawn in the mainstem Kenai River.

The sport fishery for Chinook salmon in the Kenai River is internationally recognized due to its proximity to major population centers, relative ease of access, and large-sized Chinook salmon. Consequently, large numbers of anglers participate in this sport fishery every year. Because of the high level of participation in relation to the total number of Chinook salmon in the runs, the fishery is strictly regulated. Chinook salmon fishing is limited to a 50-mile area downstream from Skilak Lake (Figure 3) from January 1 through July 31. By regulation, the early-run Kenai River Chinook salmon fishery ends on June 30. The daily bag and possession limits are 1 Chinook salmon, 20 inches or greater in length, with a protective slot limit (no retention, must be released) for Chinook salmon greater than 46 inches and less than or equal to 55 inches in total length. The annual (January 1-December 31) limit is 2 fish. However, Chinook salmon harvested prior to July 1 that are 20 inches or more in length but less than 28 inches in length do not count toward the annual limit of 2 fish.

The majority of the harvest is taken by anglers in boats. After retaining a Chinook salmon that counts toward the annual limit, an angler is prohibited from fishing from a boat in the Kenai River downstream from Skilak Lake for the remainder of that day.

The Kenai River Chinook salmon fishery supports an industry that provides sport fishing guide services. Since 1982, guides have been required to register with the Alaska Department of Natural Resources (DNR). Guided anglers are more intensively regulated than unguided anglers. This is due, in part, to the guided fishermen's greater harvest efficiency and the general concern regarding harvest parity between guided and unguided anglers.

Nearly all of the river area available to Chinook salmon fishing is managed as a state park by the Department of Natural Resources, Division of Parks and Outdoor Recreation (DPOR). In 1986, DPOR reduced the maximum size of outboard motors that could be legally used on the river to

50 horsepower. In 1987, the maximum legal horsepower was further reduced to 35 horsepower. In 2008, a DPOR regulation became effective that raised the maximum size of outboard motors that can be legally used on the river to 50 horsepower, provided those greater than 35 horsepower be 4-stroke or 2-stroke direct fuel injection (DFI) outboard motors. In addition, during the month of July, all outboard motors operating on the Kenai River must be 4-stroke or 2-stroke DFI. This regulation expired after the 2012 season and beginning in 2013, all outboard motors operating on the Kenai River must be 4-stroke or 2-stroke DFI year-round. There is no evidence to indicate that the change in horsepower changed angler efficiency.

Under current BOF policy, the early run is managed for the inriver sport and guided sport fishery. Although harvest is known to be relatively minor, early-run fish are intercepted in the mixed-stock Cook Inlet marine sport fishery prior to their entry into the Kenai River (Begich 2007, 2010a). In addition, there are small numbers of early-run Chinook salmon harvested in the Kenaitze Indian Tribal Association's educational fishery (Table 7). Commercial harvests of early-run Chinook salmon are considered insignificant. By regulation, drift gillnetting in the Central District does not commence until the third Monday in June or June 19, whichever is later, and the eastside setnet fishery does not commence until June 25 or if 50,000 sockeye have been estimated to have passed the Kasilof River sonar by June 20 in the Kasilof Section.

In 1984, ADF&G implemented an experimental sonar program to determine the number of Chinook salmon that return to Kenai River. From 1984 to 1994, the sonar counter used dual-beam transducer technology. Beginning in 1995 to 2010, the sonar program adopted split-beam technology to improve the estimation of Chinook salmon returning to the Kenai River. This estimate is the traditional target strength sonar (TS-based) estimate.

Uncertainty in estimates due to the problem of differentiating between the various salmon species migrating together in the Kenai River has necessitated that the sonar program employ several different methods to better separate Chinook salmon from the more numerous sockeye salmon in the final estimates (Bosch and Burwen 2000). Since inception, the sonar program has continuously evolved. The focus of this work has been to investigate limitations of the technology to classify species detected by sonar and to address the bias in the estimates of Chinook salmon passage that are used to manage the stocks. Annual experiments to assess the utility of new sonar technology such as dual-frequency identification sonar (DIDSON) as well as re-evaluation of split-beam technology have been undertaken. The first DIDSON trials initiated in 2002 showed promise for distinguishing between large and small fish, however the technology did not have the capability to monitor the entire distance across the Kenai River. Testing and development of DIDSON for the Kenai River Chinook salmon stock assessment program continued and resulted in the successful deployment of DIDSON operated simultaneously with split-beam sonar in 2011.

Results of these studies led to a declining confidence in TS-based estimates of run strength. Methods were developed to improve the information about the Chinook salmon passage rate into the Kenai River. During 2002, ADF&G began generating a split-beam sonar-based echo length standard deviation (ELSD) estimator of Chinook salmon passage thought to be superior at differentiating between salmon species. In addition, ADF&G standardized the Chinook salmon test-netting program conducted at the sonar station which allowed a net-apportioned split-beam sonar estimate of the rate of daily Chinook salmon passage to be calculated. This suite of Chinook salmon sonar passage estimates, in combination with the Chinook salmon abundance indices of catch per unit effort (CPUE) in the lower river creel survey and in the test netting

program, helped to evaluate the accuracy of the TS-based sonar estimates of Chinook salmon passage.

At the February 2011 Alaska Board of Fisheries (BOF) meeting, ADF&G revised the escapement goal from a biological escapement goal (BEG) to a sustainable escapement goal (SEG) because of the uncertainty in the evaluation of escapement and the lack of stock-specific information in the commercial harvest. At this same meeting, ADF&G reported that it had decided to discontinue the use of TS-based estimates of inriver run in favor of abundance indices (described below) and to continue development of a new assessment utilizing DIDSON. Because the TS-based estimates were known to overestimate abundance, and the source of the bias was identified as the imprecision in the estimates of fish length that the split-beam technology provided, use of TS-based estimates for inseason management was discontinued starting in 2011. The ELSD-based estimates, the net apportioned estimates, as well as creel and netting CPUE estimates, were used to assess inseason run strength. Following the 2011 season it was determined the ELSD-based estimates, based on split-beam technology, also provided Chinook salmon passage estimates that were imprecise and the bias could not be corrected inseason. In 2012, the development of a new assessment utilizing DIDSON continued. The 2012 inseason run assessment utilized minimum management objectives for each index set at average values for the index when the inriver sport fishery was restricted historically to achieve adequate Chinook salmon escapements. Minimum inseason management objective values were set for DIDSON net-apportioned estimates, and creel, netting, and commercial eastside set gillnet CPUE estimates. In addition, DIDSON estimates served as an index for comparison to the 2010 and 2011 runs when DIDSON was also operated.

During 2012, several alternative sonar sites that were above tidal influence were evaluated in the lower Kenai River. A site was selected near RM 13.7 and DIDSON was operated during the Chinook salmon runs in 2013 and 2014 as part of the sonar research program to move upstream above tidal influence to achieve a more accurate inseason assessment of both the early and late runs.

Following the 2012 season, several agenda change requests (ACR) were submitted by the public to the BOF at the October 2012 work session to address inseason Kenai River Chinook salmon management by changing the *Kenai River Late-run King Salmon Management Plan*. ADF&G also submitted an ACR to replace the late-run Chinook salmon SEG (17,800–35,700 fish) present in the management plan with a DIDSON-based escapement goal described as "transitional." The purpose of the transitional goal was to provide the primary management objective for the fishery during the period of time when existing sonar, independent mark-recapture, and alternative sonar site research was ongoing. In March of 2013, the BOF replaced the SEG contained in the management plan with the transitional DIDSON-based SEG of 15,000–30,000 fish recommended by ADF&G (Fleischman and McKinley 2013).

For early-run stocks, ADF&G recommended a transitional DIDSON-based SEG of 3,800–8,500 fish based on the analysis for the early-run stocks conducted by Fleischman and McKinley (2013); however, the OEG remained 5,300–9,000 fish.

Total Kenai River Chinook salmon sport fish harvest declined steadily from 1993 through 1998, then rebounded from 1999 through 2006 (Table 3). The most recent 5-year (2011–2015) average Kenai River Chinook salmon sport fish harvest from both runs combined was 3,240 fish. Harvest

and inriver abundance of Kenai River Chinook salmon have declined since 2006 (Tables 3, 7, and 8).

Recent Alaska Board of Fisheries Actions

The BOF adopted several regulations affecting both the early-and late-run Kenai River Chinook salmon fisheries at the regularly scheduled 2014 meeting. The early-run Chinook salmon slot limit was expanded to prohibit the harvest of fish from 42 to 55 inches, replacing the more liberal slot limit of 46 to 55 inches. Other early-run Chinook salmon fishing regulations also became more conservative. For instance, in waters open to Chinook salmon fishing downstream of Skilak Lake, the lower boundary for regulations designed to conserve early-run Chinook salmon during the first 14 days of July was moved downstream about 3 RM from RM 21 at the Sterling Highway Bridge crossing in Soldotna to the lower boundary of the Slikok Creek Chinook salmon sanctuary located at approximately RM 18. For these same waters, a regulation was adopted that prohibits bait during July 1 through July 14.

Several regulations were adopted affecting the amount of area open to Chinook salmon fishing resulting in a net loss of Kenai River drainage waters open to Chinook salmon fishing. The Slikok Creek Chinook salmon sanctuary was expanded from 100 yards to 300 yards upstream of the mouth of Slikok Creek. The Moose River from its mouth upstream to the upstream side of the Sterling Highway Bridge was closed year-round to Chinook salmon fishing. Although adopted to address spawning aggregates of rainbow trout and to clarify regulations, other changes impacted the amount of waters open to Chinook salmon fishing. For example, additional waters downstream of Skilak Lake closed to all fishing from May 2 through June 10 were expanded downstream about 1 RM to the upstream boundary of the Killey River Chinook salmon sanctuary. Finally, the Moose River seasonal closure to fishing from a boat was expanded to those waters of the Kenai River 100 yards upstream and 100 yards downstream of the mouth of the Moose River.

The *Kenai River Late-run King Salmon Management Plan* changed significantly as new provisions were added while some existing provisions were repealed. Major changes occurred to pair inseason restrictions among the various fisheries harvesting late-run Chinook salmon during years of low abundance. The fisheries include the Kenai River inriver sport and personal use dip net fisheries as well as Central District upper subdistrict set gillnet fishery (ESSN). A total inriver run projection of less than 22,500 late-run Chinook salmon was adopted as the guideline abundance level to trigger management plan action points to restrict fisheries.

Restrictions specific to each fishery are designed to be administered in a step-down process to achieve the sustainable escapement goal of 15,000 to 30,000 fish. Specifically, bait prohibition for the inriver sport fishery results in nonretention of Chinook salmon in the Kenai River personal use dip net fishery and a maximum of 36 hours of total fishing time per week in the ESSN fishery. New restrictions to commercial set net gear are available as options under the weekly 36-hour restriction in the new plan. In addition, a barbless hook requirement was adopted for sport fishing during nonretention or catch and release of Chinook salmon and is paired with a maximum of 12 hours total fishing time per week in the ESSN fishery. Similar to the previous plan, if the inriver sport fishery is closed by emergency order, the ESSN fishery also closes by emergency order. In company with a closure to the sport and ESSN fisheries, a new provision was adopted requiring a guideline escapement projection of at least 16,500 fish but less than 22,500 fish for the ESSN fishery to reopen for a total of 36 hours fishing time from August 1

through August 15; if the projected number of late-run Chinook salmon during this time period is greater than 22,500, the management of the ESSN fishery is prosecuted under provisions of *5 AAC 21.360*.

KENAI RIVER EARLY-RUN CHINOOK SALMON

Fishery Management Objectives

In 1988, the BOF adopted the first management plan for early-run Kenai River Chinook salmon. Since 2005, this plan has mandated an optimum escapement goal (OEG) of 5,300 to 9,000 fish. Currently, the *Kenai River and Kasilof River Early-Run King Salmon Management Plan* (Alaska Administrative Code 5 AAC 57.160) also identifies the possible management actions that can be implemented at given escapement levels. The original and current plan both enforce fishing without bait to reduce angler efficiency. In 2008, the BOF modified the management plan to allow bait by emergency order (EO) when escapement is projected to exceed the optimum escapement goal (OEG), provided the resulting harvest does not cause the escapement to decline below the lower bound of the OEG. The strategy of restricting bait in the fishery until a given escapement level can be projected has remained an integral component to the management of this fishery. The plan outlines management options and allowable alternatives to help assure achievement of the escapement objective.

By regulation the fishery begins without the use of bait and is limited to the use of only 1 single hook artificial lure. Fishing from guided vessels is not allowed on Sundays and Mondays, and fishing from motorized vessels is not allowed on Mondays, with the exception of Memorial Day. If the escapement is projected to be greater than 5,300 fish, ADF&G may establish by emergency order (EO) a period of time and an area of the Kenai River, from Skilak Lake downstream to Cook Inlet, in which bait may be used. If the spawning escapement is projected to be less than 5,300 fish, ADF&G can implement trophy fishing provisions that prohibit the retention of Chinook salmon less than 55 inches in total length, or close the Kenai River to retention of all Chinook salmon. Additionally, the plan contains options that enable fishery managers to protect Chinook salmon in the mainstem of the Kenai River. These include restricting the use of bait and prohibiting the retention of Chinook salmon greater than 20 inches but less than 55 inches in total length upstream of the Sterling Highway Bridge from July 1 through July 14.

Inseason Management Approach

The primary objective of inseason management is to achieve a spawning escapement within the OEG range of 5,300 to 9,000 early-run Chinook salmon utilizing management steps as prescribed by the *Kenai River and Kasilof River Early-run King Salmon Management Plan* (5 AAC 57.160). Achievement of this objective requires information on the daily number of early-run Chinook salmon entering the river (inriver run), and daily sport harvest information. Spawning escapement is calculated as the inriver run minus sport harvest including release mortality. The inriver run estimate is obtained with sonar, and harvest information is obtained with ADF&G creel surveys. Management steps are instigated in conjunction with these assessments of spawning escapement to achieve the OEG.

Prior to 2015 the DIDSON Chinook salmon passage estimate at RM 8.6 supplemented with indices of abundance were used to assess the inriver run . Beginning with the 2015 season, the assessment of inriver run was transitioned to ARIS sonar at RM 13.7. Sonar is usually

operational on May 16 and the early-run Chinook salmon run is assessed daily through June 30. The early-run Kenai River Chinook salmon fishery ends by regulation on June 30. Estimates from the netting and sport harvests are available daily. The sonar estimates for large Chinook salmon (750 mm or 34 inches total length or greater) are available on a daily basis; however, total Chinook salmon passage estimates are not, due to a variety of factors affecting sonar data processing.

Harvest is estimated inseason by an onsite creel survey. This survey begins on or about mid-May, as soon as water levels rise sufficiently to permit anglers and ADF&G staff to safely use boats on the lower Kenai River downstream of the Sterling Highway Bridge. Harvest estimates are typically generated as needed by managers, but daily estimates can be calculated if required for management actions.

A preliminary estimate of spawning escapement is projected inseason using a mean run-timing model. This estimate is based on the projected inriver run minus the projected harvest (including Chinook salmon mortality associated with catch-and-release fishing).

In order to publicize fishery information, the Soldotna ADF&G office has 2 recorded message phone lines. One phone line provides a general weekly fishing forecast and the other offers a brief summary of the daily weir counts and sonar passage estimates for major Kenai Peninsula fisheries. A brief summary of the early-run fishery status is provided on the message phone as well. The message phone lines may receive several hundred calls daily during the peak of the fishery. The message phone gives the public reliable access to fishery information and increases the efficiency of the Soldotna ADF&G staff. The sonar passage estimates and status of inseason management are relayed to the public on the phone system daily. A complete run assessment summary is also posted on the SF "fish count" web page: (http://www.adfg.alaska.gov/sf/FishCounts/) and can be accessed by a data query for Kenai River Chinook salmon. The summary is posted at least twice weekly throughout the season. This complete summary provides information on the status of the run including passage estimates and ADF&G's assessment of run strength, inseason management action status, fishery update, water conditions, as well as comparative data supporting the assessment project over the most recent 10 years. The summary can also be accessed from the SF "Information by Area" web page for the Northern Kenai Peninsula: http://www.adfg.alaska.gov/index.cfm?adfg=byAreaSouthcentralUpperKenai.fishingInfo#/fishcounts. The public is also kept informed about the fishery via news releases to newspaper, radio, and TV news media. News releases and the resulting requests for interviews from print, radio, and television broadcast media are commonly conducted because they distribute relevant information quickly regarding the status of the fishery and pending management actions.

Restrictive management actions in this fishery are socially and economically disruptive. These disruptions may be minimized by informing the public in a timely and efficient manner. Prior to any likely change in management action, continuous updates regarding the status of the fishery are provided in all available forums. Whenever possible, the staff of ADF&G strive to issue formal announcements (news releases) regarding EOs that change the management of the fishery at least 24 hours before a given action becomes effective.

2014 Fishery Performance

The 2014 preseason forecast for the inriver run of early-run Chinook salmon was approximately 2,230 fish (forecasts for 2014–2016 are from T. McKinley, Fishery Biologist, ADF&G,

Anchorage, personal communication). An EO was issued on February 27 that closed the Kenai River to Chinook salmon fishing on May 1 (EO 2-KS-1-04-14; Appendix A1). The cumulative DIDSON (RM 8.6) passage estimate for the early run was 5,311 fish through June 30. Following postseason analysis of ARIS sonar data (RM 13.7) and netting data, the inriver run and escapement estimate was 5,776 Chinook salmon (Table 7). Based on inseason assessment information, the midpoint of the 2014 early run was June 11 and was 4 days early compared to typical run-timing through June 30. After a high from 2003 to 2007, estimated escapement has been consistently low since 2008 as was the 2014 estimate (Table 7). The *preliminary* age composition information showed that approximately 76% of the early run was composed of ocean-age-2 and -3 Chinook salmon. While ocean-age-4 fish accounted for about 8%, age-5 about 1% and age-1 about 13% of the early run.

2015 Fishery Performance

The 2015 preseason forecast of the Chinook salmon early run was approximately 5,200 fish, which was far below the long-term average (1986–2015) run size of 12,756 (Table 7). A preseason EO 2-KS-1-05-15 (Appendix A2) was issued on February 19, 2015 closing waters of the Kenai River normally open to Chinook salmon fishing through June 30. Because of the anticipated low abundance, this EO closed Kenai River waters to Chinook salmon fishing upstream of an ADF&G marker located approximately 300 yards downstream from the mouth of Slikok Creek upstream to ADF&G markers located at the outlet of Skilak Lake through July 31 in an effort to conserve early-run stocks transiting to Kenai River drainage spawning tributaries. The fishery remained closed, resulting in a season cumulative sonar passage and escapement estimate of 6,190 Chinook salmon through June 30 (Table 7). Based on the sonar data, the midpoint of the run at the RM 13.7 sonar site was June 10, approximately 3 days earlier than the previous 2 years of sonar data collected at RM 13.7 in 2013 and 2014. In combination, all data indicated the 2015 inriver run of Chinook salmon that was well below average but improved over the runs of the previous 3 years (Table 7). Preliminary estimates of the age composition showed an increase in larger older Chinook salmon with ocean-age-4 and -5 fish accounting for nearly 20% of the run whereas ocean-age-1 Chinook salmon declined to less than about 6% of the run.

2016 Fishery Performance

The 2016 preseason forecast of 5,265 fish for the inriver early run of Chinook salmon was similar to the 2015 forecast and still well below average run strength and less than the OEG of 5,300 to 9,000 fish. Consequently, EO 2-KS-1-03-16 was issued on February 18, 2016 closing waters of the Kenai River normally open to Chinook salmon fishing from May 1 through June 30 (Appendix A3). Kenai River waters upstream of an ADF&G marker located approximately 300 yards downstream from the mouth of Slikok Creek upstream to ADF&G markers located at the outlet of Skilak Lake were also closed through July 31 under this EO to conserve low anticipated numbers of tributary spawning fish.

Near the beginning of June, run strength was estimated to be larger than forecast and preseason restrictions were eased to allow catch-and-release only fishing for Chinook salmon from the mouth of the Kenai River upstream to ADF&G markers at the outlet of Skilak Lake beginning June 4, 2016 (EO 2-KS-1-15-16; Appendix A3). This EO prohibited retention of Chinook salmon through July 31 upstream of the ADF&G regulatory marker approximately 300 yards downstream of Slikok Creek to the ADF&G markers at the Skilak Lake outlet. By June 16, the

inriver run estimated by ARIS at RM 14 was over 6,600 Chinook salmon. Therefore, EO 2-KS-1-19-16 was issued to allow harvest of early-run Chinook salmon under existing regulations from its mouth upstream to ADF&G markers located approximately 300 yards downstream of Slikok Creek while the fishery upstream from this location to ADF&G markers at the outlet of Skilak Lake remained catch-and-release only. The effective period for this EO was from June 18 through June 30, 2016. The *preliminary* estimates of the inriver run and escapement were 9,851 and 9,177 Chinook salmon, respectively. The midpoint of the run on June 10, 2016 was the earliest run timing estimated by ARIS at RM 13.7 since the sonar has been operated at this location. Preliminary estimates of age composition indicate that the higher proportions of larger, older fish observed in 2015 continued during 2016. *Preliminary* age composition estimates from inriver gillnetting indicated there were approximately 5% ocean-age-1, 26% ocean-age-2, 48% ocean-age-3, 20% ocean-age-4, and 1% ocean-age-5 fish (J. Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication). These age composition estimates will be refined as analysis of data collected during the summer of 2016 is completed.

KENAI RIVER LATE-RUN CHINOOK SALMON

Fishery Management Objectives

The Kenai River late-run Chinook salmon fishery is managed according to provisions of the *Kenai River Late-Run King Salmon Management Plan* (5 AAC 21.359). Late-run stocks of Kenai River Chinook salmon are caught by the commercial drift gillnet fishery and the commercial set gillnet fishery along the east side of Cook Inlet, both of which target sockeye salmon. Harvest also occurs in the Kenai River personal use dip net fishery which also targets sockeye salmon. The commercial fisheries that intercept late-run Kenai River Chinook salmon are managed under provisions of the *Kenai River Late-Run Sockeye Salmon Management Plan* (5 AAC 21.360). Incidental commercial harvests of Chinook salmon stocks have been the subject of intense allocation debates among sport and commercial user groups since the early 1980s. As a result, the *Kenai River Late-run Sockeye Salmon Management Plan* contains provisions to reduce incidental harvests of Kenai River–bound Chinook salmon.

The current management objective, as outlined in the *Kenai River Late-Run King Salmon Management Plan*, is to achieve adequate escapement defined as a sustainable escapement goal from 15,000 to 30,000 Chinook salmon.

Inseason Management Approach

Inseason management to achieve adequate escapement of late-run Chinook salmon requires a daily estimate of the number of late-run Chinook salmon entering the river, an estimate of the inseason harvest, the ability to project (predict) the total inriver run and to estimate what the total inriver harvest and the spawning escapement will be.

Late-run sonar estimates begin when the late-run fishery opens by regulation (July l) and conclude by mid-August. The passage of late-run Chinook salmon into the river is estimated by sonar at RM 13.7. The number of Chinook salmon entering the river is estimated by ARIS and may be supplemented with 4 indices of run strength. Estimates of run strength available to management staff on a daily basis include the ARIS-based estimates of fish greater than about 34 inches in total length, estimates of CPUE from creel surveys, and test netting and eastside set gillnet CPUE. The large numbers of sockeye salmon migrating during the late run complicate

estimation of Chinook salmon passage with sonar. Consequently, alternative techniques for estimating run strength are also used. Such techniques include estimates based on historical exploitation rates in the sport fishery and historical exploitation rates in the commercial set gillnet fishery. Since 2010, Chinook salmon from the Upper Cook Inlet Eastside set gillnet (ESSN) commercial fishery have been sampled for genetic tissue to determine stock of origin of these harvests. Findings by Eskelin et al. (2013b) and Eskelin and Barclay (2015, 2016) indicate the contribution of Kenai River mainstem Chinook salmon stocks to the ESSN fishery averaged across all years (2010–2015) was approximately 69% of the total ESSN harvest. Therefore, inseason estimates of run strength based on Chinook salmon harvests by the ESSN fishery have been refined by these data.

The sport fishery that occurs in about 13 miles of the lower Kenai River between RM 5 at Warren Ames Bridge upstream to Slikok Creek located at RM 18 is the predominant source of inriver sport harvest. Upstream of RM 18, regulations are very restrictive and EO closures above RM 18 from 2011 to 2015 have prohibited sport fishing for Chinook salmon. The harvest in this lower river area is estimated by an onsite creel survey. Harvest above this lower river area, when Chinook salmon fishing is allowed, is estimated with the SWHS. The late-run creel survey begins July 1 and continues until the end of the fishery. The fishery is closed by regulation on July 31. However, the duration of the fishery may be adjusted by emergency order predicated on the magnitude of the inriver run. Harvest estimates are typically available at the previously mentioned informational outlets twice weekly, however daily estimates may be calculated when needed to aid fishery managers.

The spawning escapement is projected inseason by applying sonar count data to a historical, run-timing model. Spawning escapement is the inriver run (from sonar) less the projected sport harvest (from creel survey). The projected sport harvest includes estimated mortality associated with catch-and-release fishing estimates (Bendock and Alexandersdottir 1992). For the late-run stock assessment, the escapement estimate includes an additional 4% of the cumulative sonar passage to account for spawning downstream of the sonar, which was estimated from tagging studies of late-run Chinook salmon by Reimer (2013).

Historically, when stock assessment was made using RM 8.6 run strength, a spawning escapement estimate could be projected with reasonable accuracy by approximately the third week in July. However, findings show that information for inseason management based on the RM 13.7 sonar will be delayed as fish transit the 5 additional miles upstream before abundance is estimated. This is especially true during the late run in July, when Chinook salmon exhibit less consistent upstream migration, which seems to slow or pause as Chinook salmon transit through the lower river section. Radio-telemetry results from Reimer (2013) were consistent with these findings. For managing the fishery, the main difference between using the different sonar sites is that the run-timing midpoint based on mean run timing at the RM 8.6 sonar is July 21. At the RM 13.7 site, the run-timing midpoint does not occur until July 28, and only approximately 34% of the run has passed the RM 13.7 site by July 21. Late-run management decisions cannot be delayed, so inseason projections based on RM 13.7 passage are made on a smaller fraction of the run than they were historically and are therefore more uncertain. Because management actions cannot be postponed, the error associated with inseason projections of run strength and escapement are now greater than the error associated with historical management actions. Inseason assessment was based on RM 8.6 through the year 2014; beginning in 2015 and thereafter, the assessment fully transitioned to RM 13.7.

The sport fishery for late-run Chinook salmon in the Kenai River is one of the largest and is quite possibly the most controversial fishery in Alaska. The inriver sport fishery as well as Cook Inlet marine sport and commercial fisheries, educational fisheries, and personal use fisheries all harvest late-run stocks. Interaction with the user groups affected by management decisions is critical to the successful implementation of any inseason management action.

The Soldotna SF office distributes information about the late-run Kenai River Chinook salmon fishery in a similar manner as described above for Kenai River early-run Chinook salmon.

2014 Fishery Performance

During 2014, the preseason forecasted run size was approximately 19,700 Chinook salmon (forecasts for 2014–2016 are from T. McKinley, Sport Fish Biologist, ADF&G, Anchorage, personal communication), well below the historical (1986–2013) average of approximately 57,000 fish (Table 8)**.** Because of the low preseason forecast and low abundance of early-run Kenai River stocks, EO 2-KS-1-26-2014 was issued on June 26 prohibiting the use of bait in the Kenai River on July 1. In addition, EO 2-KS-1-27-2014 prohibited retention of Chinook salmon in the Kenai River personal use dip net fishery open from July 10 through July 31. By mid-July, the RM 8.6 passage estimate was just 3,068 late-run Chinook salmon. Consequently, EO 2-KS-1-40-14 was issued to prohibit retention of Chinook salmon in the Kenai River sport fishery effective July 19. In addition, only a barbless single-hook was allowed to be use during the catch-and-release fishery. The barbless single-hook catch-and-release fishery ended when EO 2-KS-1-42-14 was issued July 24 to close the Kenai River to sport fishing for Chinook salmon on July 26, 2014.

After accounting for harvest (including catch-and-release mortality) above the sonar of approximately 364 fish, the escapement estimate was 17,451 late-run Chinook salmon (Table 8). The reported harvest by the ESSN fishery was 2,301 Chinook salmon of which about 60.9% (1,405) were estimated to be Kenai River mainstem Chinook salmon (Table 8). *Preliminary* estimated age composition of the run was 6.5 % ocean-age-1, 25.8% ocean-age-2, 34% each for ocean-age-3 and -4, and 1.6% ocean-age-5 Chinook salmon (J. Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication).

2015 Fishery Performance

The preseason forecast was for an inriver run of approximately 22,000 late-run Kenai River Chinook salmon. This forecasted run strength was well below the 1986–2014 average inriver run of approximately 56,000 (Table 8). Because of the low forecast and knowledge that unrestricted fisheries could result in an escapement less than the lower bound of the SEG (15,000–30,000), on June 25 ADF&G issued EO 2-KS-1-35-15 to prohibit the use of bait in the inriver sport fishery and EO 2-KS-1-36-15 prohibiting retention of Chinook salmon in the personal use dip net fishery. By July 22, the RM 13.7 passage estimate of late-run Chinook salmon was 11,079 fish. The projected inriver run at this time was 23,500 to 31,000 with an escapement projection (after including an increase in the projected harvest with bait) of 20,500 to 25,600 fish. Consequently EOs were issued to allow the use of bait (EO 2-KS-1-46-15) and to restore the annual household limit of 1 Chinook salmon to the Kenai River personal use dip net fishery (EO 2-KS-1-47-15). Both EOs were effective July 25, 2015.

The *preliminary* estimate of the inriver run and spawning escapement was 24,694 and 22,642 Chinook salmon, respectively (Table 8). The preliminary estimate of inriver sport fishing

mortality was 4,113 Chinook salmon. The reported harvest in the ESSN fishery was 7,781 Chinook salmon, with an estimated composition of 5,988 (77%) Kenai River mainstem Chinook salmon (Eskelin and Barclay 2016: Table 8). The sum of the sonar passage estimates and harvests below the sonar resulted in a preliminary total run estimate that was larger than forecast, approximately 32,003 late-run Chinook salmon (Table 8). In addition to a total run that was the largest since 2011, the preliminary age composition estimates of the run indicated about nearly 70% of the run was composed of ocean-age-3 or older fish, whereas ocean-age-2 fish accounted for about 25% of the run (J. Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication).

2016 Fishery Performance

The 2016 preseason forecast for Kenai River late-run Chinook salmon was for a total run of approximately 30,000 fish, which was well below the long-term average and less than but comparable to the 2015 total run. On June 24, ADF&G issued EO 2-KS-1-24-16 prohibiting use of bait in the Kenai River sport fishery because all harvests, if unrestricted, would probably result in an inriver run of less than 22,500 Chinook salmon. On July 8, EO 2-KS-1-36-16 was issued to allow the use of bait beginning July 9 because the sonar passage rate indicated the SEG would be achieved given the additional harvest that would occur by allowing the use of bait. The final day of the RM 13.7 sonar assessment was August 19, 2016 after 3 consecutive days of less than 1% of the season total passage estimate of late-run Chinook salmon had passed by the sonar. The *preliminary* inseason passage estimate was 22,535 fish, while the *preliminary* inseason escapement estimate was approximately 18,790 Chinook salmon. By using average Chinook salmon harvest estimates in the personal use fishery, average compositions of Kenai River mainstem Chinook salmon in the ESSN commercial fishery, and projections of total inriver sport fishing mortality, the preliminary inseason estimate of the total run was approximately 31,799 fish. The inriver gillnetting *preliminary* inseason estimates of the age composition of the inriver run was approximately 1% ocean-age-1, 16% ocean-age-2, 42% ocean-age-3, 36% ocean-age-4, and 5% ocean-age-5 Chinook salmon (J. Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication). The midpoint of the 2016 late run as estimated from *preliminary* inseason daily Chinook salmon passage estimates at RM 13.7 was July 21. This timing at RM 13.7 was 4 days earlier when compared to the 2013–2015 average midpoint of July 28.

CURRENT ISSUES

A major issue for the management of both the early and late runs is having accurate estimates of total return, escapement, and harvestable surplus available to the various fisheries. Management plans for each run are essential to the biological management of the fisheries. Plans established sustainable escapement goals for each fishery and outline management strategies to achieve these goals. Recent changes to the assessment techniques such as the transition to ARIS at RM 13.7 have made these techniques seem subjective by some of the public. In addition, the decline in Chinook salmon total runs following 2007 has been exacerbated by numerous biological issues that have, to some extent, been present in the fisheries for several years. These issues include addressing adequate protections for spawning fish as well as for unique (to the Kenai River), larger-sized ocean-age-4 and -5 fish, marine harvests in the ESSN commercial fishery, habitat impacts by a robust inriver fishery, and an increase in the numbers of small younger Chinook salmon in annual runs. The social issues that have persisted throughout the development of the

fisheries remain; these include the allocation of the harvestable surplus between the inriver sport and commercial fisheries (primarily the ESSN fishery), competition between guided and nonguided anglers, as well as numerous and complex inriver sport fishing regulations. These social issues are magnified when inseason restrictions are implemented because restrictions are disruptive to unguided anglers, guided anglers, and businesses that derive income from these fisheries.

RECOMMENDED RESEARCH AND MANAGEMENT

As the transition of the Kenai River Chinook salmon assessment program from RM 8.6 upstream to RM 14 is completed, the final phase in this transition integrates research and management by changing the escapement goal to a "large fish" goal. Because research is required for both inseason management and postseason analysis of assessment information to evaluate management strategies, it would be beneficial to use information about the numbers of large fish detected by sonar assessment for several reasons. For instance, research findings show that fish greater than approximately 34 inches in total length can be reliably distinguished as Chinook salmon and estimated by sonar each day; 34 inches is a reliable demarcation between Chinook salmon and all other species passing the sonar during the Chinook salmon season. In addition, inseason management would be more timely and based on more accurate (less biased, more precise) daily passage estimates, and uncertainty in managing the fisheries would be reduced and management would be more germane to age-class segments of the Chinook salmon stocks. The continuation of the annual assessment of Chinook salmon of all sizes remains important and will continue in order to evaluate spawner–recruit and sibling relationships between cohorts so that production can be monitored.

KASILOF RIVER CHINOOK SALMON SPORT FISHERY

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries targeting Chinook salmon in the Kasilof River:

Proposal Numbers: 82, 127, 128, 129, 130, 144, 148, 149, 182, 183, 184, 185.

BACKGROUND AND HISTORICAL PERSPECTIVE

The hatchery stocks of early-run Chinook salmon that return to the Kasilof River were originally developed from wild fish in Crooked Creek, a tributary to the Kasilof River, approximately 6 miles upstream from Cook Inlet (Figure 4). The Kasilof River also supports a wild stock of late-run Chinook salmon. The early run supports the larger fishery as measured by harvests (Tables 9, 10, and 11). In 1973, ADF&G constructed a hatchery to enhance fisheries on the Kenai Peninsula. The hatchery is no longer used for salmon production. Cook Inlet Aquaculture Association assumed operations at the hatchery in 1995. The facility was then returned to ADF&G in 1997 and Chinook salmon escapement monitoring began in 1999 and continues today (Table 9). From 1979 through 1999, an average of approximately 216,000 smolt was stocked annually into Crooked Creek (D.P. Loopstra, Fishery Biologist, ADF&G, Anchorage, personal communication). From 1994–1999, the number of stocked smolt ranged from 137,338 to 224,784 (Table 12). Because of concerns about hatchery stock introgression and straying of stocked fish, ADF&G reduced the stocking levels to a target of about 105,000 smolt in 2001.

Doing so resulted in stocking between 85,000 and 109,000 smolt annually over the next 5-year period from 2000 to 2004. Since 2004 stocking have increased up to about 145,000 smolt in recent years (Table 12). Annual operations at the facility include monitoring natural production of Crooked Creek Chinook salmon by evaluating early-run escapement numbers and estimating naturally-produced stock (a population consisting of both wild fish and naturalized hatchery fish) and hatchery stock runs to a weir at the facility in 2002. Naturally-produced Chinook salmon broodstock collected at the weir support an early-run enhancement program. In addition, a creel survey was conducted from 2004 through 2010 to estimate the catch and harvest of naturally- and hatchery-produced early-run Chinook salmon (Cope 2011, 2012). A research project was conducted from 2005 through 2008 to estimate abundance, spawning distribution, and run timing for late-run Kasilof River Chinook salmon (Reimer and Fleischman 2012).

The sport fishery for early-run Chinook salmon in the Kasilof River occurs from late May through June. The run-timing of the majority of the early run precedes the commercial set gillnet fishery on the eastside beaches of Cook Inlet. There is a personal use gillnet fishery that occurs from June 15 through June 24 at the mouth of the Kasilof River. The personal use gillnet fishery harvests primarily sockeye salmon returning to Tustumena Lake and small numbers of Chinook salmon that originate from Crooked Creek (Table 6).

The Kasilof River Chinook salmon sport fishery is limited by regulation to January 1 through July 31. During the early run (late May through June 30), the river is open in its entirety to Chinook salmon fishing. During the July late-run fishery (July 1–July 31), the area upstream from the Sterling Highway Bridge is closed to Chinook salmon fishing to protect spawning fish. Historically, the early run was harvested by relatively large numbers of shore anglers and to a lesser extent boat anglers, whereas the late run has been harvested primarily by boat anglers because discharge of the Kasilof River during July makes it difficult for anglers to effectively fish for Chinook salmon from shore. Participation and harvest during both runs is greater for the early run, although research projects indicate the abundance is higher for the late-run stock.

Harvest estimates for early-run and late-run Kasilof River Chinook salmon have been estimated by the SWHS since 1996. From 2004 through 2010, ADF&G conducted a creel survey to determine the early-run harvest and to separate the harvests by hatchery- and naturally-produced stock composition (Cope 2011, 2012). Between 2000 and 2009, the average annual angler harvest for early-run Kasilof River Chinook salmon was 3,792 fish (Table 9). From 2000 to 2009, the average annual angler harvest for late-run Kasilof River Chinook salmon was 1,105 fish (Table 10). The early-run creel survey was discontinued following the 2010 season. The growth of fishing effort from drift boats has increased during the early-run fishery over the past decade and now the angler effort and harvest from drift boats greatly exceeds the shore-based angler effort and harvest (Table 11).

Recent Alaska Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting, a regulation previously adopted in 2002 that restricted guides to only 1 trip per day (guides may have only 1 set of clients per day) was repealed.

KASILOF RIVER EARLY-RUN CHINOOK SALMON

Fishery Management Objectives

The Kasilof River early-run Chinook salmon fishery is supported primarily by stocked Chinook salmon of Crooked Creek origin and supplemented by natural production in Crooked Creek. The Kasilof River early-run Chinook salmon run is managed both to ensure that a sustainable escapement goal (SEG) of 650 to 1,700 naturally-produced Chinook salmon ocean-age-2 or greater reach the spawning grounds above Crooked Creek weir and to harvest hatchery-produced Chinook salmon. Objectives for this fishery achieved through the enhancement program include generating a return of approximately 3,000 hatchery-produced Chinook salmon, generating approximately 17,500 angler-days of annual sport fishing opportunity directed at Chinook salmon in the Kasilof River. The broodstock goal objective has changed in recent years in an attempt to improve the fishery because of low annual runs; an egg-take goal of 150,000 eggs resulting in 105,000 Chinook salmon released smolt was increased to approximately 175,000 eggs resulting in a release of about 140,000 smolt annually into Crooked Creek.

Inseason Management Approach

Currently by regulation, the bag and possession limits are 2 fish per day, of which only 1 may a naturally-produced fish. Hatchery-produced fish are allowed to be harvested 7 days each week and naturally-produced fish are allowed to be harvested 3 days per week (i.e., Tuesday, Thursday, and Saturday). The *Kenai River and Kasilof River Early-run King Salmon Management Plan* directs ADF&G to achieve the sustainable escapement goal, to provide reasonable harvest opportunities over the entire run while ensuring adequate escapement of naturally-produced Chinook salmon, and to minimize the effects of conservation actions for the Kenai River on the Kasilof River. Because Chinook salmon do not reach the weir at Crooked Creek until the later part of June and July, run strength is not evaluated inseason. Past creel survey data indicate the highest catch rates are typically observed prior to June 10. Currently, the Chinook salmon harvest is estimated postseason. Similarly, run strength estimates, harvest estimates, and data regarding the inseason performance of the fishery (catch, harvest, and effort) have not been available inseason since the creel survey was discontinued.

Since 2009, low escapements of naturally-produced Chinook salmon have occurred at Crooked Creek despite restrictions to the early-run Kasilof River Chinook salmon sport fishery that prohibited retention of naturally-produced fish and prohibited the use of bait. The SEG for Crooked Creek was not achieved in 2 of the years from 2009 through 2013. Because relatively low Chinook salmon productivity has affected several Cook Inlet stocks, including naturally-produced fish of Crooked Creek origin and hatchery-produced fish stocked into Crooked Creek, ADF&G began restricting the Kasilof River inriver sport fishery prior to the season. These preseason restrictions were designed so that both escapement and broodstock goals could be achieved while still providing reasonable harvest opportunity for Chinook salmon.

2014 Fishery Performance

The ADF&G issued EO 2-KS-1-05-14 on February 27, 2014 to prohibit the retention of naturally-produced Chinook salmon, reduce the bag and possession limits of hatchery-produced Chinook salmon 20 inches or greater in length to 1 fish, and limit sport fishing gear to 1 unbaited, single-hook artificial fly or lure while sport fishing in the Kasilof River beginning May 1, 2014 through June 30, 2014. During 2014, the SEG for naturally-produced Chinook salmon

was achieved with an escapement of 1,411 naturally-produced fish passing through the weir at Crooked Creek (Table 9). An additional 737 hatchery-produced fish raised the total escapement to 2,148 Chinook salmon (Table 9). The estimate of harvest from the SWHS was 323 Chinook salmon (Table 9). The broodstock goal was met in 2014 as approximately 143,751 Chinook salmon smolt were released back into Crooked Creek during 2014 (Table 12).

2015 Fishery Performance

Similar to 2014, the ADF&G issued a preseason EO 2-KS-1-06-15 on February 19, 2015 to restrict the Kasilof River early-run Chinook salmon fishery. Similar to 2014, the harvest of hatchery-produced Chinook salmon was reduced to 1 fish and bait was prohibited; however, the prohibition on retention of naturally-produced fish was relaxed and allowed 1 day per week (Saturdays) through June 30. The escapement of ocean-age-2 or older naturally-produced Chinook salmon was 1,456 fish (Table 9). An additional 447 hatchery-produced Chinook salmon were also counted through the Crooked Creek weir (Table 9). It became apparent that the hatchery-produced run to Crooked Creek was also composed of a large number of ocean-age-1 Chinook salmon that were equal to or larger than 20 inches in total length because weir staff harvested approximately 2,200 of these fish at the weir during sampling. The objective for stocking approximately 140,000 Chinook salmon smolt into Crooked Creek annually was met in 2015 with approximately 145,855 smolt (Table 12).

2016 Fishery Performance

Because of the 30% increase in the target number of smolt stocked annually (105,000 to 140,000) in 2014 there was a high number of large-sized ocean-age-1 hatchery-produced fish that migrated to the Crooked Creek weir in 2015. The presence of these fish and the achievement of the SEG in 2014 and 2015 led to the relaxation of restrictions, which are outlined in the preseason EO 2-KS-1-04-16. The harvest of naturally-produced fish was allowed 2 days per week and the hatchery-produced Chinook salmon bag limit was not reduced and remained at 2 per day; however, bait was prohibited. By mid-June ADF&G identified improved runs to many Cook Inlet Chinook salmon–producing rivers, including the Kenai and Kasilof rivers, where data from inriver assessment programs and catch data from guide logbooks allowed restrictions to the early-run Chinook salmon fishery on the Kasilof River to be lifted and restored to existing sport fish regulations effective June 18, 2016 (EO 2-KS-1-20-16).

The spawning escapement was composed of 1,747 naturally-produced and 2,100 hatchery-produced ocean-age-2 or older Chinook salmon through July 25, 2016 (Table 9). The weir operations were discontinued prior to August therefore the 2016 escapement counts are minimums. Because weir operations were discontinued early, the broodstock objective for stocking Crooked Creek in 2017 was not achieved; only about 110,160 eggs were collected. Consequently, the projected stocking level for 2017 is 100,000 smolt rather than 140,000 smolt. Finally, a total of 143,280 Chinook salmon smolt were released at the facility in 2016 (Table 12).

KASILOF RIVER LATE-RUN CHINOOK SALMON

Fishery Management Objectives

The Kasilof River late-run Chinook salmon sport fishery is not specifically addressed in a BOF–adopted management plan. ADF&G objectives adopted for this fishery include providing an

opportunity for angler participation at a level that can be supported by the fisheries resource and associated habitat and to ensure through appropriate management and research programs that the Chinook salmon population does not decline below the levels necessary to ensure sustained yield. Sport harvest has been monitored via the SWHS since 1996 and has averaged 959 Chinook salmon (1996–2015; Table 10). Using genetic analysis from the ESSN commercial fishery during 2010 through 2011 described in Fleischman and McKinley (2013), Eskelin et al. (2013b) and Eskelin and Barclay (2015, 2016), and applying the average of those 5 years towards the ESSN harvests since 1996, the 1996–2015 average harvest of late-run Kasilof River Chinook salmon has been estimated at 2,591 fish (Table 10).

Inseason Management Approach

Historically there has been no inseason management of this fishery. The fishery is managed through existing regulations. These regulations are conservative, permitting a harvest of late-run Kasilof River Chinook salmon downstream from the Sterling Highway Bridge only through July 31. For Chinook salmon 20 inches or more in total length, the daily bag and possession limits are 1 fish and the annual limit for Chinook salmon in Cook Inlet is 5 fish. During years of low Chinook salmon abundance, ADF&G administered inseason restrictions by EO to minimize the effects of conservation actions for the Kenai River on the Kasilof River at times when the Kenai River was restricted or closed inseason; this occurred the first time during 2012. Thereafter, ADF&G continued to use this inseason approach because low Chinook salmon production was known to be widespread throughout many Cook Inlet Chinook salmon–producing locations, rather than isolated to a specific river.

2014-2016 Fishery Performance

There have been no inseason data collected for the management of the Kasilof River Chinook salmon late run. During 2005-2008, ADF&G research projects collected information on run timing, spawning distribution, and inriver abundance of late-run Kasilof River Chinook salmon postseason (Reimer and Fleischman 2012). Catches of Chinook salmon for the research program were relatively stable from 2005 to 2008. Information on run strength or sport fishery performance is collected via angler reports during the season as well as from the guide logbook reports and SWHS. Results indicate that sport harvests are relatively stable. Similar to Chinook salmon runs elsewhere in Cook Inlet, Kasilof River stocks also experienced lower runs over recent years, including low production of hatchery-stocked early-run Chinook salmon used to supplement the Kasilof River early-run fishery. Consequently in 2014, EO 2-KS-1-28-14 restricted the late-run fishery by prohibiting bait and multiple hooks on July 1 when the Kenai River was similarly restricted (Appendix A1). This inseason action was followed by EO 2-KS-1-44-14 effective July 26 to prohibit retention of Chinook salmon in the Kasilof River late-run Chinook salmon fishery when the Kenai River was closed to Chinook salmon fishing.

In 2015, the Kasilof River late-run Chinook salmon fishery began July 1 with EO 2-KS-1-37-15 effective July 1 prohibiting bait and multiple hooks; however, existing regulations were restored on July 25 by EO 2-KS-1-48-15 (Appendix A2). In 2016, there were no inseason management actions taken during the Kasilof River late-run Chinook salmon sport fishery.

There have been changes in the commercial fisheries targeting sockeye salmon bound for the Kasilof River in the past decade due to large numbers of sockeye salmon passing the ADF&G Kasilof River sonar station in excess of escapement needs. These commercial fishery changes included the implementation of terminal commercial fishing periods at the mouth of the Kasilof

River over several years including 2014 and 2015. The terminal area commercial fishing periods were not implemented in 2016. These terminal commercial fishing periods were designed to reduce the numbers of sockeye salmon entering the Kasilof River when it is determined the sockeye salmon escapement will be exceeded; however, Chinook salmon are also harvested. All of the commercially harvested Chinook salmon bound for the Kasilof River during these terminal fishery periods were presumed to be of Kasilof River origin. Recent GSI sampling results by Eskelin et al. (2013b) and Eskelin and Barclay (2015, 2016) show harvests in the terminal harvest area are not exclusively Kasilof River origin Chinook salmon (Table 13). The estimated late-run Chinook salmon sport harvest from the Kasilof River during 2014 and 2015 was 314 and 790, respectively (Table 10). Harvests during 2016 are anticipated to be larger, probably due in part to improved abundance of Chinook salmon in the Cook Inlet and because the sport fishery was prosecuted with allowances for bait. (Appendix A3).

Occasionally, anglers bring in to ADF&G harvested Kasilof River late-run Chinook salmon that are over 50 pounds in total weight to participate in the trophy fish program. The trophy fish program is voluntary and participating anglers receive a “Trophy Fish” certificate for taking fish that meet the minimum weight standard of 50 pounds. In 2016, 2 “Trophy Fish” certificates were issued to anglers for late-run Chinook salmon harvested in the Kasilof River.

CURRENT ISSUES

Low abundance of early-run Chinook salmon in Kasilof River runs of naturally-produced fish was persistent from 2009 through 2015. At these lower levels of abundance, the SEG for naturally-produced Chinook salmon and the broodstock objectives are not likely to be achieved under existing regulations so restrictions may be necessary to meet these objectives. Balancing the need to provide opportunity to harvest hatchery-produced fish during periods of low natural Chinook salmon production has been achieved by inseason management actions to restrict harvest of naturally-produced fish while maintaining harvest levels of hatchery-produced fish. Future management strategies should be considered that may increase exploitation of hatchery fish. Since we do not have the ability to foresee or predict inordinately high numbers of smaller younger hatchery-produced Chinook salmon in annual runs, consideration should be given to regulations or inseason actions that maximize exploitation of hatchery-produced fish.

The Crooked Creek facility was originally constructed in 1974 and is now used to assess spawning escapement and to support the stocking program. The facility is an old hatchery that has several deficiencies caused by structural deterioration. In addition, water flow through the facility is obtained by diversion from Crooked Creek. These flows are conveyed through the facility and returned to the creek. Over the past 3 decades, changes to the channel morphology have altered the flow characteristics of Crooked Creek and as such the flow of water into the facility. Extensive repairs and upgrades to correct deficiencies of water flow into the structure and structural concrete deterioration has been an ongoing project. During late August of 2016, the deficiencies in water flow and structure were addressed by demolishing unused fish holding areas as well as the egg take buildings, a reduction in the size or footprint of the fish holding areas, and improved flow of water to and through the raceways used to hold smolt for imprinting and to pass adult as well as juvenile fish.

Similar to the early years of this fishery, the social issues related to limited access and angler congestion have persisted. Historically, there was a lack of good road and foot access for the public to the fishing areas and shoreline area of the Lower Kasilof River. Consequently, angling

from boats was the most popular and effective way to sport fish in the lower river Chinook salmon fishery. Growth in the Chinook salmon enhancement created demand for improved access to the river. This issue was partly addressed by the Department of Natural Resources, Division of Parks and Outdoor Recreation (DNR, DPOR) when lands were acquired and developed at the Crooked Creek State Recreation Site at the Crooked Creek–Kasilof River confluence for shore based angling. In 2004 DNR, DPOR also constructed a new boat launch at RM 8 adjacent to the Sterling Highway Bridge crossing of the Kasilof River where anglers access the fishery by drift boat. Although these positive changes provided access, issues remain related to parking and amenities (bathrooms, picnic areas) for anglers fishing from shore and those anglers fishing from drift boats. Specifically, there is no public boat landing facility in the lower river. Rather, access for drift boat retrieval is accomplished at a privately owned launch in the lower river downstream of the point where nearly all Chinook salmon fishing occurs. Historically, 3 privately owned landings to retrieve drift boats were available for public use in the lower river. Due to the landing locations relative to the lay-out of the fishery and established fishing patterns, 1 landing received primary use while the other 2 received only infrequent use by drift boat anglers. Currently, one of the infrequently used landings is no longer available for public use and the property where the primary drift boat retrieval landing is located has been purchased by the State of Alaska (SOA) DNR but is not operational because of liability issues and a lack of financial resources for construction improvements. Hence, just 1 landing is available for drift boat retrieval. Because of this situation and the popularity of the drift boat fishery, construction of a publically owned, agency managed, boat landing with sufficient infrastructure is desired by the public to maintain access.

During 2007, ADF&G conducted a *Lower Kasilof River Boat Launch Study, Acquisition and Development* project. The project provided a site investigation report for 2 locations in the lower river for the construction of boat landings to support power boat use. The evaluations were rejected by the public due to concern that construction of a power boat landing would increase use and congestion on the lower Kasilof River.

Hydraulic analysis for fish passage flows at the Sterling Highway road crossing culvert at Crooked Creek indicates that the culvert is substandard for both adult and juvenile salmonids during some months of the year. Crooked Creek is approximately 50 miles long, and the culvert is located 47 miles downstream of its source or approximately 3 miles upstream of the Crooked Creek–Kasilof River confluence. Plans to remove and replace the existing culvert are scheduled to be implemented and completed by 2018. It is not understood how the culvert barrier impacts Chinook salmon production in the 52.6 square mile Crooked Creek watershed.

Reduced ADF&G stocking level objectives for several years (2000–2013) in combination with lower production of naturally-produced Chinook salmon have increased public awareness of the stocking program. The sport fishing guide industry desires that the stocking levels be increased by over 100% or restored to those levels prior to 2000. Because stocking is dependent upon high abundance of naturally-produced fish and the SEG is a higher priority objective than stocking, the numbers of naturally-produced fish available for annual artificial spawning (collection of eggs and milt) for future smolt release varies from year to year and cannot be guaranteed. Stocking levels will not be increased to over 200,000 smolt per year until several issues are addressed: 1) boat landing infrastructure, 2) Crooked Creek facility improvements to smolt and adult broodstock holding raceways, 3) culvert replacement, and 4) the introgression of naturally- and hatchery-produced Chinook salmon. Although significant steps have been taken to remedy

these issues, all the work has not been completed. Meanwhile, ADF&G has increased stocking objectives by nearly 50% (from 105,000 to 140,000 smolt).

Similar to the early run, the issues related to limited access are present with the late run as well. Angling from a drift boat is the most effective way to sport fish in the lower Kasilof River in July. Consequently, there is a large demand for improved access to launch and retrieve drift boats. Harvest of Chinook salmon in the commercial fisheries, particularly in the Kasilof River Special Harvest Area (KRSHA) at the mouth of the Kasilof River by both set and drift gillnet operators during July, is a contentious social issue. This fishery was opened frequently under certain circumstances to reduce the escapement of sockeye salmon to the Kasilof River; however, Chinook salmon harvest also occurs. The KRSHA was not opened during the 2016 commercial fishing season.

RECOMMENDED RESEARCH AND MANAGEMENT

Future research will focus on the long-term quantitative stock assessment of naturally-produced Crooked Creek Chinook salmon, including estimating the numbers of fish in the annual runs by utilizing harvest estimates from the sport fishery and monitoring escapements at the weir. This information is necessary to estimate returns by age from the escapements to refine the existing escapement goal of naturally-produced fish. Beginning in 2000, the number of Chinook salmon smolt stocked into Crooked Creek was reduced from a long-term average of approximately 210,000 to 105,000. Since 2000, stocking levels have remained relatively stable until they were increased to 140,000 in the 2014 (Table 12). It appears that the natural production of Chinook salmon in Crooked Creek has been too low to compensate enough for the reduction in stocking levels to support historical angler effort and harvest levels. In 2008–2011, total runs of naturally-produced Chinook salmon were lower than in previous years 2004–2007 (Table 9). The number of naturally-produced fish to the weir during 2016 indicates the total runs of both naturally- and hatchery-produced Chinook salmon improved. A similar pattern of declining abundance is also evident in hatchery-produced Chinook salmon despite stable stocking levels. However, returns from higher levels of spawning escapement will continue to be assessed by reconstructing the annual runs of early-run Chinook salmon. In order to provide guidance to future management and stocking levels to support this fishery, another facet of research we recommend is to evaluate the hatchery-integrated Chinook salmon stocking program for Crooked Creek.

Management efforts are focused on ensuring the established escapement goal for Crooked Creek is achieved and to minimize the contribution of hatchery-stocked fish into the escapement through existing as well as inseason emergency order regulations. Other management efforts are focused on restoration and infrastructure improvements to the Crooked Creek facility where 1) escapements are monitored, 2) adults are collected and held for broodstock egg takes to continue the stocking program, and 3) smolt are held for imprinting prior to release during spring. Other efforts are being made to restore and maintain the connectivity of Crooked Creek as important waterway for the spawning and rearing of anadromous fish through streambank restoration and replacement of the Sterling Highway culvert.

We recommend a review of the available harvest data and total returns from recent years prior to the start of each season to determine if a preseason restriction is necessary to achieve fishery management and stocking objectives.

At present, no fisheries research is planned for late-run Kasilof River Chinook salmon. Recent inriver abundance estimates indicate there are no immediate fishery conservation concerns for

this stock because, under existing regulations and emergency order authority, the potential for the inriver fishery to overharvest this stock is low. Long-term research and management goals include estimating total run abundance. Doing so would require an estimate of the inriver run as well as harvests from the various marine fisheries harvesting this stock so that annual runs to the Kasilof River can be reconstructed. Currently, information to manage this fishery by existing regulations is provided by the guide logbook program and the SWHS.

RUSSIAN RIVER SOCKEYE SALMON SPORT FISHERIES

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries targeting sockeye salmon in the Russian River and Russian River sanctuary:

Proposal Numbers: 14, 34, 127, 128, 129, 130, 146, 193.

BACKGROUND AND HISTORICAL PERSPECTIVE

The Russian River is a clearwater tributary to the Kenai River located near the community of Cooper Landing approximately 100 miles south of Anchorage (Figure 5). Lands bordering this river are federally managed. The public can access the Russian River via the Kenai–Russian River ferry operated by a private concessionaire. The ferry is located at the Kenai National Wildlife Refuge parking area on the north shore of the Kenai River just downstream from the confluence with the Russian River. Additional access is provided at the Chugach National Forest campground on the Russian River (Figure 6).

The drainage supports one of the largest runs of sockeye salmon to upper Cook Inlet (UCI) and provides one of the largest freshwater sport fisheries for sockeye salmon in Alaska. In addition, coho, Chinook, and pink salmon also spawn in the Russian River drainage as well as resident populations of rainbow trout and Dolly Varden. The drainage is closed to fishing for Chinook salmon but supports sport fisheries for the other species.

Sockeye salmon return to the Russian River during 2 distinct time periods. An early run arrives at the confluence of the Kenai and Russian rivers in early June. Because of this early run-timing, these fish are not harvested in the (UCI) commercial salmon fisheries. The primary harvest of these fish occurs in the inriver sport fishery at the Russian River. Early-run fish typically congregate at the confluence of the Russian and Kenai rivers for several days prior to moving into the clear waters of Russian River. A late run, part of the larger late run of UCI sockeye salmon, arrives at the confluence in mid-July and typically migrates directly into Russian River. This run has 2 discrete components: one that spawns in the upper reaches of the drainage (upstream of the falls and the weir) and one that spawns in the lower river reaches (downstream of the falls). The population component that spawns in the lower river reaches is more closely related (genetically) to the mainstem Kenai River sockeye salmon stocks than to the population component spawning upstream of the weir (Seeb et al. 1996). Typically, the spawning escapement of the late run exceeds that of the early run. For the most part, spawning locations used by the late run are distinct from locations used by the early run. Because of their run timing, late-run sockeye salmon are harvested by a combination of commercial, sport, and personal use user groups. In addition, a Federal Subsistence Fishery has been prosecuted at the Russian River

since 2007 by qualifying rural residents from the communities of Cooper Landing, Ninilchik, and Hope.

The sport fishery for both early- and late-run sockeye salmon occurs primarily in the lower 3 miles of Russian River and in a 1-mile stretch of the Kenai River below its confluence with Russian River. Both runs support popular fisheries. The most recent 10-year (2006–2015) average harvest of early and late-run sockeye salmon is approximately 34,393 and 19,475 fish, respectively (Table 15). The Federal Subsistence Fishery prosecuted on both runs supports a total annual harvest of approximately 1,200 fish with the majority of this harvest taken from the early run (Table 15).

Angler effort estimates from the SWHS over the most recent 10-year period (2006–2015) have averaged 54,946 angler-days per year (Table 15). Although these estimates include effort directed toward other species including resident species as well as coho salmon, it is believed the majority of sport fishing effort occurs during the sockeye salmon season (June 11 through August 20). Overall, annual effort expended in 2014 through 2015 has remained relatively stable when compared to effort estimated historically. Because this area is popular for various forms of outdoor recreation, the 2 public campgrounds and day use parking areas managed by federal agencies are routinely filled to capacity. Consequently, during the peak times of the sockeye salmon fisheries, public demand for access to the fishery exceeds the capacity and waiting periods of several hours may be required for parking, and reservations made months in advance may be necessary for camping areas.

In 1993, ADF&G SF purchased property that adjoins U.S. Fish and Wildlife Service (USFWS) lands along the north shore of the Kenai River directly across from the confluence of the Kenai and Russian rivers. The 4.4-acre property was formerly the site of the privately owned Sportsman's Lodge. This purchase was made using primarily Federal Aid in Wildlife and Sport Fish Restoration funds (Dingell-Johnson, or D-J Amendment) to provide a launch and take-out area for boat anglers fishing the Kenai River and to provide an additional 50 to 75 parking places for anglers. Purchase of this property and subsequent improvements since 2000 have partially alleviated parking issues in this area during peak days of the fishery.

Historically, as angler effort has increased in this fishery, the regulations governing the sport fishery have become more restrictive. In 1964, the use of treble hooks was prohibited in an effort to reduce snagging. This was followed by adoption of a flies-only regulation in 1965 for the 1966 season. Under this regulation, terminal gear was limited to flies and a fly-fishing-only area was designated. The BOF required that only fish hooked in the head, mouth, or gills could be retained and in 1969, this regulation was amended to include all fresh waters of the Kenai Peninsula. In 1973, the regulation was further amended to require that fish hooked elsewhere than in the mouth must be released immediately.

Currently, the sport fishery is restricted to terminal tackle consisting of a single-hook, unweighted fly, with a maximum hook gap of three-eighths inch or less. This measure was implemented to reduce angler efficiency and lessen the angler’s ability to snag fish illegally. This affords an increased measure of protection to fish as they near their spawning destinations. In order to protect “schooled” fish that hold in the confluence area of the Kenai and Russian rivers (termed the "sanctuary"), the sanctuary is closed to sport fishing until the lower end of the early-run escapement range is projected to be met inseason. Only the lower 3 miles of the Russian River drainage, from 100 yards upstream of its mouth to an ADF&G marker 600 yards

downstream of the falls, are open to salmon fishing. The upstream portion of Russian River (e.g., above the ADF&G marker below the falls) is closed to all salmon fishing to allow fish to migrate and spawn in the remainder of the drainage.

Recent Alaska Board of Fisheries Actions

During the 2014 Alaska Board of Fisheries meeting, the possession limit was increased from 3 to 6 sockeye salmon. No other regulation changes were made to the Russian River sockeye salmon sport fisheries during the 2014 meeting.

RUSSIAN RIVER SOCKEYE SALMON MANAGEMENT OBJECTIVES

Management of this fishery is governed by the *Russian River Sockeye Salmon Management Plan* (5 AAC 57.150). The primary management objective, as directed in the plan, is to achieve a biological escapement goal (BEG) of 22,000 to 42,000 early-run sockeye salmon and a sustainable escapement goal (SEG) of 30,000 to 110,000 late-run sockeye salmon in the Russian River system. The escapement goals have changed over time for both runs and have been achieved or exceeded in all years since 1977, based upon the management plan in effect at that time.

The *Russian River Sockeye Salmon Management Plan* recognizes that commercial users as well as mainstem Kenai and Russian River sport anglers harvest late-run sockeye salmon stocks bound for the Russian River drainage. It stipulates how the burden of conservation shall be distributed between commercial and sport users. In the event that conservation measures are required to achieve the minimum escapement goal, ADF&G may restrict Kenai River drainage sport fisheries downstream to, and including, Skilak Lake. Restrictions to the commercial fishery shall be limited to meeting the inriver escapement goal for Kenai River late-run sockeye salmon as outlined in the *Kenai River Late-Run Sockeye Salmon Management Plan* (5 AAC 21.360).

The goal ranges for both runs are based on data collected at the weir. Precise biological data collected annually at the weir is sufficient enough to develop a BEG for the early-run stock only. The late-run stock SEG is based on weir counts that have sustained the fishery. In the case of the early run, ADF&G recommended a new BEG in 2011 (Fair et al. 2010). Since the Russian River late run is a component of the larger late run returning to the Kenai River drainage, the total returns for late run Russian River sockeye salmon are not known. However, although they have similar run timing, there is a significant genetic difference between late-run Russian River sockeye salmon and late-run Kenai river sockeye salmon. Genetic stock identification (GSI) was undertaken to identify the degree to which late-run Russian River sockeye salmon are harvested by the various mixed-stock marine commercial, personal use, and sport fisheries in order to reconstruct the total return of late-run Russian River sockeye from 2006 to 2008 (Eskelin et al. 2013a). In the future, this type of analysis might enable ADF&G to better assess late-run sockeye salmon production in the Russian River drainage.

INSEASON MANAGEMENT APPROACH

The early- and late-run fisheries are managed based on escapements counted at a weir at the outlet of Lower Russian Lake. In years of low abundance, the escapement is achieved through inseason restrictions to the sport fishery. In years of high abundance, the fisheries are liberalized to provide additional harvest opportunity. The weir is installed during early June each year and is removed from the river during early September in most years. Early-run sockeye salmon are

classified as those that pass through the weir from the weir installation date through July 14, while fish passing through the weir from July 15 until the weir is removed are classified as late-run sockeye salmon.

Sockeye salmon run strength is determined by examining 3 indicators: weir counts, instream fish abundance estimates, and observed fishery performance. Weir counts are the primary indicator of run strength. Historical weir counts provide the mean migratory run timing statistics to project inseason abundance and escapement. An estimation of run strength can generally be made several days prior to the historical midpoint of the run (June 28 for the early run and August 7 for the late run). In some years, fish have been late or have "held" in the Kenai River. Weir counts are supplemented by onsite foot surveys of the fish present downstream from the weir, including the area between the weir and the falls, the falls area, lower Russian River, and the sanctuary area (Figure 6). Fish may "hold" for long periods of time in the falls area during periods of extreme high water or low water. In the case of high water, ADF&G staff observe fish behavior in the falls and monitor staff gauge water levels at the weir site. In extreme cases when the staff gauge readings exceed 17–19 inches and flow input of Rendezvous Creek (located downstream of the weir but above the falls) may prevent fish from migrating upstream through the falls, a fish passage around the falls is opened. No methods are employed to facilitate fish passage to spawning areas during low water conditions. Historically, the fish pass is used infrequently for early-run sockeye salmon during high water caused by the combination of spring snow-melt runoff and rain in early June. It has not been used during the late-run period that begins July 15. The fish pass was last used during high water events in June of 2012 and 2013; however, it was not used during 2014 through 2016. Utilization of the fish pass has no direct effect on sport fishing opportunities because the upstream boundary of the fishing area is approximately a third of a mile (600 yards) downstream of the falls; however, it does facilitate the sockeye salmon passage rate into the escapement, which is of primary importance to determine run strength so that appropriate inseason management actions can be taken to achieve escapement goals. In addition, observed fishery performance in the Kenai River downstream from the sanctuary area for the early run and throughout the entire fishery downstream to Skilak Lake in the late run are used as indicators of run strength. If inseason restrictions become necessary in order to achieve the escapement goal, the *Russian River Sockeye Salmon Management Plan* specifies several options to ensure adequate escapement, including bag limit reductions and closures by area and time in the Russian River as well as the mainstem Kenai River downstream to and including Skilak Lake. When inseason restrictions are implemented, they remain in place until the lower end of the escapement range is projected to be met.

The sockeye salmon sport fishery opens June 11 and closes August 20 by regulation. Sockeye salmon run strength at the Russian River improved somewhat during the recent 2013–2016 period, with the second highest early-run escapement (50,226) in 10 years occurring in 2015 (Table 15). As a result, the early-run sport fishery was liberalized in both 2014 and 2015. The late-run continues to show escapements below the most recent 10-year average of 53,432 (Table 15). The liberalization of the early-run fishery is generally implemented by opening the 700-yard sanctuary area at the confluence of the Kenai and Russian rivers to fishing. The sanctuary area opens by regulation after the early run period on July 15. However, it may be opened by EO earlier if information indicates sockeye salmon abundance is high and the lower end of the early-run BEG (22,000-42,000) will be achieved. Experience has proven that a daytime opening facilitates an orderly expansion of fishing opportunity in the fishery. Late evening and midnight openings are avoided. If weir counts, instream fish estimates, and observed performance of the

fishery remain high and the projected escapement is greater than the upper bound of the BEG, the bag limit is increased to contain the escapement into Lower Russian Lake within the BEG. Typically, the bag limit increase is applied in all waters of the Kenai and Russian rivers fly-fishing-only waters, which include the Russian River, the Russian River sanctuary, and that portion of the Kenai River from ADF&G regulatory marker located below the Ferry Crossing on the Kenai River downstream to the powerline crossing. Since 2009, the bag limit increase was applied downstream to Jim's Landing to increase exploitation on a large run (Begich and Pawluk 2010). Historically, the bag and possession limits have been increased from 3 fish to 4 or 6 fish. Over more recent years, the fishery has been liberalized from the Russian River downstream to the markers located at the outlet of Skilak Lake and the bag limit liberalization has been standardized to increase from 3 fish to 6 fish while the commensurate increase in the possession limit is from 6 fish to 12 fish when the bag limit is increased.

2014 EARLY-RUN FISHERY PERFORMANCE

Following installation of the weir on June 4, initial stream surveys of the Russian River and sanctuary area at the start of the sport fishery indicated low sockeye salmon abundance. The abundance of fish increased later than usual in the month, however stream surveys by the third week of June indicated abundance was large enough to increase harvest opportunity. Consequently, the ADF&G issued 2 EOs (2-RS-1-24-14; 2-RS-1-25-14) effective June 24, 2014 to open the sanctuary area and to increase the bag and possession limits from 3 and 6 to 6 and 12 in the Russian River and Kenai River from the Russian–Kenai rivers confluence downstream to Skilak Lake (Appendix A1). The escapement (ending July 14) of early-run sockeye salmon was 44,920 fish and was above the BEG (22,000–42,000) (Table 15). Fishing success was good to excellent and the estimated harvest was 35,870 and the estimated total run was 82,066 fish (Table 15).

2015 EARLY-RUN FISHERY PERFORMANCE

The first day of weir operations was on June 5, 2015. Similar to 2014, the abundance of sockeye salmon in the Russian River area when the fishery opened on June 11 was low. During the third week of June, foot-surveys of sockeye salmon present in the river downstream of the falls and in the sanctuary area, as well as high catch rates in the sport fishery, indicated average to above average run strength. Due to a large wildfire on the Kenai Peninsula (Card Street Fire) and a small wildfire east of but near the Russian River area (Stetson Creek Fire) liberalizations to the sockeye salmon sport fishery during 2015 were delayed for social reasons. Consequently, the EO to open the sanctuary area (EO 2-RS-1-29-15) and the EO to increase the bag as well as possession limit (EO 2-RS-1-28-15) became effective June 23, 2015 when a season total of over 26,000 sockeye salmon had been counted through the weir (Appendix A2). The upper bound of the BEG (22,000–42,000) was exceeded on July 2 and the final escapement was 50,226 sockeye salmon (Table 16). The estimated early-run Russian River sockeye salmon sport harvest was 29,997 and the 2015 total early run to the Russian River area was approximately 81,212 (Table 15).

2016 EARLY-RUN FISHERY PERFORMANCE

The weir was installed on June 4 at Lower Russian Lake. Fish passage was relatively low until the last week of June. Sockeye salmon were not observed to accumulate in the sanctuary area nor within the Russian River. These observations combined with relatively mediocre fishery

performance indicated approximately less than average early-run abundance; therefore, no management actions were taken during 2016. During the early run there was initially a high discharge that declined as the season progressed so the fish pass was not used to facilitate fish passage. The lower bound of the BEG (22,000–42,000) was not achieved until July 1 and the final escapement count at the weir was 38,739 sockeye salmon through July 14 (Table 16). The estimated harvest will not be available until the fall of 2017 however a below average harvest is expected for 2016 based on fishery performance and sockeye salmon abundance. The estimated total run will probably be less than the preseason forecast of approximately 76,500 early-run sockeye salmon.

2014 Late-Run Fishery Performance

During the 2014 season, the late-run Russian River Area sockeye salmon sport fishery displayed low catch rates. No inseason management actions were taken for the sport fishery. The lower bound of the SEG (30,000–110,000) was achieved on August 13, 2014 (Table 16) and the final escapement through the weir was 52,277 fish. The estimated late-run sockeye salmon harvest was 17,864 fish and was the 5th lowest harvest in the past decade (Table 15). The estimated number of late-run sockeye salmon spawning in the Russian River downstream of the weir during a foot survey conducted on August 25 was 10,659 fish. By summing sockeye salmon harvest and escapement through the weir, the "local run" estimate for late-run Russian River sockeye was approximately 70,637 fish (Table 15).

2015 Late-Run Fishery Performance

No management actions were taken for the 2015 late-run Russian River sockeye salmon sport fishery. Sockeye salmon were enumerated at the Russian River weir from July 15 through September 2. The 2015 late-run sockeye salmon escapement through the Russian River weir was 46,223 fish and was within the SEG range of 30,000 to 110,000 fish (Table 15). This was below the previous 10-year (2005–2014) average escapement of 54,757 fish. The lower goal range of 30,000 fish was achieved on August 15, 2015 (Table 16). This was later than typically observed historically but similar to recent years when the late-run sport fishery has experienced late arriving, less abundant fish and low sport fishing catch rates of sockeye salmon in the Russian River during late July and early August. Passage rates of sockeye salmon at the weir were sporadic, with days of relatively moderate passage (1,000 fish) followed by a few days of low (hundreds) passage (Table 16). Moderate or high passage rates of 1,000 fish or more were not sustained for several days as is more typical. Many sockeye salmon arrived to the Russian River area in a heightened state of maturity in mid-to-late August near the standard regulatory closure of the fishery on August 20. The 2015 harvest was 13,744 fish and was the 3rd lowest harvest of late-run Russian River sockeye salmon since 1997 (Table 15). The estimated number of late-run sockeye salmon spawning in the Russian River downstream of the weir during a foot survey conducted on August 26 was 11,172 fish. This was the 29th largest foot survey count of spawning sockeye salmon observed downstream of the weir since the surveys were initiated in 1968. Including escapement through the weir and those fish harvested downstream of the weir, the "local run" estimate for late-run Russian River sockeye was approximately 60,671 fish (Table 15).

2016 LATE-RUN FISHERY PERFORMANCE

The weir was removed on September 2 after a total escapement of 37,837 late-run sockeye salmon had been counted (Table 15). The escapement through the weir was within the SEG (30,000–110,000) and was lower than the previous 10-year (2006–2015) average escapement of 53,432 fish. Fishery observations indicated that both catch rates passage rates at the weir were low for the duration of the sockeye salmon fishery when it closed under existing regulations on August 20. No management actions were taken for the 2016 late-run Russian River sockeye salmon sport fishery. The estimated number of late-run sockeye salmon spawning in the Russian River downstream of the weir during a foot survey conducted on August 25 was 14,590 fish. The 2016 estimates of fishing effort, harvest, and estimate of the total run to the area will be available when the SWHS is published in 2017.

CURRENT ISSUES

Presently, there are no biological issues associated with this fishery. Social issues focus on angler congestion during peak fishing periods. There is no evidence indicating angler-caused habitat impacts or infrastructure (trails, boardwalks, stairways) added to support anglers have affected the productivity of the Russian–Kenai river fisheries. The early-run Russian River sockeye salmon are at high levels of abundance. Spawning escapement goals have been consistently achieved. Angler opportunity and harvest have been maximized to the extent practicable.

For the late-run stock, delayed arrival of fish to the upper Kenai River area as well as relatively low harvests and escapement counts have become common over recent years. In the Russian River downstream of the weir, consistently high counts of spawning sockeye salmon have been observed during foot-survey counts conducted during late August. The late timing is a new issue and it is a concern for anglers because the majority of sockeye salmon have been reaching the area in August, just days before the normal regulatory closure of the Russian River to sockeye salmon sport fishing on August 20. These fish are in a heightened state of maturity and therefore are considered to be of low food quality. Consequently, fishing effort directed at sockeye salmon during August has declined. There is no information to determine what factors may be contributing to delayed run timing of late-run Russian River sockeye salmon.

RECOMMENDED RESEARCH AND MANAGEMENT

No change in management strategy is recommended at this time. Spawning escapement goals have been consistently achieved for both runs. Recent late-run escapements counted through the weir have been less than average. We recommend biological data, specifically escapement counts and age, sex, and length data, continue to be collected from the escapement to enable continued analysis and refinement of escapement goals (Appendices B1–B6). Upper Russian River late-run sockeye salmon total run reconstructions by Eskelin et al. (2013a) estimated in a 3-year study (2006–2008) total runs averaged about 178,743 fish while escapements averaged 62,955 fish. The most recent 3-year escapement (2014–2016) averaged 45,446 fish. From 2006 to 2008, Eskelin et al. (2013a) estimated the harvest rate of Upper Russian River late-run sockeye salmon was 43% in 2006, 74% in 2007, and 73% in 2008. It is not known if angler effort on the late-run stock has increased, or if production has been low recently. During the study by Eskelin et al. (2013a), on average the sport fishery accounted for 48% of the harvest of Upper Russian River late-run sockeye salmon, the Upper Cook Inlet commercial fishery accounted for 41% of the harvest, and the Kenai River personal use fishery accounted for the

remaining 11% of the harvest (Eskelin et al. 2013a). If low escapements persist, mark–recapture methods using genetic stock identification (GSI) methods to reconstruct the annual runs of Upper Russian River late-run sockeye salmon, such as those used by Eskelin et al. (2013a), should be used to determine if increased exploitation, changes in fishing patterns, or low production is the main factor contributing to multiple years of low escapements so that management strategies can be reviewed.

KENAI RIVER LATE-RUN SOCKEYE SALMON SPORT FISHERIES

2017 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING KENAI RIVER LATE-RUN SOCKEYE SALMON SPORT FISHERY ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) may have some impact on the sport fisheries targeting late-run sockeye salmon in the Kenai River:

> Proposal Numbers: 34, 116, 117, 118, 119, 120, 121, 122, 127, 128, 129, 130, 146, 178, 179, 180, 181, 182, 183, 184, 186, 187, 188.

BACKGROUND AND HISTORICAL PERSPECTIVE

The Kenai River originates at Kenai Lake near the community of Cooper Landing and terminates in Cook Inlet adjacent to the city of Kenai. The river is glacial and approximately 82 miles in length. It is paralleled for much of its length by the highway road system, making it the most accessible of Alaska's major salmon-producing rivers (Figure 7).

Historically, snagging was the traditional harvest method for taking sockeye salmon in the Kenai River. It was generally believed that this species would not strike a lure or accept bait and that conventional (non-snagging) techniques could not be used to harvest these fish. When the number of sport anglers was relatively small, snagging posed neither a biological nor a social problem. However, as the population of Southcentral Alaska expanded and the Kenai River sport fishery increased in popularity, anglers began to oppose the practice as an unethical harvest method. Anti-snagging measures, first adopted at the Russian River, culminated in 1975 with the BOF promulgating a regulation that prohibited snagging in all freshwaters of the state. In 1979, snagging was prohibited in salt water within a 1-mile radius of the Kenai River mouth and in 1984, all snagging in salt water north of Anchor Point was similarly prohibited.

Because snagging was no longer a legal harvest method in either fresh or salt water, anglers began to experiment with alternative terminal tackle in an attempt to legally harvest sockeye salmon in the Kenai River. Initial efforts were moderately successful with annual harvests averaging 23,778 sockeye salmon from 1977 through 1981 (Table 3).

Between 1981 and 1989, the average harvest increased (Table 17). This dramatic increase (277,906 sockeye salmon were harvested in 1989; Table 17) is attributed to the use of coho flies as terminal gear. The coho flies are drifted along the bank similar to the technique used for a number of years at the Russian River. The belief that sockeye salmon could not be harvested with conventional tackle was gradually dispelled and this innovative technique prompted

additional anglers to seek these fish. The change in fishing technique, coupled with relatively clear water in 1982 and 1983, played a large role in the increased harvests. The larger harvests were further influenced by the magnitude of the inriver runs, which exceeded 1,300,000 sockeye from 1987 to 1989 (Table 18). Kenai River late run sockeye salmon sport fish harvests from 1981 to 2015 have ranged from 15,702 to 455,454 and averaged 211,296 fish, whereas the estimated sockeye salmon runs to the sonar have exceeded a million fish on many occasions (Tables 17 and 18).

The sport fishery for sockeye salmon in the Kenai River is characterized as follows:

1) Large numbers of sockeye salmon must be present to provide acceptable harvest rates.
2) The fishery is short in duration, usually within July 14 to August 5 depending on run timing, and is approximately 15–20 days.
3) The fishery is affected by water conditions; i.e., high water levels with high discharge inundate shore fishing locations with turbid water and generally decreases angler efficiency whereas average discharge increases catch rates.
4) Only a percentage of the total angler effort on the Kenai River is directed toward sockeye salmon, irrespective of run strength or fishing conditions. This is a result of the Kenai River being a multispecies fishery in July and August when the late-run sockeye salmon sport fishery occurs. ADF&G expects angler effort to increase as the population of Alaska increases. Angler participation in the Chinook salmon sport fishery, coho salmon sport fishery, and during even years, the sport fishery for pink salmon, as well as fishing effort for resident rainbow trout and Dolly Varden, account for the remainder of total angler participation.

Recent Alaska Board of Fisheries Actions

During the 2014 Alaska Board of Fisheries meeting, the possession limit for sockeye salmon in the Kenai River drainage was increased to 6 fish.

KENAI RIVER SOCKEYE SALMON LATE-RUN MANAGEMENT OBJECTIVES

Kenai River late-run sockeye salmon are managed under provisions of the *Kenai River Late-Run Sockeye Salmon Management Plan* (5 AAC 21.360). SF manages the inriver sport fishery. Late-run Kenai River sockeye salmon are a component of the harvest of the Upper Cook Inlet commercial fishery managed by the Division of Commercial Fisheries (CF). Since 2011, the Kenai River has been managed to achieve an optimum escapement goal (OEG) of 700,000 to 1,400,000 sockeye salmon. The OEG represents the actual spawning escapement, defined as the inriver sonar estimate less the inriver sport harvest above the sockeye sonar located at river mile (RM) 19.

The plan directs ADF&G to do 3 things:

1) meet the optimum escapement goal,
2) achieve inriver goals as established by the BOF and measured at the Kenai River sonar counter located at RM 19, and
3) distribute the escapement of sockeye salmon evenly within the OEG range, in proportion to the size of the run.

Inriver goals set in the plan are ranges of sockeye salmon passing the sonar at RM 19 (Figure 7) of the Kenai River, and are derived from 3 levels of projected run strength. Ranges of projected run strength and corresponding inriver (sonar) goals are outlined in the plan as follows:

1) If the projected run strength is less than 2.3 million fish, the inriver (sonar) goal is 900,000–1,100,000 sockeye salmon.
2) If the projected run strength is 2.3–4.6 million fish, the inriver goal is 1,000,000–1,200,000 sockeye salmon.
3) If the projected run strength is greater than 4.6 million fish, the inriver goal is 1,100,000–1,350,000 sockeye salmon.

ADF&G CF operates the RM 19 sonar and is responsible for managing UCI commercial fisheries to achieve the inriver (sonar) goals. It is the responsibility of ADF&G SF to assess inriver harvests and to take steps to ensure that the OEG range is achieved by issuing EOs to restrict or liberalize the sport harvest if necessary.

INSEASON MANAGEMENT APPROACH

Historically, management of this fishery has changed in concert with changes in the *Kenai River Late-Run Sockeye Salmon Management Plan*. Prior to the late 1980s, management of the sockeye salmon sport fishery was accomplished through changes to bag and possession limits. Sport harvests were not large enough to significantly impact spawning escapements. Growth in this fishery during the late 1980s and early 1990s witnessed significantly greater inriver harvests.

In 1996, the BOF amended the management plan to incrementally increase the inriver escapement goals for late-run Kenai River sockeye salmon. The inriver goal during the 1996 season was established at 550,000 to 800,000 fish. The inriver goal was subsequently increased to 550,000 to 825,000 fish in 1997 and 550,000 to 850,000 fish in 1998. The inriver goal changed under the tiered management system adopted by the BOF in 1999 and was managed for an OEG of 500,000 to 1,000,000 fish. In 2011, the BOF amended the management plan after ADF&G completed the transition from Bendix sonar technology to DIDSON technology as the method to assess late-run Kenai River sockeye salmon. The goals adopted by the BOF (described above) reflected the adjustment in the estimated number of sockeye salmon passing the RM 19 sonar station as estimated by DIDSON technology that were historically provided by Bendix sonar technology.

Changes to the goals within the management plan did not alter the process for inseason management of the inriver sport fishery because management of this fishery relies on sonar estimates of inriver run strength, escapement, and postseason assessment of the sport harvest from the SWHS. There is no need to assess the sport harvest of sockeye salmon inseason, provided the inriver goal can be met. The current management plan provides a buffer or "escapement gap" between the inriver goal and the lower limit of the OEG range. This gap between the lower limit of the OEG and the inriver goal estimated at the sonar is intended to provide for inriver sport harvests. If the inriver goal (sonar estimate) is achieved, the sport fishery can be prosecuted without restriction. This management strategy for the Kenai River sockeye salmon sport fishery depends heavily upon the successful management of the commercial salmon fishery in UCI to meet the inriver goal. Achieving the inriver goal provides sockeye salmon for inriver harvests and achieves the OEG.

2014 FISHERY PERFORMANCE

The 2014 preseason forecast for Kenai River late-run sockeye salmon was for a run of approximately 3.8 million fish (Shields and Dupuis. 2015). This forecasted run size was the long-term average run size of just over 3.8 million sockeye salmon.

The final estimated total run (escapement and all harvests) was approximately 3.3 million Kenai River sockeye salmon (Shields and Dupuis. 2015). The estimated number of sockeye salmon to pass the sonar counter was 1,520,340 fish (Table 18). When sport harvest estimates above the sonar were subtracted from the sonar estimate, the estimated escapement of late-run Kenai River sockeye salmon was 1,218,342 fish and was above the OEG range (500,000-1,000,000; Shields 2010).

2015 FISHERY PERFORMANCE

A total run of Kenai River late-run sockeye salmon of 3.6 million was forecasted in 2015. This forecast run size was 0.2 million less than the 20-year average run of 3.8 million (Shields and Dupuis 2016). Inseason, the preliminary run size was estimated to be near forecast. The run lagged behind the historical average during the first 2 weeks of July because daily passage was relatively low, remaining below 25,000 fish per day through July 18. Daily passage estimates increased thereafter, however, remaining mostly in the 25,000 to 40,000 fish range with 2 days exceeding 70,000 fish over the 15-day period from July 19 to August 2. The steady but low to moderate immigration of sockeye salmon provided fair to good fishing at times in some areas of the Kenai River downstream of Skilak Lake. The Kenai River sport fishery was liberalized by increasing the sockeye salmon bag limit from 3 to 6 fish effective July 29 with issuance of EO 2-RS-1-50-15 on July 28, except in the Russian River and Kenai River upstream of Skilak Lake. The possession limit was increased to 12 sockeye salmon. The remainder of the run passed the sonar in August with similar daily passage rates as late July; the estimated number of sockeye salmon to pass the RM 19 sonar station daily in August ranged from approximately 13,000 to 42,000 fish until the sockeye salmon sonar at RM 19 was discontinued after August 26.

The final estimate for the 2015 sockeye salmon total run was 3.9 million fish, approximately 300,000 more fish than the preseason estimate (Shields and Dupuis 2016). The number of sockeye salmon estimated to pass by the sonar was 1,709,051 (Table 18). Based on run-timing information, the 2015 run was 10 days later than overall average representing the latest timing ever recorded (Shields and Dupuis 2016). After accounting for the sport harvest of 309,004 sockeye salmon above the sonar, the estimated spawning escapement was 1,400,047 sockeye salmon and was just slightly above the OEG range (700,000-1,400,000; Table 18).

2016 FISHERY PERFORMANCE

The 2016 preseason forecast for Kenai River late-run sockeye salmon was for a run of approximately 4.7 million fish, which was about 1 million fish greater than the 20-year average. ADF&G used inseason assessment data to project that the 2016 Kenai River sockeye salmon run might exhibit late timing and complete the run near forecast. Based on this projection, ADF&G issued EO 2-RS-1-36-16 to increase the sockeye salmon bag and possession limits to 6 per day and 12 in possession, effective July 22 downstream of Skilak Lake (Appendix A3). At the time the EO was issued, approximately 677,000 sockeye salmon had passed the sonar. The minimum inriver run goal of 1,100,000 fish in the Kenai River was achieved on August 5, and by the close of the RM 19 sockeye salmon sonar on August 19, the cumulative passage estimate was

1,383,692 sockeye salmon. The final estimates of harvest above the sonar will be available in 2017; however, the final estimated escapement will probably be within the OEG range (700,000-1,400,000). The *preliminary* estimated total run of Kenai River late-run sockeye salmon was approximately 3.6 million fish, which was less than the preseason forecasted run strength.

CURRENT ISSUES

Allocation of the harvestable surplus of sockeye salmon remains a divisive issue between commercial, personal use, and inriver sport users. Success rates in the sport fishery can decline during or after commercial fishing periods. Consecutive fishing periods may mean consecutive days of low success rates in the sport fishery. Greater harvest in the personal use fishery decreases the numbers of sockeye salmon that may reach upriver sport fishing areas. Therefore, low success rates in the sport fishery are an issue in the management of the fishery.

Provisions within the *Kenai River Late-run Sockeye Management Plan* that require ADF&G to make an inseason projection of the total run of late-run sockeye salmon to the Kenai River cause issues with the public. The responsibility of developing the inseason projection falls upon CF staff. Inherent limitations of the assessment techniques used to make the inseason projections and associated levels of accuracy and precision they afford creates confusion among the public during the implementation of the management plan. The purposes of ranges of projected run strength, corresponding inriver (sonar) run goals, and the SEG and OEG are often misunderstood by the public.

Large numbers of anglers concentrated in confined shoreline fishing areas during this brief but intense sport fishery is an issue. Damage to riparian habitat is an issue of biological concern that has been addressed where possible through regulations adopted by the BOF. Maintaining and providing sport fishing access and infrastructure is an ongoing effort on public lands not closed to fishing. This effort involves several agencies who manage lands in the Kenai River corridor, municipalities, borough, as well as the public.

RECOMMENDED RESEARCH AND MANAGEMENT

We recommend continuing the evaluation of the sockeye salmon sustainable escapement goal as well as research to improve the assessment techniques used to make the inseason projections of sockeye salmon run strength.

The *Kenai River Late-Run Sockeye Salmon Management Plan* in part states[2]:

> …the sonar count levels established in this section may be lowered by the board if noncommercial fishing, after consideration of mitigation efforts, results in a net loss of riparian habitat on the Kenai River. The department will, to the extent practicable, conduct habitat assessments on a schedule that conforms to the Board of Fisheries triennial meeting cycle. If the assessments demonstrate a net loss of riparian habitat caused by noncommercial fishermen, the department is requested to report those findings to the board and submit proposals to the board for appropriate modification of the Kenai River late-run sockeye salmon inriver goal.

[2] "board" means Alaska Board of Fisheries and "department" means Alaska Department of Fish and Game in regulatory language.

Language in this plan has created confusion with the public as to whether or not ADF&G can regulate use on public, private, municipal, and borough lands in the Kenai River corridor. We recommend that it is not practicable to measure habitat loss that is directly attributable to the fishery on lands for which ADF&G holds a management right because these lands are protected from development in perpetuity and are contained in *5 AAC 57.180: Riparian Habitat Fishery Management Plan for the Kenai River Drainage*. We recommend that ADF&G remain active in securing management rights to additional land parcels within the Kenai River corridor for riparian habitat conservation.

NORTHERN KENAI PENINSULA AREA COHO SALMON SPORT FISHERIES

2017 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING KENAI RIVER COHO SALMON SPORT FISHERY ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries targeting coho salmon in the Kenai River:

> Proposal Numbers: 34, 128, 129, 130, 144, 078, 179, 180, 181, 182, 183, 184, 186, 187, 188, 189, 190, 191, 192.

BACKGROUND AND HISTORICAL PERSPECTIVE

Run timing of coho salmon bound for the Kenai River and other Kenai Peninsula systems is slightly later than many Northern District systems. Anecdotal evidence suggests that 2 runs of coho salmon migrate into the Kenai River. However, creel surveys conducted from 1991 to 1993 and in 1998 indicate that 2 distinct runs are not readily discernable from harvest rate data (Clark et al. *Unpublished*). Furthermore, recoveries of coho salmon marked as smolt and returning to the Kenai River as adults indicate that time of entry and time of spawning are independent of date of marking as smolt (Clark et al. *Unpublished*). As a result, coho salmon in the Kenai River are managed as a single stock based on harvest information and smolt abundance.

Coho salmon typically begin entering the Kenai River in late July, continue through mid-September, and continue at much reduced levels into late November. Elsewhere in the NKPMA, the Kasilof and Swanson rivers support major coho salmon fisheries with smaller fisheries also occurring at Crooked, Resurrection, and Six Mile creeks. Unlike the Chinook salmon fisheries, area coho salmon fisheries are generally more accommodating to angler participation; i.e., easy to access by shore or boat fishing with a wide variety of terminal tackle and less specialized equipment. Beginning in the year 2000, bag and possession limits were reduced to 2 fish. All NKPMA coho salmon stocks are assumed to be subject to an unknown degree of commercial exploitation in Upper Cook Inlet (UCI).

It is assumed that the Kenai River has the only significant late-season coho salmon run in Cook Inlet. Sport effort shifts to coho salmon almost immediately after the termination of the Chinook salmon season at the end of July or during the first week in August. The inriver sport fishery occurs downstream from Kenai Lake to the river's terminus at Cook Inlet (Figure 8). Like the highly mobile Chinook salmon fishery, the coho salmon fishery is conducted from boats;

however unlike the fishery for Chinook salmon, fishing from anchored boats as well as from shore is very common. Beginning in the year 2000, bag and possession limits were reduced to 2 fish. Additionally, a 3-day closure was adopted to provide a temporal break between the intensely targeted Chinook salmon fishery at the end of July and the traditional start of coho salmon fishing during the first week in August. In 2002, the BOF adopted the closure as an allocative means to reduce overall harvest of coho salmon by sport anglers as part of the *Kenai River Coho Salmon Conservation Management Plan* (5AAC 57.170). The plan established a coho salmon fishing season end date of September 30 and also included various restrictions on the use of bait as well as restrictions to guided anglers. Coho salmon fishing regulations were liberalized for the Kenai River by the BOF in 2005. Changes resulted in a net gain in fishing time and area and also incorporated less restrictive fishing methods. Several liberalizations implemented for the Kenai River coho salmon sport fishery included the following:

1) The end date of the season was extended for coho salmon fishing within the Kenai River drainage from September 30 to October 31.
2) Bait was allowed throughout the entire season downstream of the upper Killey River.
3) The August 1–3 coho salmon fishing closure downstream of Skilak Lake was repealed, allowing a continuous season from July 1 through October 31.
4) The regulation prohibiting fishing after a person takes a bag limit of 2 coho salmon below the upper Killey River was reduced to below the Soldotna Bridge, allowing a person to continue to fish upstream of the Soldotna Bridge.
5) Fishing from a guided vessel was allowed on Monday for species other than coho salmon upstream of the confluence of the Moose and Kenai rivers.

Coho salmon fishing regulations were also liberalized for the Kenai River by the BOF in 2008. Changes resulted in an increase in the bag and possession limits as well as a net gain in fishing time. The most recent liberalizations implemented for the Kenai River coho salmon sport fishery included the following:

1) A bag and possession limit increase from 2 coho salmon to 3 coho salmon within the Kenai River beginning September 1, except within the Russian River and the Kenai–Russian Rivers fly-fishing only waters.
2) A 30-day season extension for coho salmon fishing within the Kenai River drainage downstream of Skilak Lake from October 31 to November 30.

In 2011 coho salmon fishing regulations for the Kenai River were reviewed by the BOF. The regulatory changes related to the Kenai River were as follows:

1) A coho salmon 16 inches or greater that is removed from fresh water must be retained and becomes part of the bag limit of the person who originally hooked the fish.
2) A person may not remove a coho salmon 16 inches or greater from the water before releasing it.
3) The bag limit in the Kenai–Russian Rivers confluence area downstream of the ferry crossing to the powerline was reduced from 2 coho salmon per day and in possession to 1 per day and in possession.

Kenai River coho salmon stocks are subject to commercial exploitation in Upper Cook Inlet (UCI). Data from a comprehensive coded-wire-tagging (CWT) program (Carlon and Hasbrouck 1996-1998; Massengill and Carlon 2004a, 2004b, 2007a, 2007b; Massengill 2007a, 2007b, 2008, 2013; Massengill and Evans 2007; Begich and Pawluk 2010; Robert Massengill ADF&G Sport

Fish Biologist, Soldotna, personal communication) indicated that Kenai River coho salmon stocks in UCI commercial salmon fisheries were principally harvested in the Central District eastside setnet (ESSN) fishery along the entire coastline of the Kenai Peninsula. Most of this harvest was taken from the setnet fisheries on Coho and Ninilchik beaches (south of the Kasilof River). The majority of the total harvest of Kenai River stocks occurs in the sport fisheries of the Kenai River (i.e., those in Table 19).

Kenai River coho salmon are also harvested in personal use and subsistence fisheries. In 1981 and 1983-1993, there was a fall personal use and subsistence set gillnet fishery for coho salmon on the eastside beaches open to commercial setnetting. This fishery was open in September and therefore harvested late-running coho salmon. In 1985 and 1991–1994, there was also a subsistence set gillnet fishery on Central and Northern District beaches that were open to commercial setnetting. This fishery was generally open on scheduled days from May through September, with open periods concentrated in July (Brannian and Fox 1996).

Kenai River coho salmon are also harvested in the Kenai inriver personal use dip net fishery (Table 6). This fishery has existed in various forms in most years since 1981 and targets Kenai River sockeye salmon in late July and early August. It is described in more detail in the *Kenai River Sockeye Salmon Dip Net Fishery* section of this report. In March 1997, the Alaska BOF changed the closing date of this fishery from August 5 to July 31 to reduce the harvest of coho salmon. The personal use fishery was extended by EO from August 3 through 10 during 2006 due to a late return of sockeye salmon to Kenai River.

Despite relatively stable harvests in the sport fishery through the early 1990s, fisheries managers became increasingly concerned that the current harvest levels could not be sustained.

SF began a stock assessment program in 1992 that focused on the estimation of annual smolt production as an indicator of future abundance (Carlon 2000, 2003; Carlon and Hasbrouck 1997; Carlon and Hasbrouck 1998). Data from this program indicated a decline in smolt abundance from approximately 1,000,000 from 1992 to 1993 to less than 500,000 in 1995. Because this decline in smolt abundance was likely to result in reduced adult returns to the Kenai River, the BOF addressed this fishery in March 1997.

In 1998, SF began an adult coho salmon tagging program to estimate the number of adult coho salmon returning to the Kenai River. This program provided data to estimate the number of adult coho salmon returning to the Sterling Highway Bridge at RM 20 in Soldotna, with acceptable levels of accuracy and precision from 1999 to 2004. In addition, this inriver estimate in combination with the sport harvest data from the SWHS enabled ADF&G to estimate total runs, spawning escapement, and exploitation of Kenai River coho salmon. These estimates, combined with the smolt abundance estimates, also provided estimates of smolt to adult survival.

From 1999 through 2004, the coho salmon runs averaged about 140,000 fish with harvests averaging just over 62,000 fish. From 2000 to 2004, exploitation rates ranged from about 35% to 47%. Smolt abundance ranged from nearly 580,000 to 1,200,000 with marine survival ranging from 6 to 32% (Carlon and Evans 2007; Massengill and Evans 2007).

From 2005 through 2007, the focus of the coho salmon stock assessment program was to estimate smolt abundance through a mark–recapture project. In this project, smolt were tagged in the spring and early summer at Moose River. Fish wheels, operated upstream of the Soldotna Bridge at RM 28, captured returning adults in order to estimate the number of smolt leaving the

system the prior year. Smolt tagging was discontinued in 2007 and returning adults were sampled for tags during 2008 (Robert Massengill, Division of Sport Fish Biologist, Soldotna, personal communication).

Annual Kenai River coho salmon sport harvests increased from a low of 9,537 fish in 1977 to a record high 86,711 fish in 1994 (Table 19). Sport harvests then decreased from 1994 to 1999. Kenai River coho salmon sport harvests averaged 40,776 fish during 1977–1999, prior to the 2-fish per day bag limit that started in 2000, and have since averaged 49,982 fish (Table 19).

Similar to the Kenai River, other NKPMA coho salmon stocks are assumed to be subject to some unknown degree of commercial exploitation in Upper Cook Inlet (UCI). Kasilof River coho salmon are also harvested in a personal use fishery (Table 6). The Kasilof River personal use fishery is open through August 7.

Sport harvests of coho salmon in the Kasilof and Swanson River drainages as well as in Resurrection creek have remained stable, with some variation (Table 20). In 2015, Six Mile Creek reported the second highest harvest since 1986. Harvests for the most recent 10-year average (2006–2015) are slightly greater in Kenai River tributaries, the Kasilof River drainage, and other drainages (excluding Swanson River drainage) than harvests prior to the bag limit reduction in 2000 (Tables 19 and 20).

Recent Alaska Board of Fisheries Actions

During the 2014 BOF meeting, 1 regulation was adopted affecting coho salmon sport fisheries in the NKPMA. This regulation eased the restriction to guided anglers by allowing them to fish for coho salmon downstream of the Moose River on Labor Day. Previously guided anglers were prohibited from fishing downstream of the Moose River on any Monday in September including Labor Day.

COHO SALMON MANAGEMENT OBJECTIVES

In March 1997, the BOF adopted the *Kenai River Coho Salmon Management Plan* (5 AAC 21.357). This plan contained regulations that reduced the total (combined sport and commercial) harvest by approximately 20%. In the spring of 2000, the BOF amended this plan again and adopted it as the *Kenai River Coho Salmon Conservation Management Plan* (5AAC 57.170). It contains management directives and outlines the burden of conservation between various user groups in the NKPMA**.** It directs ADF&G to minimize the incidental take of Kenai River coho salmon stocks in the commercial fishery. It also directs ADF&G to manage Kenai River coho salmon stocks primarily for sport and guided sport uses in order to provide fishermen with reasonable opportunity to harvest these stocks over the entire run, as measured by the frequency of restrictions.

During the February–March meeting of the BOF in 1999, early-run Kenai River coho salmon were addressed in the *Upper Cook Inlet Salmon Management Plan* (5 AAC 21.363). This BOF–adopted management plan directed ADF&G to minimize the harvest of this species in the Cook Inlet commercial salmon fishery. In 1999, the BOF amended this plan.

In 2005, the *Kenai River Coho Salmon Conservation Management Plan* was repealed. The resulting plan, *Kenai River Coho Salmon Management Plan* (5AAC 57.170), provides the current regulatory framework and guidelines for management to ensure an adequate escapement of coho salmon into Kenai River.

In addition to objectives and guidelines given in the aforementioned management plan, ADF&G management objectives for NKPMA coho salmon are as follows:

1) Provide opportunity for angler participation at a level that can be supported by the fisheries resource and associated habitat.
2) Ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure sustained yield.

INSEASON MANAGEMENT APPROACH

Currently, there are no active research programs associated with NKPMA coho salmon fisheries. For the Kenai River stock, there are no quantitative data to assess coho salmon stock status, and an escapement goal has not been established. With the exception of 1997, when use of bait was prohibited and the coho salmon bag and possession limits were reduced to l fish, there has been no inseason management of NKPMA coho salmon stocks except in the Kenai River during 2004 when the coho salmon season was extended 31 days from September 30 to October 31. Rather, all the NKPMA coho salmon sport fisheries are presently managed inseason by regulation.

Inseason fishery performance in the Kenai River from 1999 through 2007 was gauged by fish wheel catches from the coho salmon stock assessment program, through direct observation by research and management staff, and by information provided by anglers. Escapement was not estimated from ADF&G fish wheels inseason. However, fishwheel capture rates can indicate an index of low, medium, or high magnitudes for the Kenai River coho salmon run size. Currently, inseason fishery performance is assessed through information provided by anglers and through guided angler success determined from the guided logbook program data received at the Soldotna office during August through September.

The SWHS is currently used to assess coho salmon fishery performance postseason (Mills 1987-1994; Howe et al. 1995, 1996; Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited December 2016], available from http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Results from this survey are typically available during the year following the season. A comprehensive CWT project in Cook Inlet has estimated the annual smolt outmigration from the Moose River drainage. These estimates were previously thought to be a useful management tool under the assumption that there is a correlation between the magnitude of smolt outmigration and the magnitude of total return. However, research results indicate that the correlation is weak due to variation in smolt to adult survival.

2014–2016 FISHERY PERFORMANCE

Inseason run strength and fishing success were gauged by reports volunteered by guides and individual anglers. Final harvest estimates are provided by the SWHS as well as the guide logbook program.

Areawide reports from anglers as well as harvest estimates indicated the 2014 and 2015 coho salmon fisheries were average to above average while the 2016 fishery was below average. The estimated harvest in the Kenai River declined each year from 52,912 in 2010 to 36,407 in 2012 but has since increased in 2014 and 2015.(Table 19). Harvest during 2014 (60,566 fish) was above the long term (1981–2015) average harvest of 47,818 coho salmon. The most recent 10-year (2006–2015) average harvest was 47,728 fish. Harvests in the Swanson River drainage have

been lower more recently than harvests in the past. The 2014 harvest (782 fish) was well below the average for 2006–2011 (1,796 fish); however, the 2015 estimated harvest of 969 coho salmon was the highest harvest estimated since 2011 (Table 20). Coho salmon harvest estimates in other NKPMA drainages were higher than the long-term average harvests estimated for those systems. Based on angler reports, staff observations, and information throughout Cook Inlet, it appeared that the 2015 coho salmon run timing was later than typically observed. For instance, reports from many streams throughout the Cook Inlet area indicated high fishing success occurring during late August and early September at locations where fishing success typically peaks during August. Reports from anglers during the 2016 coho salmon fishery indicated the fishery declined after 2014 and 2015, with many fisheries reporting very low success rates during the traditional peak coho salmon fishing in August and September. ADF&G expects that the 2016 harvests of coho salmon from these fisheries will be less than the recent 10-year average for each system.

Reports from anglers during the 2016 Kenai River coho salmon sport fishery indicated the fishery started out very slow and did not improve to good fishing success. Poor to fair coho salmon catches were reported throughout the season from early August through September. Reports indicated that good fishing was sporadic and did not improve later in the run during September. Coho salmon were caught throughout the drainage and the run timing was difficult to determine on a broad scale because success rates remained low all season.

The *Kenai River Coho Salmon Management Plan* was established to prevent the over exploitation of the stock in times of weak or very low runs. Although no estimate for the total number of coho salmon in the run to Kenai River is available, estimates of harvest from the SWHS for the 2014 and 2015 seasons indicated a small decline in harvest in 2015 but this was an increase from prior years (Table 19) and matched inseason fishery reports. For both 2014 and 2015, run abundances were probably average or larger than average, with the 2015 run generally considered to be one of the latest arriving runs relative to timing over several recent years.

Reports from 2016 indicated that fishing was generally slow with sporadic reports of fair to good fishing reported only at the beginning of September and occasional report in mid-September. These reports indicated run strength was probably well below average. The below-average run-strength was reflected in ADF&G catches of coho salmon in the lower Kenai River Chinook salmon netting program which detected few coho salmon passing into the Kenai River during mid-August. Therefore, below-average harvest estimates are anticipated for the Kenai River in 2016.

CURRENT ISSUES

Since 1977 fishery performance, measured by catch and harvest, was thought to be proportional to abundance and therefore the fishery was managed under a 3-fish bag limit. The fishery is presently managed under a 2-fish bag limit except for the Kenai River where the bag limit increases to 3 fish beginning September 1. Recent catch and harvest estimates are similar to or larger than those estimated historically. Without an inseason assessment program or biological information upon which to manage each of the numerous coho salmon stocks that compose this fishery, the fishery is managed with a 2-fish bag limit to avoid the potential of decreasing coho salmon production during years of low abundance. The lack of information to estimate total runs, escapements, and a harvestable surplus is a concern for the public that desires a 3-fish bag limit.

RECOMMENDED RESEARCH AND MANAGEMENT

We do not recommend a change in the management of NKPMA coho salmon until a stock assessment program can be initiated and developed to estimate total runs, spawning escapement, and harvestable surplus available to the various fisheries.

NORTHERN KENAI PENINSULA MANAGEMENT AREA PINK SALMON SPORT FISHERIES

2017 Proposals to the Alaska Board of Fisheries Concerning Pink Salmon Sport Fishery Issues

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) may have some impact on the sport fisheries targeting pink salmon in the Kenai River:

Proposal Numbers: 34, 123, 124, 125, 126, 128, 129, 130, 186, 187, 188.

BACKGROUND AND HISTORICAL PERSPECTIVE

Runs of pink salmon occur each year; however in the NKPMA, this species is more abundant during even-numbered years. Although small numbers of pink salmon return to several NKPMA streams, the Kenai and Kasilof rivers and Resurrection Creek near Hope support the largest runs. The majority of the pink salmon harvest occurs in the Kenai River (Table 21).

Pink salmon are readily caught with a variety of artificial lures, flies, and with bait. Because this species tends to limit its inriver distributions near tide water in the lower sections of rivers while maturing, massive aggregations of fish are present in some years, making them popular with juvenile anglers and tourists. In 1989, the bag and possession limits in the Kenai River were increased to 6 fish in the Kenai River; in other NKPMA drainages, it remains an aggregate bag limit of 3 sockeye, pink, and coho salmon 16 inches or greater in length of which no more can be 2 coho salmon.

Recent Alaska Board of Fisheries Actions

There have been no recent regulatory changes in this fishery.

PINK SALMON MANAGEMENT OBJECTIVES

This fishery is not specifically addressed in a sport fishery management plan adopted by the BOF. ADF&G objectives for this fishery are as follows:

1) Provide opportunity for angler participation at a level that can be supported by the fisheries resource and associated habitat.
2) Ensure, through appropriate management and research programs, that the spawning escapement does not decline below levels necessary to ensure a sustained yield.

INSEASON MANAGEMENT APPROACH

Inseason management has not been required in this fishery. Management is achieved through existing regulations. The SWHS is currently used to assess pink salmon fishery performance postseason (Mills 1987-1994**;** Howe et al. 1995, 1996**;** Alaska Sport Fishing Survey database

[Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited December 2016], available from http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Results from this survey are typically available during the year following the season.

2014–2016 FISHERY PERFORMANCE

Inseason run strength was gauged by reports from ADF&G staff, and information volunteered by guides and by individual anglers. Final harvest estimates provided by the SWHS indicate the Kenai River even-year catch and harvest estimates from 2014 were comparable to historical catch and harvest levels (Table 21). However, according to staff operations and angler reports, the run strength of pink salmon to NKPMA Rivers was unusually strong. This was most obvious in the Kenai River sockeye salmon sport fishery where catch rates of pink salmon overwhelmed catch rates of the target species (sockeye salmon) beginning the last week of July through the remainder of the season. In addition, great aggregations of pink salmon were observed by staff and the public in several areas of the Kenai River downstream of Skilak Lake with the most noteworthy numbers being distributed in the lower section from Soldotna downstream to tidewater.

The 2016 abundance of pink salmon was less relative to other even-year run strengths as reported from ADF&G staff, guides, and individual anglers; however, the size of the pink salmon in the run were unusually large. Inseason data provided by the Division of Commercial Fisheries fish ticket database showed the average weight of pink salmon in the commercial harvest was double the historical average weight: 6 pounds rather than 3 pounds (P. Shields, Commercial Fisheries Biologist, ADF&G, Soldotna, personal communication). In addition, the State of Alaska record pink salmon weight was broken on 2 occasions during the same date when the existing record of 12 pounds, 9 ounces was exceeded by a 12 pound, 13 ounce fish followed later the same day by a pink salmon weighing 13 pounds, 10.6 ounces. These highly publicized large fish sizes in 2016 may have driven up angler interest and as such, 2016 fishery statistics may be higher than most other even years.

CURRENT ISSUES

There are currently no biological concerns regarding Northern Kenai Peninsula pink salmon.

RECOMMENDED RESEARCH AND MANAGEMENT

No research or management activities specific to this fishery are recommended.

NORTHERN KENAI PENINSULA MANAGEMENT AREA RESIDENT SPECIES SPORT FISHERIES

2017 Proposals to the Alaska Board of Fisheries Concerning Kenai River Rainbow Trout Sport Fishery Issues

KENAI RIVER RAINBOW TROUT SPORT FISHERY

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries targeting rainbow trout in the Kenai River:

Proposal Numbers: 34, 71, 73, 74, 75, 76, 77, 78, 81, 145, 186, 187, 188.

Background and Historical Perspective

The Kenai River is the most heavily utilized river for freshwater sport fishing in Alaska and one of the largest rainbow trout fisheries in the United States. Although many of the anglers fishing the Kenai River participate in the river's salmon fisheries, the Kenai River drainage also supports a major rainbow trout fishery with annual catches that have trended upwards for 2 to 3 decades. Catches have ranged from 8,720 to 241,651 fish since 1984 and are more stable in recent years (Table 22, Figure 9) although the 2015 reported catch exhibits a dramatic increase over prior years, possibly a reflection of limited Chinook salmon opportunity due to early-run closure.

Increasing public concern for the rainbow trout resource and a scarcity of biological and fishery data from the early years of the fishery prompted the BOF to adopt increasingly restrictive regulations between 1959 and 2008 (Appendix C1).

In 1986, ADF&G began to compile population and fishery databases for use in formulation of a drainagewide management strategy for Kenai River rainbow trout. During 1986, a mark-recapture program was designed to estimate the rainbow trout population in section 004 from Jim's Landing upstream to the power line near the Russian River (Figure 10; Lafferty 1989). The rainbow trout population estimates for section 004 for fish over 200 mm were 3,640 fish in 1986 and 4,950 fish in 1987 (Lafferty 1989).

In 1987, the study was expanded to include 2 sections (002 and 003) of the river below Skilak Lake in the middle river (Lafferty 1989; Figure 10). Lafferty (1989) concluded that the best estimates of rainbow trout abundance, 200 mm or greater in length, for section 003 of the middle river was 1,750 fish (Table 23). This study also concluded that these estimates were probably negatively biased.

In 1995, the population estimate was repeated in section 004 (Hayes and Hasbrouck 1996). Data analysis in 1995 included a reevaluation of the 1986 and 1987 data to provide comparable estimates. Estimates of abundance of rainbow trout, 300 mm (12 inches) or greater in length, in section 004 in 1986, 1987, and 1995 were 2,520, 3,472, and 5,598 fish, respectively (Table 23). This study concluded that the rainbow trout population in the upper Kenai River had increased and that there was an increased number of rainbow trout in each 2-inch size class of the population from 12 to 22 inches in length. It was further concluded that the upper Kenai River rainbow trout population numbers had been maintained at a high level and that section 004 could serve as an index of abundance of the upper Kenai River rainbow trout population.

In 1998, additional research was instituted to reassess the population of rainbow trout in the Kenai River drainage. This study was a multi-year study that addressed multiple sections of the river. Primary aspects of this work were to repeat the mark–recapture programs in the area below Skilak Lake and in the upper river section to compare population estimates among years (Larson and Hansen 2000; King and Breakfield 2007).

The middle river estimate of abundance in 1999 was 7,883 fish, compared to 1,750 fish during 1987 (Larson and Hansen 2000). The estimated number of rainbow trout had increased by 400% in the 12 years between studies. Final conclusions were that the population was increasing and the numbers of fish in each size class were increasing, with the exception of large fish (those over 24 inches in length). Over this same period, rainbow trout catches in the middle river

increased from 6,430 fish in 1987 to 32,050 fish in 1999 (Table 22). Harvest remained relatively stable and averaged about 802 fish from 1987 to 1999.

In 2001, the fourth rainbow trout population estimate in 16 years was derived for the upper river index area (King and Breakfield 2007). The estimated number of rainbow trout, 12 or more inches in length, increased from 5,598 fish in 1995 to 6,699 fish in 2001 and was nearly 300% higher than the population size estimated in the mid-1980s (King and Breakfield 2007). The reported catch of rainbow trout in the upper river from 1986 to 1987 averaged 2,945 fish and the catch increased to 33,475 fish in 1995 and was 78,836 fish in 2000 (Table 22).

During 2009, abundance of rainbow trout in the upper river was indexed for the fifth time (Eskelin and Evans 2013). The estimated number of rainbow trout, 300 mm (12 inches) or more in length, was 5,106 fish in 2009 (Table 23). The 2001 data were reevaluated in 2009 using different assumptions resulting in an estimated population size of 6,365 fish (Table 23). The 2009 estimate is lower than the 2001 estimate of 6,365 fish but within the range of abundance estimates from this area since 1995. The decline was attributed to a slight reduction in the estimated numbers of smaller rainbow trout. The numbers of large rainbow trout increased slightly over abundance estimates conducted previously.

Based on these positive findings about the status of the upper and middle Kenai River rainbow trout stocks, ADF&G did not have a concern for the health of the stocks.

In 2010, a rainbow trout radio telemetry project was initiated to define the seasonal movements and spring spawning distribution of rainbow trout in the middle and lower sections of the Kenai River. Findings from this project showed that rainbow trout summering in the area of the river between Moose River at RM 36 and Slikok Creek at RM 18 undertake seasonal migrations amongst overwintering, spawning, and oversummering areas that are relatively well defined. Specifically, radiotagged rainbow trout present in the middle Kenai River downstream of Moose River (RM 36) in summer generally overwinter upstream of RM 42 to Skilak Lake (Figure 10). In addition, a majority of tagged fish successfully tracked over 1-year spawn mostly from Skilak Lake outlet downstream to RM 44, an area downstream of the upper Killey–Kenai rivers confluence (Figure 10; Tony Eskelin, ADF&G Sport Fish Biologist, Soldotna, personal communication).

Recent Alaska Board of Fisheries Actions

During the 2014 Alaska Board of Fisheries meeting, regulations were adopted opening rainbow trout fishing the entire year in the Kenai River downstream from ADF&G markers located approximately 1 mile upstream of the lower Killey River confluence.

Kenai River Rainbow Trout Management Objectives

Management objectives for this fishery were first developed from and were contained in the *Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy* (CIRTMP; ADF&G 1987). This policy was adopted by the BOF in 1986 for Cook Inlet waters, and was amended in 1988 to include the Copper River Basin. This plan was replaced in 1998 by the *Criteria for establishing management areas for trout* (5 AAC 75.013) which was replaced by the *Special management areas and liberal harvest opportunities for trout* (5 AAC 75.210) in 2003. This most recent version of the plan establishes the criteria for considering proposed regulatory changes for bodies of water that would diversify sport fishing opportunity through the liberalization of harvest opportunities for rainbow trout.

As specified in the plan, the Kenai River rainbow trout fishery is managed for sustained yield. The fishery provides a diversity of sport fishing opportunities for wild rainbow trout through establishment of special management areas by regulation. These management areas provide for diverse fishing practices as well as modest harvest opportunity.

Fishery objectives for the Kenai River rainbow trout fishery are as follows:

1) Provide the opportunity for angler participation at a level that can be supported by the fisheries resource and associated habitat.
2) Ensure, through appropriate management and research programs, that the trout population does not decline below levels necessary to ensure sustained yield.

Inseason Management Approach

The Kenai River rainbow trout fishery is highly restricted and inseason management is directed by regulation. The adoption of the rainbow trout spring spawning season fishing closure in 2005 resulted in a net gain in fishing time and fishing area for rainbow trout anglers in the Kenai River drainage. However, anglers are still allowed to fish for Dolly Varden in the middle and lower Kenai River below the upper Killey River during the spring closure. Currently, the rainbow trout populations in the Kenai River watershed are considered to be relatively robust. Information from the SWHS indicates sport fishing for rainbow trout in the Kenai River remains very popular. ADF&G staff have observed the presence of a number of both guided and unguided anglers on the river fishing for rainbow trout throughout several months of the year. Fishing in winter months, provided sections of the river remain free of ice, is popular near Cooper Landing and downstream of Skilak Lake. Reports from the general public and staff observations indicate rainbow trout fishing during the fall, winter, and early spring prior to the spawning closure on May 2 is still gaining popularity.

2014–2016 Fishery Performance

Sport harvest and catch for the Kenai River rainbow trout fishery is determined by the SWHS (Mills 1987-1994**;** Howe et al. 1995, 1996**;** Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited December 2016], available from http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Total catches of Kenai River rainbow trout increased steadily since the mid-1980s and remain high with some variation (Table 22; Figure 9). The most recent 10-year (2006-2015) average catch and harvest, as determined from the SWHS, is 180,669 and 2,316 fish respectively (Table 22). The most recent 10-year (2006–2015) average percent of rainbow trout retained of fish caught in the flowing waters of the Kenai River is less than 2% (Table 22). ADF&G estimates that the 2016 total catch will be similar to the most recent average.

Retention of rainbow trout by anglers has not changed much since the mid to late 1990s (Table 22). Retention of fish in the former catch-and-release fishery between Kenai and Skilak lakes has been allowed since the 2005 season for trout that are 16 inches or less. Retention in this fishery increased sharply from an estimated harvest of 267 fish in 2005 to about 941 in 2008 (Table 22). Since 2008, the estimated harvests have been less than 450 fish and during 2015, the estimated harvest of rainbow trout in this section between the lakes was 286 fish, while catch in this section remained high and was, in fact, the highest recorded catch on record for this section (Table 22). For the entire river, the overall percentage of retention has declined since the late 1980s due to greater catches (especially after 2003) probably precipitated by more anglers

participating in the fishery. The percentage of the total number of rainbow trout caught in the Kenai River in 2015 that were retained was about 1% (Table 22). This is similar to the recent percentages estimated for fish retention. ADF&G predicts that this trend will continue and the 2016 catch and harvest data will be similar to 2015 data. Overall, the SWHS information shows that the Kenai River rainbow trout fishery is as popular as a catch-and-release sport fishery as it has ever been. Information about the rainbow trout stock in combination with catch and harvest information indicates the stock remains robust.

Reports from anglers participating in the 2016 fishery and ADF&G staff observations suggest that the rainbow trout and Dolly Varden fishing was considered average. No unusually high water events occurred during late-August through September to reduce angler participation, although high water levels within historical ranges did occur at times. However, under favorable water conditions in both the upper river (between Kenai and Skilak lakes) and in the middle river (between Skilak Lake and Moose River), catches of rainbow trout and Dolly Varden were reported to be similar to recent years. ADF&G did not receive reports from anglers during the season that indicated that the rainbow trout stocks in the Kenai River were declining, failing, weak, or that fish size had changed appreciably. Several reports of large trophy rainbow trout were relayed to area staff in the Soldotna office.

Current Issues

Kenai River rainbow trout are conservatively managed under restrictive bag limits and fishing is not permitted during the spawning period upstream of approximately RM 42.5. Fishing during the spawning period in areas of the Kenai River that are not closed to all fishing is allowed under existing regulation; however, participation in this fishery during May 2 through June 10 is low.

Recommended Research and Management

Interest and participation in the Kenai River rainbow trout fishery as measured by annual catch remains high and the population appears to be robust. We recommend continued projects conducted periodically to determine the abundance of rainbow trout in select sections of the Kenai River.

KENAI RIVER DOLLY VARDEN SPORT FISHERY

The following proposals in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) may have some impact on the sport fisheries targeting Dolly Varden in the Kenai River:

Proposal Numbers: 34, 71, 145, 186, 187, 188, 208.

Background and Historical Perspective

Dolly Varden are harvested in all areas of Kenai River. Harvest and catch of this species is determined by the SWHS (Mills 1987-1994**;** Howe et al. 1995, 1996**;** Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited December 2016], available from http://www.adfg.alaska.gov/sf/sportfishingsurvey/). The open season for Dolly Varden fishing is January 1 through December 31, except in those areas of the river upstream of the upper Killey River and upstream of Skilak Lake, where more restrictive seasons apply. Prior to 1984, the bag

and possession limits were 10 Dolly Varden of any size. Beginning in 1984, these limits were reduced to 5 Dolly Varden of any size. In 1990, the BOF chose a more conservative management approach and reduced the daily bag and possession limit for the upper Kenai River to 2 fish, only 1 of which could be 24 inches or larger. The bag and possession limits for the remainder of the drainage were unchanged until 1992, when the BOF reduced the limit from 5 to 2 fish of any size. In 1996, the limit for all Kenai Peninsula flowing waters was reduced to 2 fish, including a protected slot limit prohibiting retention of fish between 12 and 24 inches, and an open season from June 15 through April 14 was also established. In 1998, spawning season closures were established in 3 upper Kenai River tributaries that were identified as important for Dolly Varden production. Fishing was prohibited from September 15 through October 31 in Cooper Creek, Quartz Creek, and Snow River.

The Kenai River is assumed to support both resident and anadromous Dolly Varden populations. Only limited biological information is available regarding both populations. Resident fish are believed to inhabit the entire river, including both Skilak and Kenai lakes. Seasonal movements of these resident fish are not known, but it is assumed that a percentage of the stream-residing fish overwinter in Skilak and Kenai Lakes. The anadromous population is believed to enter Kenai River in July and it is assumed that some of these fish also overwinter in Skilak Lake and probably Kenai Lake. Dolly Varden emigrate from both of these lakes in April and May. Harvest estimates presented in Table 24 do not differentiate between resident and anadromous populations.

A study of Kenai River Dolly Varden was initiated in 1996. The primary objective of this study was to locate major staging areas of Dolly Varden within the Kenai River watershed upstream of Skilak Lake (Palmer and King 2005). Future Dolly Varden studies will investigate the age, maturity, and availability of Dolly Varden in these locations.

A number of staging areas where Dolly Varden congregate have been located by deploying various trapping devices and conducting visual observations. The U.S. Fish and Wildlife Service (USFWS) conducted a Dolly Varden radiotelemetry study during 1998 and 1999 when radio transmitters were placed in Dolly Varden in the Kenai River, selected tributaries, and Skilak and Kenai lakes. The radiotelemetry study provided information on major staging areas, seasonal fish movements, and overwintering areas (Palmer and King 2005).

Research findings indicate Dolly Varden occupy most tributary streams to Kenai Lake and the Kenai River. Staging areas containing spawning fish were identified in Quartz, Summit, and Cooper creeks and the Snow River; Quartz Creek and its associated tributaries were also suspected of supporting one of the major spawning populations upstream of Skilak Lake. To date, no major Dolly Varden staging areas have been located within Kenai Lake during summer or fall. Radiotelemetry data indicate Dolly Varden prefer traveling throughout the pelagic zone of Kenai Lake during the summer and fall rather than along the shoreline. During winter, fish may frequent the area around Porcupine Island. Porcupine Island is one of the few areas within Kenai Lake having a shallow gravel bottom, which may be preferred overwintering habitat for Dolly Varden.

During the 2002 BOF meeting, changes were made pertaining to size retention and bag and possession limits of Dolly Varden. In the Kenai River drainage upstream of the upper Killey River, the protected slot limit was removed and the bag limits were changed to 1 per day and 1 in possession less than 18 inches in length. In 2005, the BOF aligned the Dolly Varden regulations

in the Kenai River to be the same or similar to those for rainbow trout. The bag and possession limits remained at 1 fish; however, the maximum retention length of a Dolly Varden was restricted to less than 16 inches in waters above Skilak Lake with a season of June 11 through May 1. In the Kenai River below Skilak Lake the bag and possession limits were reduced to 1 fish less than 18 inches and the season was open the entire year.

Recent Alaska Board of Fisheries Actions

During the 2014 Alaska Board of Fisheries meeting, no regulations were adopted affecting the Kenai River Dolly Varden sport fisheries. Kenai River drainage sport fishing regulations for Dolly Varden have remained unchanged since 2005.

Kenai River Dolly Varden Management Objectives

This Dolly Varden fishery is not directly addressed in a management plan adopted by the BOF. ADF&G objectives for this fishery are as follows:

1) Provide the opportunity for angler participation at a level that can be supported by the fisheries resource and associated habitat.

2) Ensure, through appropriate management and research programs that the Kenai River Dolly Varden population does not decline below the level necessary to ensure sustained yield.

Inseason Management Approach

Inseason management has not been required in this fishery. The fishery is managed by existing regulations. Populations of Dolly Varden currently appear to be robust.

2014–2016 Fishery Performance

There is no creel survey or monitoring program to assess this population inseason. Harvest estimates are derived postseason from the SWHS (Mills 1987-1994**;** Howe et al. 1995, 1996**;** Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited December 2016], available from http://www.adfg.alaska.gov/sf/sportfishingsurvey/). Catch for this species was first estimated by the SWHS in 1990. Harvest estimates reflect a fishery with a peak harvest in 1984 of 31,407 (Table 24). The significant decline for 1986 and 1987 harvests is attributed to more restrictive bag limits (from 5 fish per day to 2 fish per day in 1993; from 2 fish per day to 1 fish per day in 2005) and the adoption of a voluntary catch-and-release philosophy. The Dolly Varden catch is thought to be greatest when increasing angler effort is directed toward rainbow trout beginning in August. Because the regulatory structure is similar to that for rainbow trout, this fishery is not harvest oriented and nearly all fish caught are released. Dolly Varden undertake seasonal migrations in the fall when anglers welcome the additional fishing opportunity they provide.

The most recent 10-year average (2006–2015) Dolly Varden harvest from the Kenai River was 3,128 fish (Table 24). The 2015 SWHS estimate of total catch of Dolly Varden in the Kenai River was 151,563 fish and is the largest catch total since 1990 (Table 24; Figure 11). The percentage of Dolly Varden retained in 2015 (2.5%) was almost equal to the percentage of the most recent 10-year average (2005–2014) of 2.4% (Table 24). Anglers are expected to continue to retain low percentages of Dolly Varden caught in the Kenai River sport fisheries. ADF&G

projects that the 2016 season's sport fishing catch and harvest should be similar to the 2015 season.

Current Issues

There are currently no major issues associated with the Kenai River Dolly Varden fishery.

Recommended Research and Management

As interest and participation in the Kenai River fisheries for rainbow trout has increased so has interest in Dolly Varden. Over recent years, total participation in the Kenai River fisheries has stabilized; however, fisheries for resident species have continued to grow as measured by catch. The conservative management of Dolly Varden has stabilized annual catches and reduced harvest. We do not recommend any specific research or management for this fishery.

OTHER NORTHERN KENAI PENINSULA MANAGEMENT AREA RESIDENT SPECIES SPORT FISHERIES

2017 Proposals to the Alaska Board of Fisheries Concerning NKPMA Resident Species Sport Fishery Issues

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries targeting other resident species in the NKPMA:

Proposal Numbers: 71, 72, 73, 78, 194.

Background and Historical Perspective

Lake survey data collected by ADF&G from 362 lakes within the NKPMA document that 212 lakes support natural populations of game fish and an additional 27 lakes are stocked by ADF&G. Game fish present in area lakes include rainbow trout, Dolly Varden, Arctic char, Arctic grayling, lake trout, landlocked salmon, and burbot (*Lota lota*). Numerous flowing waters also support fisheries for rainbow trout as well as Dolly Varden. Steelhead occur in both the Kasilof and Kenai rivers.

With the exception of a few studies, investigations by ADF&G for these fisheries is limited to research on stocked lakes, summarized by Pawluk and Berkhahn (2012), and on unstocked lakes by Tobin III and Palmer (1997). Overall, research information on area lakes is confined to basic lake survey information conducted by ADF&G during the 1960s and 1970s. These resident species fisheries are not monitored inseason. The statewide harvest survey has been used to determine the catch, harvest, and participation from lakes, provided the number of respondents is sufficient to estimate these sport fishing parameters. Similarly, statewide harvest survey estimates are available for numerous flowing waters that support popular fisheries for resident species.

Tributaries within the Kenai River drainage, including the Russian River, Quartz, and Ptarmigan creeks, support popular fisheries for both rainbow trout and Dolly Varden (Tables 25 and 26). Estimates of participation and catch of both species at these locations increased through the early 1990s with some variation. Although in 2011 and 2012 there was a marked decline in effort and

catch (excluding the Russian River), but the estimated total fishing effort and catches of rainbow trout and Dolly Varden have increased since then.

Steelhead occur naturally in the Kasilof River. In the early 1980s, steelhead spawning in Crooked Creek, a tributary to the Kasilof River, were used to enhance the stock for sport fishing. According to the SWHS, enhancement generated relatively large catches exceeding 6,000 fish and harvest in excess of 2,000 fish during 1993. This program was terminated in 1996. In the Kasilof River drainage from 2004 to 2009, steelhead were assessed using weirs at Crooked and Nikolai creeks; Nikolai Creek is a tributary of Tustumena Lake. In combination, counts averaged over 1,000 steelhead. During this same time period, the USFWS conducted a steelhead telemetry study at the Kasilof River and documented seasonal distributions and run-timing patterns of Kasilof River steelhead (Gates and Palmer 2008b; Gates 2009; Gates et al. 2010). This documented fish from Nikolai Creek, as well as a Kasilof River mainstem spawning component previously not known to be present. These findings are significant because it was originally thought that all Kasilof River steelhead originated from Crooked Creek.

The Kasilof River supports a minor steelhead fishery with sporadic harvests. Presently, catch and harvest supported by natural production are small in comparison to what occurred when the enhancement program was ongoing. Steelhead have also been documented in the Kenai River drainage. The main source for this information is from the adult coho salmon assessment projects conducted from 1998 to 2007. During these years, fish wheels were operated at approximately RM 28 and inriver netting was conducted as part of a capture–recapture experiment upstream of RM 28 to approximately RM 36 in the middle river during October; these wheels and nets occasionally captured steelhead. Since that time, anglers fishing during late fall and winter report catches of large rainbow trout with physical characteristics commonly observed in the anadromous form. Steelhead and rainbow trout present in the Kenai River are not separated for management purposes. In addition, the SWHS information is not categorized between the life history forms of rainbow trout. The anadromous form is larger in size (greater than 20 inches in total length) at first maturity when they are recruited into the sport fishery. In the Kenai River, steelhead are conservatively managed because harvest of rainbow trout 18 inches or greater in total length is prohibited year-round where they have been observed downstream of Skilak Lake.

In addition to the Kenai River drainage, the Swanson River and Swanson River drainage canoe route lakes provide rainbow trout and Dolly Varden sport fishing opportunities in 40 lakes that are linked to the 46 mile long Swanson River that flows into Cook Inlet. The river and canoe route lakes are accessible by the road system. Historically, this fishery gained popularity during the 1980s, displaying moderate annual increases in participation and catch until the mid-1990s (Tables 25 and 26). The fishery remained relatively stable until about 2001. Over the past decade, the estimated effort has declined as has catch, but this catch is similar to other years of low effort (Tables 25 and 26).

Natural populations of rainbow trout are not supplemented with hatchery rainbow trout in open water systems of the NKPMA. The first lake stocking in the NKPMA took place in 1952 when Longmare Lake was stocked with rainbow trout. Since that time, the stocking of barren lakes that did not support game fish and that were on the road system has been expanded to present-day stocking levels that include 27 lakes in the NKPMA. Select lakes are also stocked with Arctic grayling, Arctic char, as well as landlocked coho and Chinook salmon. The objective of the NKPMA lakes stocking program is to provide sport fishing diversity through annual or alternate year stocking of these species in area lakes. The lake-stocking program on the Northern Kenai

Peninsula is designed to provide additional public fishing as well as harvest opportunities that cannot be supported by natural populations of resident fish. Since 1983, the numbers of all species stocked has averaged 277,185 fish (Table 27). Catch and harvests have trended upwards since 2009 (Table 27).

Lake trout are indigenous to several NKPMA lakes and have been introduced to 1 lake. Lake trout occur in glacial Tustumena, Skilak, Kenai, and the Trail lakes. Clearwater lakes that naturally support lake trout include Hidden, Juneau, Swan, and Trout lakes. The lake trout present in Upper Summit Lake were transplanted from Skilak Lake during 1970. ADF&G basic lake survey data as well as angler reports of lake trout catch documents a successful transplant. Recent SWHS information, observations by ADF&G staff as well as reports from anglers indicate that relatively little fishing effort is directed toward lake trout in the glacial lakes (Table 28). Lake trout are caught in the Kenai, Kasilof, and Trail rivers near river inlets and outlets incidental to fisheries directed at other resident species (rainbow trout, Dolly Varden) and are often reported by the SWHS as harvest from these rivers (Table 28).

Hidden Lake supports the primary lake trout fishery in the NKPMA. Staff observations and angler reports indicate the fishery is popular near the time of ice-out in spring and through the winter months. Lake trout harvest at Hidden Lake is estimated by the SWHS. Harvest in this fishery has been variable, but has declined over the past decade (Table 28). Historically, lake trout harvest regulations were liberal. The bag limit was 10 between 1948 and 1968. In 1969, the bag limit remained at 10 of which only 2 were allowed to be over 20 inches. In 1983, the fishery was liberalized to allow a bag limit of 12 lake trout: 2 over 20 inches and 10 under 20 inches. The fishery was prosecuted under these regulations through 1996. In 1997, the regulations changed to a bag and possession limit of 2 fish regardless of size. Concurrent to the 1997 bag limit reduction from 12 fish to 2 fish was the closure of Hidden Lake to burbot fishing. The closure reduced the number of lines that could be used by anglers fishing through the ice from 15 lines to just 2 lines. These changes greatly reduced the catch and harvest of lake trout estimated by the SWHS (Table 28). Over the next 10 years, the popularity of the fishery during winter remained relatively stable. Public concern regarding lake trout abundance and angler reports about small fish led ADF&G to investigate the sustained yield for lake trout at Hidden Lake.

Because of public concerns and the high lake trout harvests estimated historically from Hidden Lake, information from a lake-area model was used to ascertain a yield potential in numbers of lake trout for Hidden Lake (R. Begich, Sport Fish Biologist, ADF&G, Soldotna, unpublished data). The estimated yield potential for Hidden Lake ranged from 316 to 612 lake trout. In comparison to yields estimated by the SWHS, the estimated yield potential in numbers of fish for Hidden Lake was exceeded in each year for the 20-year period between 1977 and 1996. Consequently in 2008, the BOF adopted an ADF&G proposal to reduce the bag and possession limits to 1 fish, regardless of size in order to prevent annual harvests from increasing to those that were estimated prior to 1996 (greater than 600 fish) (Table 28). In 2011, the USFWS did a study of lake trout to determine seasonal distribution and size structure of lake trout in Hidden Lake (Gates 2012). Overall, total catch of lake trout in the NKPMA has remained fairly stable since 2013 (Table 28).

Prior to statehood in 1952, Arctic grayling were introduced into Crescent Lake by the USFWS. Arctic grayling were also stocked by ADF&G during the 1960s. The introductions resulted in self-sustaining populations of Arctic grayling in Crescent, Upper Paradise, Lower Paradise, Lower Fuller, Grayling, Twin, and Bench lakes. Arctic grayling are the only game fish species

present in these remote lakes that are accessible by road system trails or by float plane. Crescent Lake is an alpine lake located within the Chugach National Forest and supports the largest fishery for this species in the NKPMA (Table 29). Primary access is via 2 hiking trails: the 6.4-mile Crescent Creek trail and the 3.3-mile Carter Lake trail or access may be gained via float plane. Basic life history information about Crescent Lake Arctic grayling was collected sporadically from the 1960s through 1970s and in 1991. During 2009–2010, a radiotelemetry study documented seasonal distributions and time of spawning. In addition, basic life history information (size, age, maturity compositions) was collected during the telemetry project. Foot surveys were continued during 2011–2013 to document time of spawning (A. Reimer, Sport Fish Biologist, ADF&G, Soldotna, unpublished data). Preliminary results indicate the following: 1) spawning areas were more widely dispersed than previously known, 2) time of spawning was more variable than documented historically, 3) fish displayed distinct seasonal spring spawning movements, summer and overwintering distributions, and 4) no relevant comparisons could be made between historical and recent basic life history information due to lack of historical data. Catch and harvest of Arctic grayling in other lakes is small. Historical size composition information from Bench Lake indicates the presence of Arctic grayling that are larger in size than those at Crescent Lake. In 2011–2012, efforts by ADF&G to collect size composition information about Bench Lake Arctic grayling were not successful.

Recent Alaska Board of Fisheries Actions

During 2011, the BOF adopted a regulation that reduced the bag and possession limits of burbot to 2 fish in all waters of the NKPMA. During the 2014 BOF meeting, no regulations were adopted affecting the other NKPMA resident species sport fisheries.

Resident Species Management Objectives

These fisheries are not directly addressed in a management plan adopted by the BOF. ADF&G objectives for these fisheries are as follows:

1) Provide the opportunity for angler participation at a level that can be supported by the fisheries resource and associated habitat.

2) Ensure, through appropriate management and research programs that the resident species populations do not decline below the level necessary to ensure sustained yield.

Inseason Management Approach

Inseason management has not been required in these fisheries. The fisheries are managed by existing regulations.

2014–2016 Fishery Performance

Harvest estimates derived from the SWHS (Mills 1987-1994**;** Howe et al. 1995, 1996**;** Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish [cited December 2016], available from http://www.adfg.alaska.gov/sf/sportfishingsurvey/) indicate that from 2014 to 2015, populations of resident species appear to be stable (Tables 25–26 and 28–29). Based on staff observations and reports from anglers, 2016 fishery performance will be similar to that of the most recent 3 years.

Current Issues

There are currently no major issues associated with other NKPMA resident species fisheries. For the most part, SWHS information indicates that the catch and harvest in area lake fisheries will wax and wane as angler participation increases or decreases. Participation in stocked lake fishing has remained relatively constant whereas fishing effort in several area unstocked lakes has declined. To attract anglers to area lake fisheries, stocked lakes are located in close proximity to communities, rural subdivisions, or popular recreation areas. Most lakes can be reached by highway vehicle, although a few are remote and accessible by short hiking trails. Stocked lakes provide opportunity for both open water and winter ice fishing. A total of 28 lakes were stocked through 2012. Beginning in 2013, 24 lakes were stocked and will continue to be stocked. Stocking was discontinued in Aurora, Cecille, and Quintin lakes due to very low or nonexistent levels of participation reported by the SWHS. Stocking was also discontinued in 2012 for Jerome Lake due to an ailing gabion barrier; however, participation in this fishery was also very low or nonexistent. Fish from all lakes that are no longer stocked are being distributed to the more popular remaining stocked lakes to provide additional opportunity. In addition, Arctic grayling were stocked into area lakes in 2009 (Arc Lake), 2010 (Scout Lake), and 2012 (Tirmore Lake) to provide sport fishing diversity. This species has generated high interest from the public. The SWHS will be used to assess if stocking this species has resulted in additional participation in fishing these lakes.

Recommended Research and Management

We do not recommend any specific research or revision to management activities to other resident species fisheries at this time. Resident species are conservatively managed in all waters where they occur naturally. Management will continue to engage in public informational and educational activities to apprise the public of the fisheries status and to promote lawful and ethical fishing practices. Management is active in the dissemination of lake fishing information to the public. Recently, a statewide stocked lake database was created for the ADF&G web page that now includes NKPMA lakes; unstocked lakes are planned to be added into the database. Stocked lakes access evaluation and improvement should remain an ongoing activity for area management and access staff. The stocked lakes will continue to be monitored by the SWHS so that stocking practices can be evaluated and, if necessary, adjusted to benefit public use of stocked fish.

NORTHERN KENAI PENINSULA MANAGMEMENT AREA NORTHERN PIKE SPORT FISHERY

2017 Proposals to the Alaska Board of Fisheries Concerning Northern Pike in the Northern Kenai Peninsula Management Area Sport Fishery Issues

The following proposal published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries targeting northern pike in the Northern Kenai Peninsula Management Area:

Proposal Number: 83.

BACKGROUND AND HISTORICAL PERSPECTIVE

Northern pike are not indigenous to the Kenai Peninsula. This species was illegally introduced into Derks Lake, a tributary to Soldotna Creek, in the mid-1970s. From this initial introduction, they spread rapidly through the Soldotna Creek drainage, including East and West Mackey Lakes, Soldotna Creek, and Soldotna (Sevena) Lake. The presence of northern pike in the Soldotna Creek drainage is believed to be the origin of northern pike for illegal introductions to other NKPMA lakes. Stormy Lake, in the Swanson River drainage, is the largest lake containing northern pike. It is thought, based on SWHS information as well as reports from anglers that northern pike were introduced to Stormy Lake in the years following the introduction into the Soldotna Creek drainage.

Northern pike are a predator species, and reports from landowner anglers living in the Soldotna Creek drainage indicated that as the number of northern pike increased, numbers of rainbow trout and Dolly Varden declined to the degree where rainbow trout and Dolly Varden were scarce and difficult to catch. Soldotna Lake, prior to the introduction of northern pike, was reputed to support one of the most robust rainbow trout populations on the Kenai Peninsula. The drainage also supports spawning and rearing Pacific salmon, primarily coho salmon. Soldotna Lake's reputation as a trout producer declined steadily in the 1980s as the abundant forage base of resident rainbow trout, Dolly Varden and rearing Pacific salmon allowed northern pike to become the dominant species and spread throughout the drainage.

There were considerable concerns by both the public and ADF&G that northern pike would become established in the mainstem Kenai River, negatively impacting this river's salmon and trout populations. Although small numbers of northern pike have been caught in the Kenai River mainstem (Table 30), there is no evidence to date that northern pike are reproducing in the mainstem Kenai River, and negative impacts to the river's salmon and trout cannot be measured directly. Northern pike have, however, used the Kenai River as a migratory corridor. A weir operated by the U.S. Fish and Wildlife Service (USFWS) at Soldotna Creek near its confluence with the Kenai River documented the passage of northern pike from the creek to the Kenai River during 2009 and 2010. Because northern pike are present in the Soldotna Creek drainage and have negatively impacted salmonid production there, northern pike have also, to an unknown degree, negatively impacted the Kenai River drainage’s salmonid production.

In spring 1986, a weir was established on the east fork of Moose River in conjunction with a rainbow trout study. One northern pike was known to have passed through the structure. Information from the SWHS also indicates that anglers have harvested small numbers of northern pike in the lakes of this drainage (Afonasi, Imeri, Watson, Egumen, Peterson, Kelly, and Hikers lakes). Harvests of northern pike are too small to be estimated for specific lakes (Table 30).

Northern pike were also illegally introduced into Scout Lake near Sterling, Alaska. Scout Lake is a land-locked lake stocked by ADF&G. Two lakes (Tree Lake and Denise Lake) lost their northern pike populations by winterkill or other natural means prior to 2008. Northern pike were also illegally introduced into unnamed lakes about 5 miles south of Soldotna in the early to mid-1980s. This group of 6 small lakes is accessed via Tote Road and is now known collectively as the Tote Road Pike Lakes. It is assumed local residents introduced the northern pike. These lakes are fortunately landlocked. Currently, the only known populations of northern pike in the NKPMA are in these lakes.

During 2010, 2 lakes, Hall and Tiny lakes near Soldotna, were verified by ADF&G to contain northern pike that were not previously known to support them. Tiny Lake is an approximately 4-acre surface area land-locked lake adjacent to the Mackey's Lake drainage and was reported to ADF&G by the public to support northern pike. Tiny Lake was intensively gillnetted during the fall; gillnets were set to actively fish through the winter while the lake was ice-covered. Prior to freeze-up 26 northern pike were harvested from the lake. When the nets were retrieved the following break-up in the spring, no more northern pike had been captured. In total, about 21,000 hours of netting was conducted at Tiny Lake. Hall Lake was the second lake reported to ADF&G by the public to contain northern pike during the fall of 2010 and was netted in a similar fashion. The gillnet harvest of northern pike from this approximately 40-acre surface area lake was 26 fish. Continued netting did not result in harvest of more northern pike so netting was discontinued after gillnets fished a total of approximately 60,000 hours during fall open water and winter ice-cover combined.

Although there is some local interest in northern pike fishing, this species supports a minor if not insignificant sport fishery. Historically, the best northern pike fishing was in Stormy, East, and West Mackeys, and Soldotna (Sevena) lakes. The Mackeys and Soldotna (Sevena) lakes are almost entirely bordered by private land and access is limited, whereas Stormy Lake is surrounded by public lands within the boundaries of the Captain Cook State Park and Kenai National Wildlife Refuge. A small outlet stream drains from the southwest corner of Stormy Lake into the lower tidally influenced area of the Swanson River, a major Kenai Peninsula coho salmon producer. Prior to 2012, northern pike had been present in Stormy Lake for about 3 decades, as indicated from information provided by ADF&G staff and the public. The largest northern pike sampled by ADF&G and reported by the sport fishing public have been harvested from Stormy Lake. Reports of northern pike harvest elsewhere in the Swanson River drainage have not been confirmed by ADF&G. Some fishing by local residents, including spear fishing during the winter months, occurs throughout the year. Northern pike harvested in the east fork of the Moose River are probably caught incidentally to rainbow trout and Dolly Varden. Total northern pike harvest on the Kenai Peninsula has historically averaged about 142 fish annually (Table 30).

Northern pike can be found in 2 NKPMA stocked lakes, Arc and Scout lakes, as well as Union, West Mackey, East Mackey, Derk's, Sevena, Soldotna Creek, and Stormy lakes, which supported naturally occurring game fish. These lakes were successfully treated with rotenone in 2008 (Arc Lake), 2009 (Scout Lake), 2012 (Stormy Lake), 2014 (Union, East and West Mackey, Derk's including one unnamed pond), and 2016 (Sevena Lake, Soldotna Creek) to eradicate the northern pike. Sevena Lake will be retreated with rotenone in 2017 to ensure all northern pike are removed from the drainage. Restoration of the sport fisheries in Arc and Scout lakes by stocking has occurred. Live trapping by ADF&G, angler reports, and the SWHS show the lakes are now supporting catchable populations of stocked land-locked coho salmon and Arctic grayling (Arc Lake) and rainbow trout and Arctic grayling (Scout Lake). During 2015 and 2016 after rotenone degradation, native fish have been restocked at lakes where natural production occurred by capturing and relocating fish from untreated water bodies to treated waters. A total of 83,374 fish have been transplanted back into the Mackey Lake chain to aid in recovery of the native fish assemblage including 3,194 rainbow trout, 3,279 Dolly Varden, 40,340 juvenile coho salmon, 32,853 stickleback (*Gasterosteus cognatus* or *Pungitius pungitius*), and 3,798 slimy sculpin (*Cottus cognatus*).

Since the rotenone treatment during September of 2012, the restoration of Stormy Lake has been ongoing. In November of 2011, staff from ADF&G collected native Arctic char broodstock and conducted an egg take at Stormy Lake. Fertilized eggs were incubated and raised to fingerling stage at William Jack Hernandez Sport Fish Hatchery for release back into Stormy Lake after the eradication of northern pike. Prior to and during the treatment, a large scale live fish trapping effort was initiated to capture and hold native fish (rainbow trout, juvenile coho salmon, Arctic char, nine-spine stickleback [*Pungitius pungitius*], longnose sucker [*Catostomus catostomus*]) over the treatment period and after the treatment until rotenone was no longer detectable and therefore no longer toxic to fish. Fish were held in net pens in an adjacent lake. During 2013, Arctic char fingerlings and all native fish rescued from the treatment were stocked back to Stormy Lake. ADF&G issued EO 2-NP-1-59-15 prohibiting retention of any fish species during the 2015–2016 winter ice fishing season to apply conservative regulations on these native fish stocks until they are able to recolonize and propagate.

Nonlethal netting of Stormy Lake has been ongoing from 2013 through 2016 to assess the recolonization of the native fish assemblage. To augment the recovery of Arctic char to a self-sustaining population EO-2-DV-1-52-13 and EO-2-DV-1-58-15 prohibited retention of Arctic char or Dolly Varden in Stormy Lake during the 2013–2014 and 2015–2016 winter ice fishing season as well as 2016 open water season (Appendices A1–A3). Since the rotenone treatment, the observed native fish assemblage of Stormy Lake has changed dramatically. Rainbow trout, juvenile coho salmon, and immature Arctic char are abundant. Other species present include longnose sucker as well as adult coho salmon that immigrate to Stormy Lake via the small outlet stream connected to the Swanson River. Monitoring efforts will continue to ensure native fish populations are self-sustaining. Because of all these removal efforts, the catch and harvest of northern pike in NKPMA estimated by the SWHS has declined sharply. It is the goal of ADF&G to remove all invasive northern pike from the NKPMA.

NORTH KENAI PENINSULA MANAGEMENT AREA NORTHERN PIKE FISHERY OBJECTIVES

This fishery is not specifically addressed in any management plan adopted by the BOF. The ADF&G objective for this fishery is to eradicate northern pike from the Kenai Peninsula so that they are no longer present.

INSEASON MANAGEMENT APPROACH

There has been no inseason management in the history of this fishery. The fishery is managed through existing regulations. Regulations are liberal because northern pike were illegally introduced into Kenai Peninsula waters and because they compete with resident trout and salmon species. Currently, there is no bag limit or closed season for northern pike in the NKPMA.

Beginning in 2002 and continuing through 2008, ADF&G began to aggressively target and remove northern pike from lakes within the NKPMA (McKinley 2013; Begich and McKinley 2005; Begich 2010b; Massengill 2014a; Massengill 2010, 2011, 2014b). The invasive species removal project (basically netting northern pike) took place during the open water season. During the years of this project, several thousand northern pike were captured with variable mesh gillnets and removed from 4 lakes of the Soldotna Creek drainage. Gillnets were fished for tens of thousands of hours among Derks and Sevena lakes, and East and West Mackey lakes. Initially, no other adult fish species were captured in these lakes. Subsequent sampling of these

lakes over the years has indicated that the northern pike population has been temporarily reduced and that the size and age structure has changed to smaller and younger fish. Interestingly, as the numbers of northern pike removed from lakes in the Soldotna Creek drainage increased over time, bycatch species that were not northern pike increased. The bycatch included rainbow trout, Dolly Varden, juvenile coho salmon, and stickleback. During 2009, a northern pike radiotelemetry project was initiated at Stormy Lake. The objectives of this project were to define seasonal movements, spawning distribution, and spawning time so that future eradication efforts could be effectively planned.

In 2013, ADF&G conducted a study to evaluate the use of environmental DNA (eDNA) as a tool to assess the success of invasive northern pike eradication efforts. Results indicate that eDNA sampling of waterbodies can be a highly sensitive tool for detecting the presence of northern pike, and when combined with traditional sampling methods, provides the best information on northern pike presence.

Public scoping meetings were held to address removal of invasive northern pike for all projects involving rotenone and environmental assessments were produced for these projects. Educational messages about invasive northern pike through the ADF&G web site, public service announcements, and angler outreach program are ongoing and remain a high priority component of ADF&G information and education programs.

2014–2016 Fishery Performance

The recent SWHS and guide logbook report results detected the harvest of northern pike in the Kenai River during 2012–2014 (Table 30). Over the last 10 years, northern pike harvest has decreased, which is probably due to increased eradication efforts of northern pike in area lakes, particularly as a result of the rotenone treatments at Arc, Scout, Derk's, Union, East and West Mackey lakes, and Soldotna Creek as well as to some extent, netting efforts in Soldotna (Sevena) Lake. According to the SWHS, when northern pike harvests were larger, such as in 2008 and 2009, most of the northern pike harvested were from Stormy Lake and the Tote Road Lakes (Table 30). Due to the successful eradication of northern pike and the restoration of fisheries, especially at Stormy Lake and the Mackey Lakes chain, catches and harvests of northern pike in the NKPMA are likely to remain at very low levels.

Current Issues

The negative impact of nonnative northern pike on the production of native species will remain a fishery conservation issue until northern pike are no longer present in waters of the NKPMA.

Recommended Research and Management

The final effort to eradicate northern pike from the Soldotna Creek drainage using rotenone treatments will be undertaken in 2017 with the second treatment to Sevena Lake. The native fish assembly of the Soldotna Creek drainage could be restored by the year 2018. Funding has been secured to treat the Tote Road Lakes during 2018.

NORTHERN KENAI PENINSULA MANAGEMENT AREA EDUCATIONAL FISHERIES

2017 Proposals to the Alaska Board of Fisheries Concerning Educational Fisheries Issues

There are no proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) pertaining to the educational fisheries in the NKPMA.

EDUCATIONAL FISHERIES OBJECTIVE

The educational fisheries that occur in the NKPMA are Federal Court–ordered fisheries for which regulations were developed by consent preliminary injunction. Terms of the injunction were incorporated into the educational permit. The objective of each fishery is to implement the provisions of the permit. Standards, general conditions, and requirements of an educational fishery program are outlined in 5 AAC 93.200–235.

Objectives for the educational fisheries include teaching and preserving the cultural and traditional subsistence ways of life as well as providing salmon for others in need.

HISTORICAL PERSPECTIVE

The first Kenaitze Tribal fishery (1989) originated as a Federal Court–ordered subsistence fishery resulting from extensive legislation and litigation related to both state and federal interpretation of subsistence. Prior the 1993 season, the Alaska Superior Court, in negotiations with ADF&G and the Kenaitze Tribe, ordered ADF&G to issue educational fishing permits as an interim measure during ongoing litigation. A chronology of events leading to the present day fishery is available in Nelson et al. (1999) and Gamblin et al. (2004).

Including the Kenaitze Tribal Fishery, a total of 3 educational fisheries are permitted within the NKPMA. The Alaska Territorial Lodge educational fishery was first permitted in 2007 and the Kasilof Regional Historical Association has been permitted since 2008 (Tables 31–33). Each permit contains stipulations that are specific to gear, periods, seasons, location, quotas, and harvest reporting. The Kenaitze Tribe is permitted to fish at the Kenai, Kasilof, and Swanson rivers. The Kasilof Regional Historical Association is permitted to fish in marine waters near the Kasilof River mouth while the Alaska Territorial Lodge fishes near Moose Point on the east coast of Cook Inlet several miles north of the Kenai River.

INSEASON MANAGEMENT APPROACH

Inseason management of the fisheries follows terms of each of the educational permits issued each year. Authorized representatives for each issued permit report harvests inseason on a schedule established by both ADF&G staff and the permit holder. The Kenaitze Tribe follows a weekly reporting format while the Alaska Territorial Lodge and Kasilof Regional Historical Association report harvests as they occur. ADF&G maintains the flexibility to modify stipulations of each permit based on annual review of the fisheries as well as inseason through emergency order authority to restrict or to close educational fishing in accordance with applicable fisheries management plans adopted by the BOF.

2014–2016 FISHERY PERFORMANCE

The Kenaitze Tribe educational fishery supports the largest educational fishery salmon harvest in the NKPMA, and sockeye salmon are the primary species harvested (Table 31). Total salmon harvests averaged 7,492 fish from 2014 to 2016 (Table 31). During 2014–2016, the Kenaitze Tribe educational fishery at the Kenai River was restricted or closed inseason on a schedule corresponding to the emergency order actions taken in the inriver sport fishery to conserve Chinook salmon. From 2014 to 2016, the annual harvest of early–run Chinook salmon averaged 5 fish while annual harvest of late-run Chinook salmon averaged 6 fish. During the 2015 fishery, the total annual salmon quota was achieved by mid-August and an inseason request was made to the ADF&G by the Kenaitze Tribe for additional quota; however, the request was denied. Total harvests in both the Alaska Territorial Lodge and Kasilof Regional Historical Association educational fisheries are relatively minor (Tables 32 and 33). Fishing occurs sporadically during the season, and sockeye and coho salmon are the primary species harvested (Tables 32 and 33). No harvest quotas were exceeded in the NKPMA by these other two educational fisheries during 2014–2016.

CURRENT ISSUES

Total harvest of salmon from the educational fisheries has remained relatively constant. Presently, effort in this fishery is directed at achieving a harvest commensurate with educational needs. Therefore, harvest during subsequent years will likely remain similar unless these needs change and are subsequently approved in permit form.

The Kenaitze Educational Fishery harvests mainly salmon of Kenai River origin. The harvest of Chinook salmon is minor and probably has an insignificant effect on the performance of the inriver sport fishery during years when inriver fisheries are not restricted. Recent low runs of Chinook salmon to the Kenai River have resulted in restrictions to all fisheries harvesting these stocks, including the Kenaitze Tribal educational fishery. Public dissatisfaction with this fishery is visible because there was some negative public reaction to this fishery from the commercial fishing sector during 2014. Comments focused on the exclusion of commercial fishing during periods when the Kenaitze Tribe continued to fish. The Kenaitze Tribe is concerned about being excluded from harvesting primarily sockeye salmon while other fisheries, commercial drift gill net, personal use, and inriver sport, continue to harvest Kenai River sockeye salmon. Therefore, the Kenaitze Tribe is reviewing alternative fishing methods that will satisfy concerns by ADF&G about Chinook salmon mortality such that their educational fishery will not be restricted or closed during years when the inriver sport fisheries for Chinook salmon are restricted.

RECOMMENDED RESEARCH AND MANAGEMENT

No research or management activity specific to this fishery is recommended.

NORTHERN KENAI PENINSULA MANAGEMENT AREA GUIDED SPORT FISHERY

2017 Proposals to the Alaska Board of Fisheries Concerning Guided Sport Fishing Issues in the NKPMA

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the sport fisheries for guided anglers in the Northern Kenai Peninsula Management Area:

Proposal Numbers: 178, 179, 180, 181, 182, 183, 184, 185.

BACKGROUND AND HISTORICAL PERSPECTIVE

The guided sport fishery, particularly on the Kenai River, has generally been recognized as an important component of the local recreation economy for several decades. Growth in guided sport fishing effort and harvests on both the Kenai and Kasilof rivers began mostly in the 1980s and continued over the next 2 decades. Significant growth in the number of guides who offer sport fishing services on the Kenai River is well documented (Table 34). Increased participation in guided sport fishing prompted the BOF to adopt fishing regulations to provide opportunity for private (unguided) anglers when no guided anglers are present; these are as follows: 1) restrictions in area for guided sport fishing 2) limited hours when guided sport fishing can occur, and 3) prohibited days of the week when anglers may fish from a registered guide vessel. Information from ADF&G Chinook salmon creel surveys conducted on the both the Kenai and Kasilof rivers indicate that catch and harvest rates are greater for guided than for unguided anglers. At specific areas, times of the day, or days of the week, the numbers of guided anglers may also exceed the number of unguided anglers. Effects of these BOF regulations include changes to total fishing effort by angler type as well as changes to catch and harvest rates.

In 1998, the BOF adopted *Sport Fishing Services and Sport Fishing Guide Services; License Requirement; Regulations of Activities* (5 AAC 75.075). No licensing program, fees, or daily fishing activity reporting were required from guides until 2 years after the Alaska State Legislature established licensing requirements for sport fishing guide business owners and sport fishing guides in 2004. By 2006, guide logbooks required reporting of guided anglers' license numbers as well as harvest and release of the number of fish by species, and date and location(s) fished. Further regulations implemented for the logbook program include an approximate 14-day reporting requirement of daily fishing activity on a schedule determined by ADF&G each year. Results of the logbook program have been published annually by ADF&G (Sigurdsson and Powers 2009–2014, 2016).

In addition to the ADF&G requirements, relatively extensive administrative permitting and registrations are required to operate as a fishing guide on the Kenai River because of State of Alaska and Federal land ownership. All fishing guides are required to register and be permitted by the Department of Natural Resources, Division of Parks and Outdoor Recreation (DNR-DPOR) to operate within the Kenai River Special Management Area State Park (KRSMA). A requirement established in 2006 for all guides operating in the KRSMA includes the successful completion of the Kenai River Guide Academy (KRGA). The KRGA is a week long course that

has been in place since 2006 and is required to obtain a commercial use permit to operate as a fishing guide in the KRSMA. In addition, permits are also required for guides to operate in specific areas of the KRSMA from the United States Forest Service (USFS) on waters within the Chugach National Forest and from the United States Fish and Wildlife Service (USFWS) on waters within the Kenai National Wildlife Refuge (KNWR). In waters bounded by the KNWR from the Russian–Kenai rivers confluence near Sportsman's Landing downstream to the waters of Skilak Lake, the number of guide operators is managed under a limited vendor program. This program has been in place since 1987 and limits the number of commercial businesses that may offer fishing guide services on a daily basis to 18 businesses per year, of which each business may have 2 fishing guides. Although the number of guides that may operate on a daily basis through the year is controlled by the limited vendor program, management of fishing guides in this area provides for additional guided fishing opportunity by allowing all other Kenai River fishing guides registered through DNR–DPOR 3 starts per year to guide fishing trips on this section of the Kenai River. Both the USFS and USFWS require operators to complete annual reports of commercial use activities on Kenai River waters bounded by federal lands.

Numerous proposals to change guided sport fishing regulations are submitted during each regularly scheduled Upper Cook Inlet Finfish BOF meeting. Proposed regulatory changes seek to both expand and to relax restrictions to guided sport fishing. All proposed changes are allocative because guided anglers are generally more successful than unguided anglers.

Recent Alaska Board of Fisheries Actions

During the 2014 Alaska Board of Fisheries meeting, the BOF repealed a regulation on the Kenai River that prohibited guided sport fishing downstream of the Kenai–Moose rivers confluence on Labor Day.

NORTHERN KENAI PENINSULA MANAGEMENT AREA GUIDED SPORT FISHERY OBJECTIVES

This fishery is not specifically addressed in any management plan adopted by the BOF. The fishery objective is to implement the provisions of the BOF–adopted management plans and sport fishing regulations for the NKPMA as well as guide licensing provisions contained in 5 AAC 75.075.

INSEASON MANAGEMENT APPROACH

There has been no inseason management in the history of this fishery. The fishery is managed through existing regulations.

RECENT FISHERY PERFORMANCE

According to SWHS and guide logbook data, guided angler participation is most prevalent on the Kenai and Kasilof rivers and occurs to a significantly lesser extent in all other NKPMA waters (Table 36). The total number of fishing guides operating on Kenai River has declined from 316 in 2010 to 258 in 2015 (Table 34). The number of fishing guides on the Kenai River in 2016 was 267, a small increase from 2015 (Table 34).

Logbook information for the Kenai River indicates that annual changes in guided fishing activity are evident by month. Generally, as the open water fishing season progresses (May through September), guided fishing effort increases then decreases (Table 36). Changes in guided fishing

effort are also evident among years. For example, from 2006 to 2015, total guided effort each year has declined significantly in May, June and July and increased slightly during August while guided fishing effort in September and October has remained stable (Table 36). Decreases in June and July (Table 36) are probably the result of low Chinook salmon abundance over recent years from 2009 through 2014.

Annual changes in logbook catch and harvest of salmon by species are probably indicative of run strength. For instance, logbook data show that guided anglers harvested 8,757 Chinook salmon from the Kenai River during 2006, while logbook data from 2012 indicates a harvest of 309 Chinook salmon by guided anglers (Table 35). Annual trends in participation are most evident in July and August, when the majority of guided sport fishing effort occurs (Table 36). Proportions of resident and nonresident guided anglers have remained relatively stable since 2006. Nonresident guided anglers compose the vast majority of guided anglers fishing the Kenai River each year (Table 36). Similar trends in effort, fishing patterns, and guided angler demographics are anticipated for the 2016 season.

CURRENT ISSUES

A decline in Chinook salmon total runs in recent years has resulted in the implementation of inseason restrictions that are disruptive to guided anglers and businesses that derive income from these fisheries. The number of registered sport fishing guides operating on the Kenai River has been in decline. Issues that are social and allocative in nature will continue to be addressed through the BOF process and include competition between guided and unguided anglers, restrictive guide regulations, as well as numerous and complex sport fishing regulations.

RECOMMENDED RESEARCH AND MANAGEMENT

Guided fishing effort and catch and harvest by species will continue to be monitored through the SWHS and guide logbook program. This information will allow ADF&G to discern changes in fishing patterns and to aid in providing information to address social and allocative issues related to the NKPMA guided sport fishery.

NORTHERN KENAI PENINSULA MANAGEMENT AREA HABITAT

2017 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING HABITAT ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on sport fishery habitat in the Northern Kenai Peninsula Management Area:

Proposal Numbers: 178, 179, 180, 181, 189, 201, 202, 205.

BACKGROUND AND HISTORICAL PERSPECTIVE

Maintaining healthy riparian and aquatic habitat in the NKPMA is important for area fisheries resources. Various habitat types occur along the Kenai River's 67-mile length. Including islands, the river provides approximately 166 miles of waterfront shoreline (134 miles river upland

shoreline and 32 miles of island shoreline) (Liepitz 1994). Twenty-seven species of fish have been documented to occur from the Kenai River Delta at the river's mouth upstream to Kenai Lake (Bendock and Bingham 1988a, 1988b). The diversity of fish species decreases with distance inland because the highest diversity occurs in the lower river delta area.

Land ownership along the Kenai River is comprises several entities. Land owners along the interlake section of approximately 15 miles (30 miles total riverfront shoreline) between Skilak and Kenai Lake include the USFS, USFWS, Kenai Peninsula Borough (KPB), as well as the State of Alaska and private individuals. Less than about 3 miles of total riverfront shoreline of the interlake section is in private ownership. In 1986, land ownership status of the 50 mile river corridor (100 miles shoreline) below Skilak Lake was as follows: 66% of the river shoreline was private, 15% State of Alaska, 15% municipal (owned by the Cities of Soldotna, Kenai, and the Kenai Peninsula Borough), while 4% was in federal ownership (ADNR 1998). Since that time, ownership status may have changed. Some privately held parcels have been added into the KRSMA and some lands have been conveyed to various municipalities, the Kenai Peninsula Borough, and the State of Alaska. Presently, the approximate land ownership status of the lower river 50 mile corridor or 100 miles of shoreline downstream of Skilak Lake is as follows: 40% private, 24% State of Alaska, 14% Federal and about 22% other, which includes the cities of Soldotna, Kenai, a native corporation, and the Kenai Peninsula Borough (Table 37).

ADF&G is the manager of Kenai River fish stocks and does not manage lands along the Kenai River corridor that are within the KRSMA. Under Alaska Statute AS.16.05.871 *Protection of Fish and Game*, ADF&G authority extends from the riverbed to mean ordinary high water, giving the ADF&G permit jurisdiction over activities affecting anadromous streams and activities in streams frequented by fish. The DNR–DPOR manages State of Alaska–owned KRSMA shorelands above mean ordinary high water of which several parcels are subject to a conservation easement to protect them from development in perpetuity. ADF&G was also given a management right to support the protections for these DNR lands important to fish resources. Consequently, the BOF has adopted the *Riparian Habitat Fishery Management Plan for the Kenai River Drainage* (5 AAC 57.180) to complement land protection efforts where it is legal to do so on public lands. Under this plan, the number of State of Alaska–owned parcels that are closed to fishing within 10 feet of the shoreline from July 1 through August 15 has been increasing over the past 2 decades, with the most recent acquisition and subsequent BOF action occurring in 2014. Presently, 25 parcels representing approximately 18.4 miles of publicly owned riverfront shoreline are closed to all fishing within 10 feet of the shoreline from July 1 through August 15. Therefore, about 40% of the approximately 31.5 shoreline miles owned by the State of Alaska downstream of Skilak Lake is managed by restricting sport fishing access (Table 37). Riparian habitat on these lands that is beneficial to fisheries resources remains intact and has not been lost. Additional riverbank closures are proposed by ADF&G and more may occur as parcels are acquired as conservation easements into the KRSMA for which the ADF&G holds a management jurisdiction. Jurisdiction over land-use activities on all other public and private lands above mean ordinary high water within the KRSMA resides with the DNR, KPB, Department of Environmental Conservation (DEC), and United States Army Corps of Engineers (ACE). In addition to BOF–adopted fishing regulations to protect lands, other agencies have jurisdiction to restrict or to close activities on riverfront shoreline uplands. For example, DNR–DPOR has several internal administrative orders in place prohibiting all public use of several shoreline areas along the Kenai River.

Kenai River habitat research was first conducted by the ADF&G Habitat Division in 1993 (Liepitz 1994). Further projects conducted by the Division of Sport Fish from 1996 through 2001 included angler distribution surveys, assessment of bank position change, assessment of vegetation changes, and a pilot study using aerial photogrammetry techniques (Larson and McCracken 1998; King and Clark *Unpublished*[3]; King 2007; King and Hansen 1999, 2001, 2002, 2015a, 2015b). Findings from these projects identified sensitive riverfront uplands on conservation easement lands as well as other lands that could be damaged but not lost by public use. This information was used to close areas to sport fishing under the previously mentioned BOF–adopted plan.

MANAGEMENT APPROACH AND RECENT ACTIVITIES

Habitat management is accomplished by several governmental as well as nongovernmental agencies, including ADF&G, that are involved in maintaining and increasing the suitability of Kenai River habitat for fisheries resources. Habitat maintenance occurs through several methods: 1) protective habitat regulations pursuant to the multiagency permitting process that reviews instream and riverfront upland projects; 2) BOF–adopted habitat closures, clean outboard motor regulations, and passenger limits to reduce boat-wakes; and 3) land-use restrictions or closures by land managing agencies. Recent habitat projects within the Kenai River drainage are mainly multiagency habitat restoration and improvement projects.

From the mid-1990s through 2009, a total of 385 Kenai River cost-share habitat projects beneficial to fisheries resources were completed (Johnston and Pyper 2010[4]). These projects focused on restoration and protection of shoreline habitats as well as recovering damaged fish habitat. Completion of this work resulted in the improvement, through restoration, of about 9 miles of Kenai River shoreline habitat or 9% of the 100 miles of riverfront shoreline downstream of Skilak Lake. Projects have continued from 2010 through 2016, including projects identified by Johnston and Pyper (2010), and over 750 projects have been completed on the Kenai River.

CURRENT ISSUES

The *Kenai River Late-Run Sockeye Salmon Management Plan* in part states:

> …the sonar count levels established in this section may be lowered by the board if noncommercial fishing, after consideration of mitigation efforts, results in a net loss of riparian habitat on the Kenai River. The department will, to the extent practicable, conduct habitat assessments on a schedule that conforms to the Board of Fisheries triennial meeting cycle. If the assessments demonstrate a net loss of riparian habitat caused by noncommercial fishermen, the department is requested to report those findings to the board and submit proposals to the board for appropriate modification of the Kenai River late-run sockeye salmon inriver goal.

Language in this plan has created confusion with the public as to whether ADF&G is following the management plan and if they can regulate land-use practices on public, private, municipal,

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[3] King, M. A., and R. Clark. Unpublished. 2004 Kenai River Riparian Assessment. Alaska Department of Fish and Game, Report to the Alaska Board of Fisheries, 2005, Anchorage.

[4] Johnston, G., and B. Pyper. 2010. Kenai River Restoration Project Assessment. Prepared by Inter-Fluve, Inc. (Hood River, Oregon) for Kenai River Sportfishing Association, Soldotna, Alaska. Award #NA04NMF4380162 from the NOAA, U.S. Dept. of Commerce for the Alaska Dept. of Fish and Game.

and borough lands in the Kenai River corridor. Conversely, less shoreline is available to the public for sport fishing than was available in the past decade due to management regulations. Because less area is available, angler densities in the remaining areas may increase to undesirable levels.

RECOMMENDED RESEARCH AND MANAGEMENT

Since 1986, land status ownership of the lower Kenai River corridor has changed substantially with an approximate 26% reduction in private land ownership and a significant increase in State of Alaska ownership. This is mainly due to land acquisitions by the State of Alaska through the Exxon Valdez Trustee Council. We recommend that ADF&G remain active in securing management rights to additional land parcels within the Kenai River corridor for ownership by the State of Alaska. However, future management considerations should include strategies that prevent the loss of shoreline areas to sport fishing by closure of newly acquired lands.

NORTHERN KENAI PENINSULA MANAGEMENT AREA PERSONAL USE FISHERIES

2017 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING NORTHERN KENAI PENINSULA PERSONAL USE DIP NET FISHERIES ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2016/2017 Proposed Changes in Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide (except Southeast and Yakutat) King and Tanner Crab; and Supplemental Issues*" (ADF&G 2016a–d) will probably have some impact on the personal use dip net fisheries targeting sockeye salmon in the Kenai and Kasilof rivers:

> Proposal Numbers: 130, 178, 179, 181, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208.

BACKGROUND AND HISTORICAL PERSPECTIVE

The *Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan* was adopted at the 1981 BOF meeting. This plan provided for personal use dip net fisheries in the Kenai and Kasilof Rivers that targeted sockeye salmon and a personal use gillnet fishery in the marine waters at the mouth of Kasilof River. The fisheries are open only to Alaska residents. The BOF's intent was to provide for salmon dip net fisheries in Cook Inlet by allowing Alaska residents an opportunity to harvest sockeye salmon for their personal consumptive needs without disrupting existing fisheries. Personal use dip net fisheries did not initially open until ADF&G determined that specific escapement goals were met and subsistence, commercial, and other sport users have had, or will have, reasonable opportunity to harvest fish in excess of spawning requirements. Participants in these fisheries include mainly local and regional residents from Southcentral Alaska as well as minor numbers of participants from other areas of the state. Sockeye salmon are the primary species harvested in each fishery; however, coho, pink, and Chinook salmon are also caught and retained.

Prior to adoption of the *Upper Cook Inlet Personal Use Salmon Fishery Management Plan* (5 AAC 77.540) in 1996, several changes to the management of personal use fisheries occurred. During the late 1980s through 1995, legal, legislative, and BOF actions affected the implementation of the personal use fisheries in the NKPMA. Management changes specific to

the Kenai River or Kasilof River were dependent upon abundance of returning salmon and were tied into fisheries management plans for other user groups.

In 1989, an Alaska Supreme Court's decision had the effect of making all Alaska residents subsistence users. In December 1990, the BOF adopted the *Upper Cook Inlet Subsistence Salmon Management Plan.* Under this plan, subsistence fishing was allowed in most marine waters of Upper Cook Inlet (UCI) normally open to commercial gillnet fishing. Set gillnet fishing was also allowed in Knik Arm, as well as dip net fishing in the mouths of the Kenai and Kasilof rivers. Permits were required to participate in these subsistence fisheries and a valid Alaska resident sport fishing license was not required. The annual bag and possession limits were 25 salmon per head of household of which no more than 5 could be Chinook salmon. In addition, a household was allowed another 10 salmon for each household member, of which no more than 1 could be a Chinook salmon.

After the 1989 Alaska Supreme Court decision, the *Cook Inlet Personal Use Dip Net Fishery Management Plan* was still in place; however, this management plan specified that personal use fisheries in the Kasilof and Kenai rivers could not occur on the same day as the subsistence dip net fishery.

During the 1992 session, the Alaska State Legislature passed legislation that required the Alaska Boards of Fisheries and Game (Joint Boards) to identify nonsubsistence areas where dependence on subsistence was not a principle characteristic of the economy, culture, and way of life. During their November 1992 meeting, the Joint Boards established the Anchorage–Matanuska-Susitna–Kenai nonsubsistence area. The BOF also rescinded the *Upper Cook Inlet Subsistence Salmon Management Plan*. This ended all subsistence fisheries in UCI except the Tyonek subsistence fishery. The personal use dip net fishery remained in place. The escapement trigger for opening the personal use dip net fishery on the Kenai River was now 400,000 sockeye salmon, and once the fishery opened, fishing could be continuous. The 1993 personal use fishery opened on July 17 and closed on July 31, with an estimated harvest of 33,467 sockeye salmon (Table 38).

In October 1993, Superior Court Judge Dana Fabe (in *Kenaitze v. Alaska*) found unconstitutional the provision in the 1992 state subsistence law that directed the Joint Boards to designate nonsubsistence areas. This ruling was appealed by the State of Alaska to the Alaska Supreme Court where a stay was granted on March 10, 1994. The full court vacated this stay on April 11, 1994. A special meeting of the Joint Boards was convened on April 28, 1994 by teleconference. As a result of these meetings, the *Upper Cook Inlet Subsistence Salmon Management Plan* was readopted on April 28, 1994.

Because there was not enough time for a formal board meeting prior to the 1994 season, the BOF directed that the Commissioner of ADF&G should exercise his emergency regulatory authority to adopt subsistence fishing regulations for the 1994 fishery. The BOF directed that this fishery should mirror the 1992 subsistence fishery. Subsistence fishing periods were again on select Wednesdays and Saturdays from late May to the end of September. The annual bag and possession limits were again 25 salmon per head of household of which no more than 5 could be Chinook salmon. In addition, a household was allowed another 10 salmon for each household member, of which no more than 1 could be a Chinook salmon. A permit was required to participate, but not a sport fishing license.

In 1995, subsistence fisheries were scheduled to begin on May 20; however, in early May, the Alaska Supreme Court overturned the October 1993 Superior Court decision. This ruling

reestablished the Anchorage–Matanuska-Susitna–Kenai nonsubsistence area. The BOF convened an emergency meeting by teleconference on May 24, 1995 to close subsistence fisheries in the now nonsubsistence area. The BOF delegated authority to the ADF&G Commissioner to readopt the *Upper Cook Inlet Subsistence Salmon Management Plan* as a personal use fishery. The 1995 dip net fishery was therefore prosecuted as a personal use fishery, having the same regulations as the 1994 subsistence fishery, and still requiring a permit. This permitted fishery was open on select Wednesdays and Saturdays from late May to the end of September. To further complicate the situation, the old personal use fishery, allowed under the *Cook Inlet Personal Use Salmon Dip Net Management Plan*, was still in place.

The management issues created by the legal challenges summarized above resulted in the *Upper Cook Inlet Personal Use Salmon Fishery Management Plan* adopted by the BOF in 1996. The plan contained personal use fishing regulations that were not tied to the fisheries management plans for other user groups and were independent of the abundance of returning salmon. This plan established a July 10–August 5 season that allowed fishing 24 hours per day. The permitting system for the personal use dip net fisheries was developed and initiated in 1996. Since then, 1 permit is issued for all 4 (UCI) personal use salmon fisheries (Kenai River dip net, Kasilof River dip net, Kasilof River gillnet, and Fish Creek dip net).

Several regulations have changed since 1996. In the Kenai River, the area open to those dipnetting from a boat was restricted to that area from a marker immediately upstream from the Kenai City Dock to the downstream edge of the Warren Ames Bridge (Figure 12). In 1997, the season ending date was amended to July 31 due to expected low abundance of Kenai River coho salmon stocks and daily hours were reduced to 17 hours daily (6:00 AM to 11:00 PM). During 1996, the estimated sockeye salmon harvest for the 27-day personal use dip net fishery was 102,821 fish, while the estimated harvest for the 22-day 1997 fishery was 114,619 sockeye salmon (Table 38).

The Kenai River fishery was modified again in 1999 by closure of a section of the lower Kenai River to dipnetting from shore along the bluff on the north side of the river in response to increased erosion of lands owned by the City of Kenai (Figure 13). In addition, harvested salmon from the personal use fishery must be recorded “immediately” (defined as “before concealing the salmon from plain view or transporting it from the fishing site”).

During 2008, the BOF adopted an outboard motor regulation for the Kenai River personal use fishery. The current regulation, which was also effective for the 2008 season, is that fish may not be taken from a boat powered by a 2-stroke motor, other than direct fuel injection (DFI). This regulation was adopted in response to high hydrocarbon levels in the lower Kenai River during peak-use days in late July.

Regulations governing the Kasilof River personal use dip net fishery from 1996 to 2001 remained the same (Figure 14). Between 1996 and 2001, participation in the dip net fishery fluctuated somewhat but averaged 2,571 days fished (calculated from Table 6). The 1996–2001 average sockeye salmon harvest from this fishery was 27,460 (calculated from Table 6) fish. The average total dip net harvest for other salmon species during this period was 103 Chinook, 536 coho, 358 pink, and 37 chum salmon (calculated from Table 6).

New regulations were adopted by the BOF for the 2002 Kasilof River personal use dip net fishery that extended the fishing season up to 44 days per year. Beginning in 2002, the new season dates for this fishery were from June 25 through August 7. The 2002 salmon harvest for

the Kasilof River personal use dip net fishery was 46,769 sockeye, 106 Chinook, 1,197 coho, 1,862 pink, and 139 chum salmon (Table 6). This includes a known harvest from 14,284 returned permits and an estimate of the harvest from those who had permits but did not return them (see Brannian and Fox 1996). During 2002, participation in the dip net fishery was 4,020 days fished (Tables 6 and 39).

A personal use gillnet fishery also occurs in June at the mouth of Kasilof River that targets sockeye salmon (Figure 15). This fishery began in 1982. The personal use gillnet harvest of salmon in Cook Inlet was prohibited except at the mouth of the Kasilof River. From 1996 through 2001, it opened on June 16 and closed by emergency order issued by CF when approximately 10,000–20,000 fish had been taken. The fishery typically lasted for about 9 days. The gillnet fishery is included in the *Upper Cook Inlet personal use fishery management plan.* Harvest in the gillnet fishery counts toward the permit holder's total allowable harvest in all 4 Upper Cook Inlet personal use fisheries (Kenai dip net, Kasilof dip net, Fish Creek dip net, and Kasilof gillnet). In the gillnet fishery, participants are allowed to keep all the Chinook salmon that they catch. From 1996 through 2001, the Kasilof River personal use gillnet fishery was monitored inseason by CF and is discussed in an annual management report (Fox and Shields 2001). During 2002, the BOF adopted regulations for the Kasilof River personal use gillnet fishery, establishing a June 15 through June 24 season. Although the personal use permit system is administered by SF, inseason management authority of the gillnet fishery is the responsibility of CF. The basic regulations governing the Kasilof River personal use gillnet and dip net fisheries remained unchanged from 2002 to 2010. During the 2011 BOF meeting, the definition of personal use salmon in regulation was aligned with the definition in Alaska Statute.

Recent Alaska Board of Fisheries Actions

In 2014, the definition of personal use fishing "site" was strengthened to aid enforcement to improve public compliance of recording daily harvests at the location the harvest occurred. No other regulations affecting the NKPMA personal use fishing regulations were modified or adopted in 2014.

KENAI RIVER PERSONAL USE DIP NET FISHERY MANAGEMENT OBJECTIVES

This fishery is managed under provisions of the *Kenai River Late-Run Sockeye Salmon Management Plan* (5 AAC 21.360) and the *Upper Cook Inlet Personal Use Salmon Fishery Management Plan* (5 AAC 77.540). The fishery objective is to implement provisions contained in the respective management plans. The fishery primarily targets sockeye salmon.

Inseason Management Approach

Management of this fishery is the joint responsibility of CF and SF. CF is responsible for operation of the Kenai River sonar counter that estimates sockeye salmon entering the river. The personal use dip net fishery opens and closes by regulation. Inseason management by SF would be required only in the event the minimum inriver escapement goal for sockeye salmon could not be projected and achievement of that goal required restrictions to the dip net fishery; if the projected run strength is greater than 2.3 million sockeye salmon and the OEG is projected to be met, additional time is allowed by EO.

All participants in this personal use fishery are required to be Alaska residents with a valid Alaska sport fishing license to get a free permit or be a member of a household with a permit and be named on that permit. Permits are household permits that allow all members of the household to fish under the same permit. Completed permits must be returned to ADF&G following the fishing season. Persons who do not comply with the reporting requirement are sent reminder letters to prompt their response. Since 1996, harvest and effort in the Kenai River personal use dip net fishery has been estimated from reported harvest on returned permits. All permit holders who returned their permits before the second reminder letter was mailed are considered compliant households. Information obtained by permit holders who returned their permits after the second reminder letter was mailed is considered to be from noncompliant households. Participation and harvest by noncompliant households was estimated by calculating the mean participation (household days fished) and harvest by species for noncompliant permits that were returned. These were then expanded to include all nonrespondents. Total estimates of participation and harvest by species for the fishery were obtained by summing the estimates for the noncompliant households with the information obtained from compliant households.

The Kenai River personal use fishery opens by regulation on July 10 for the daily hours of 6:00 AM through 11:00 PM and closes at 11:00 PM on July 31. Given sufficient run strength of greater than 2.3 million Kenai River late-run sockeye salmon, the personal use fishery may be liberalized to a 24-hour per day fishery. If the fishery is liberalized, it is typically done during the last week in July.

2014 Fishery Performance

In the 2014 Kenai river dip net fishery, the total harvest of sockeye salmon was well above the long term average and was approximately 379,823 fish (Tables 6 and 38). A total of 4,710 coho; 19,140 pink; and 1,194 chum salmon were also harvested in the Kenai River personal use dip net fishery during 2014 (Table 6). The fishery was open for 22 consecutive days without disruption except that retention of Chinook salmon was prohibited by EO (2-KS-1-27-14) for the entire personal use fishing season. The final Kenai River sockeye salmon run size was estimated to be greater than the forecasted run of 3.3 million fish (Shields and Dupuis. 2015).

2015 Fishery Performance

The 2015 estimated harvest of sockeye salmon from the Kenai River personal use dip net fishery was 377,532 fish (Table 38). This is smaller than the most recent 5-year (2010–2014) average of approximately 436,271 sockeye salmon, but was the fifth largest harvest in the fishery on record (Table 38). Due to the anticipated low abundance of Chinook salmon, a preseason EO (2-KS-1-36-15) was issued June 25 that prohibited retention of Chinook salmon in the personal use dip net fishery for the season (Appendix A2). The fishery was open for the harvest of other salmon for the entire 22 consecutive day season without disruption and fishing time was increased by emergency order to 24 hours a day for the final 4 days (July 24–31) (EO 2-RS-1-51-15; Appendix A2). As described above in the section on the Kenai River late-run sockeye salmon sport fishery, actual numbers of sockeye salmon in the run lagged behind the historical average for several days of the season. Beginning July 18, the numbers of sockeye salmon present in the area of the Kenai River open to dipnetting increased; however, sockeye salmon abundance was not large enough each day to provide the high catch rates experienced in past years. Analysis indicated a total Kenai River sockeye salmon run of approximately 3.9 million fish (Shields and Dupuis 2016).

2016 Fishery Performance

The 2016 dip net fishery was similar to the 2015 season relative to the influx of sockeye salmon in the lower Kenai River. Consequently, catch rates were modest because of moderate numbers of sockeye salmon immigrating into the river each day. One management action was taken for the 2016 Kenai River personal use dip net fishery; EO 2-KS-1-35-16 opened the fishery for 24 hours per day effective beginning Friday, July 22 (Appendix A3). The *preliminary* inseason estimated total abundance of late-run Kenai River sockeye salmon was 3.6 million fish (P. Shields, Commercial Fish Biologist, ADF&G, Soldotna, personal communication).

Current Issues

From 2014 to 2016, late-run Kenai River sockeye salmon have achieved the OEG; however, there are several issues associated with the Kenai River personal use dip net fishery. Allocation of the harvestable surplus of sockeye salmon remains an allocative issue between commercial, personal use, and inriver sport users. Success rates in the personal use fishery can decline during or after commercial fishing periods. Consecutive fishing periods may mean consecutive days of low success rates in the dip net fishery. Greater harvest in the personal use fishery decreases the numbers of sockeye salmon that may reach upriver sport fishing areas. Therefore, low success rates in the personal use and inriver sport fishery are an issue in the management of the fishery.

Participation in the fishery was previously thought to be capacity limited by the amount of land area available for public parking at access points to the fishery. This does not appear to be the case because over the past decade, the fishery has experienced incremental growth in participation. Parking to access the fishery occurs from various Kenai City lands, residential streets, local businesses, nearby campgrounds, and from upriver boat launches. Most shore-based participants fish on the north and south shores at the river's mouth. A growing number of participants park wherever space is available to access the river area open to dip net fishing. The City of Kenai owns the areas on the north and south banks at the river mouth, while shore-based dip netting, accessed from near the Warren Ames Bridge, occurs on KRSMA lands managed by DPOR. Parking, congestion, high traffic volume, litter, safety, trespass, and public nuisance have continued to be issues of concern in all areas that support shore-based dipnetting. A new access road to the south beach personal use fishing area was constructed and was open for public use during the 2016 season. The participation in boat-based dipnetting has also greatly increased to the extent that wait-lines routinely form at the Kenai City dock near the mouth of the river (sometimes backing up traffic out onto Bridge Access Road) as well as at upriver boat launches such as Eagle Rock and Pillars boat launches, historically used for sport fishing access to the river. Boating safety and congestion of river areas previously used by sport anglers are issues present throughout the lower river corridor during the dip net fishery.

Numerous proposals to change personal use fishing regulations are submitted during each regularly scheduled Upper Cook Inlet Finfish BOF meeting to address the concerns about the growth of the fishery. However, regulations have remained relatively unchanged for several years. The only changes that have occurred are related to supporting growth of the fishery because local city and borough governments are active in planning to control congestion through the development of infrastructure (parking, rest rooms, traffic management, new road access), increasing law enforcement, and establishing local ordinances to help manage growth in the numbers of people visiting the area during July to participate in the fishery.

Recommended Research and Management

No research or revised management strategies are recommended.

KASILOF RIVER PERSONAL USE DIP NET AND GILLNET FISHERIES

Management Objectives

Regulation and management of this fishery are governed by the *Upper Cook Inlet Personal Use Salmon Fishery Management Plan* (5 AAC 77.540). The fishery objective is to implement the provisions of the BOF–adopted management plan.

Inseason Management Approach

Management of this fishery is the joint responsibility of CF and SF. CF is responsible for operation of the Kasilof River sonar counter that enumerates sockeye salmon entering the river. The personal use gillnet and dip net fisheries open and close by regulation. Inseason management by SF would be required only in the unlikely event the minimum sonar count and biological escapement goal could not be projected and achievement of these goals required restrictions to the dip net fishery or if the projected run strength exceeded the upper goal range. Prior to 2011, in the event that the upper goal range of the BEG of 150,000-250,000 sockeye salmon was projected to be exceeded, ADF&G staff had the tools to liberalize the personal use fishery. In this event, the Kasilof River personal use dip net fishery area could be expanded for shoreline and boat-based dipnetting. The shoreline-based dipnetting area could be expanded to the Sterling Highway Bridge and the area opened to dipnetting from boats could also be expanded upriver to river mile 3 below Trujillo's landing. Both liberalizations were enacted concurrently when sockeye salmon escapement was proceeding at a rate greater than that needed to ensure the BEG was met. In 2011, the BOF amended the *Kasilof River Salmon Management Plan* after ADF&G completed the transition from Bendix sonar technology to DIDSON technology as the method to assess the Kasilof River sockeye salmon run. The BEG of 150,000-250,000 was replaced with a BEG of 160,000–390,000 sockeye salmon. The new goal reflected the adjustment in the estimated number of sockeye salmon passing the Kasilof River sonar station in terms of DIDSON technology that were historically provided by Bendix sonar technology. Change to the new goal within the management plan did not alter the process for inseason management of the personal use fishery, just the trigger points of when to restrict and when to liberalize. So, similar to the years prior to 2011, inseason management relies on estimates of inriver sonar counts, and estimated escapement.

Participants in this personal use fishery are required to get a permit, and are required to return the permit to ADF&G, regardless of whether or not they fished. Persons who do not comply with the reporting requirement are sent reminder letters to prompt their response. Since 1996, harvest and effort in the Kenai River personal use dip net and gillnet fishery have been estimated from reported harvest on returned permits. All responses prior to the second reminder letter are treated as a census of "compliant" permits. Responses from the second (and up to fourth in some years) reminder letters are considered to be a sample of the "noncompliant" permits. Estimates of mean harvest and effort from the noncompliant permits are expanded by the known total number of noncompliant permits and used to generate the total estimate of "noncompliant" harvest and effort. This estimate is then added to the sum of the harvest and effort from the compliant permits to generate the estimate of total harvest for the fishery.

2014 Fishery Performance

The preseason forecast for the Kasilof River was for a total run of approximately 1.1 million sockeye salmon. The 2014 Kasilof River personal use fisheries produced good opportunities to harvest sockeye salmon periodically throughout the season depending upon daily passage rates of sockeye salmon into the river. During commercial fishery closures, personal use dip net harvests may significantly increase and the inverse may also be experienced during commercial fishery openings. The estimated harvest of sockeye salmon in the 2014 personal use gillnet fishery was 22,567 fish, while the dip net harvest was 88,513 fish (Tables 6 and 39). The dip net harvest was larger than the most recent 5-year (2009–2013) average of approximately 70,500 sockeye salmon, and was the second largest harvest in the fishery on record (Table 39).

The 2014 Kasilof River sockeye salmon run strength allowed ADF&G to issue EO 2-RS-1-36-14 to increase the area open to personal use dipnetting from a boat and from shore effective July 4, 2014. The final estimated escapement was 440,192 salmon past ADF&G's sonar station (Table 39).

2015 Fishery Performance

The 2015 Kasilof River sockeye salmon run forecast was similar to 2014 and was 1,092,000, which was 12% greater than the 20-year average of 953,000 fish. The 2015 sockeye salmon run to the Kasilof River resulted in an estimated escapement of 470,667 sockeye salmon (Table 39). Similar to 2014, an EO (2-RS-1-39-15; Appendix A2) was issued on June 30 to expand the amount of area on the Kasilof River open to dipnetting. The personal use harvest of sockeye salmon was 27,567 fish in the gillnet fishery and 89,000 fish in the dip net fishery (Table 6). The dip net harvest estimate of 89,000 was the highest ever recorded for the fishery. The estimated total run of Kasilof River sockeye salmon was an estimated 1,173,000 fish (Shields and Dupuis 2016).

2016 Fishery Performance

The total run forecast for the Kasilof River sockeye salmon was 861,000 fish which was about 13% less than the 20-year average run (1996–2015) of 987,000 fish. The 2016 preliminary inseason sockeye salmon passage estimate was 239,981 fish. This passage was less than the most recent 2 years; however, this still provided personal use gillnetting and dipnetting opportunity for participants. It is anticipated that the 2016 Kasilof River personal use estimates of sockeye salmon harvest will be similar to the historical average harvest based on the level of participation observed during the fisheries. No inseason management actions were taken for the Kasilof River personal use dip net fishery during 2016.

Current Issues

From 2014 to 2016, Kasilof River sockeye salmon escapement has met or exceeded the OEG. Historically, land use and lack of infrastructure to support increases in participation are issues associated with the Kasilof River personal use fisheries. Parking, congestion, litter, safety, trespass, public nuisance, and camping have continued to be issues of concern in these fisheries. State lands where these fisheries occur are open to generally allowed public use. The Kasilof River Special Use Area was established through DNR, Division of Lands Mining and Water. This designation will aid in developing regulations to control land use that will address land use and infrastructure issues during the summer months when the Kasilof River personal use fisheries occur. The Department of Natural Resources, Division of Mining Lands and Waters

was granted funding for construction of infrastructure facilities to support public use and access at the North Shore of the Kasilof River mouth. These facilities are anticipated to be open for the 2017 personal use fishing season.

Recommended Research and Management

No research or revised management strategies are recommended at this time.

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TABLES

Table 1.–Angler-days of effort expended by sport anglers fishing Northern Kenai Peninsula Management Area waters, 1977–2015.

	Kenai River [a]		Russian River [b]		Kasilof River [c]		Other NKPMA [d]		NKPMA	Percent	Alaska
Year	Effort	% NKPMA	Effort [e]	% NKPMA	Effort	% NKPMA	Effort	% NKPMA	total	of state	total
1977	122,138	55	54,220	25	ND	0	44,655	20	221,013	18	1,198,486
1978	164,264	61	67,237	25	ND	0	38,707	14	270,208	21	1,286,063
1979	178,485	63	58,133	20	ND	0	47,773	17	284,391	21	1,364,739
1980	171,803	58	78,983	27	ND	0	46,252	16	297,038	20	1,488,962
1981	178,716	64	54,642	20	8,311	3	37,205	13	278,874	20	1,420,772
1982	231,948	65	70,372	20	13,238	4	39,186	11	354,744	22	1,623,090
1983	229,312	72	35,018	11	16,675	5	36,205	11	317,210	18	1,732,528
1984	270,489	71	55,861	15	25,697	7	29,977	8	382,024	20	1,866,837
1985	323,045	71	80,054	18	24,103	5	25,315	6	452,517	23	1,943,069
1986	335,051	69	70,729	15	36,115	7	44,581	9	486,476	23	2,071,412
1987	289,165	61	91,600	19	42,703	9	53,503	11	476,971	22	2,152,886
1988	374,630	69	76,180	14	43,965	8	51,342	9	546,117	24	2,311,291
1989	377,892	74	53,598	11	39,318	8	37,668	7	508,476	22	2,264,079
1990	342,711	68	68,861	14	40,437	8	48,723	10	500,732	20	2,453,284
1991	323,662	66	76,433	16	46,208	9	44,361	9	490,664	20	2,456,328
1992	332,573	66	67,443	13	49,774	10	56,947	11	506,737	20	2,540,374
1993	324,355	65	61,018	12	57,149	11	56,548	11	499,070	19	2,559,408
1994	340,904	66	65,996	13	50,821	10	59,908	12	517,629	19	2,719,911
1995	377,710	70	58,090	11	50,012	9	57,202	11	543,014	19	2,787,670
1996 [e]	265,986	69	50,122	13	33,585	9	34,745	9	384,438	19	2,006,528
1997 [e]	247,898	68	46,914	13	32,287	9	39,177	11	366,276	18	2,079,514
1998 [e]	216,650	66	47,942	15	26,487	8	36,561	11	327,640	18	1,856,976
1999	307,446	68	64,536	14	40,263	9	38,471	9	450,716	18	2,499,152
2000	358,569	69	69,864	13	46,654	9	44,472	9	519,559	20	2,627,805
2001	298,817	70	55,972	13	39,034	9	35,770	8	429,593	19	2,261,941
2002	312,815	68	68,263	15	35,198	8	41,003	9	457,279	20	2,259,091
2003	321,044	74	50,448	12	30,840	7	33,564	8	435,896	20	2,219,398
2004	376,313	75	60,784	12	29,889	6	33,749	7	500,735	20	2,473,961
2005	389,379	76	55,801	11	30,436	6	33,386	7	509,002	21	2,463,929

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Table 1.–Page 2 of 2.

Year	Kenai River [a] Effort	Kenai River [a] % NKPMA	Russian River [b] Effort [e]	Russian River [b] % NKPMA	Kasilof River [c] Effort	Kasilof River [c] % NKPMA	Other NKPMA [d] Effort	Other NKPMA [d] % NKPMA	NKPMA total	Percent of state	Alaska total
2006	330,085	72	70,804	15	26,323	6	33,254	7	460,466	20	2,297,961
2007	410,381	77	57,755	11	28,246	5	38,554	7	534,936	21	2,543,674
2008	360,344	75	55,444	12	29,939	6	35,630	7	481,357	21	2,315,601
2009	337,217	73	64,518	14	24,545	5	34,949	8	461,229	21	2,216,445
2010	347,938	80	39,873	9	19,481	4	30,130	7	437,422	22	2,000,167
2011	365,863	79	47,264	10	23,422	5	24,516	5	461,065	24	1,919,313
2012	374,732	82	41,152	9	22,099	5	19,873	4	457,856	24	1,885,768
2013	411,592	78	59,682	11	27,430	5	31,942	6	530,646	24	2,202,957
2014	455,578	79	57,544	10	30,369	5	34,399	6	577,890	25	2,309,853
2015	422,792	78	55,420	10	29,766	6	31,502	6	539,480	24	2,212,331
Average 1977–2015	312,828	70	60,630	14	32,881	7	39,531	9	442,497	21	2,125,476

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] Does not include Skilak and Kenai lakes.

[b] Does not include Lower and Upper Russian lakes; all data here is from SWHS.

[c] Does not include Tustumena lake.

[d] No breakdown of other lakes or streams is available from 1977 to 1982. Those years contain some Kasilof River totals and may contain some non-NKPMA data. Does not include unspecified lakes and streams totals either because those may contain non-NKPMA data.

[e] SWHS data from revised estimates (September 13, 2000).

Table 2.–Angler-days of sport fishing effort for the Kenai River by section, 1977–2015.

Year	Cook Inlet to Soldotna Bridge	Soldotna Bridge to Moose River	Moose River to Skilak Outlet	Skilak Inlet to Kenai Lake	Kenai River reach not specified [a]	Kenai River total
1977	ND	ND	ND	ND	ND	122,138
1978	ND	ND	ND	ND	ND	164,264
1979	ND	ND	ND	ND	ND	178,485
1980	ND	ND	ND	ND	ND	171,803
1981	91,763	35,877	33,701	17,375	ND	178,716
1982	119,164	49,372	39,170	24,242	ND	231,948
1983	109,067	52,266	41,442	26,453	ND	229,228
1984	150,824	42,644	40,976	35,978	ND	270,422
1985	163,690	66,100	55,904	36,536	815	323,045
1986	181,035	63,876	51,171	38,969	ND	335,051
1987	141,203	66,807	41,128	40,027	ND	289,165
1988	203,728	79,727	55,334	35,470	371	374,630
1989	198,697	93,508	53,135	31,562	990	377,892
1990	169,818	82,331	43,401	47,112	49	342,711
1991	151,592	82,552	45,067	44,157	294	323,662
1992	150,249	81,378	49,774	51,172	ND	332,573
1993	162,171	70,353	38,583	53,013	235	324,355
1994	170,944	71,440	39,222	59,298	ND	340,904
1995	206,127	81,280	43,432	46,871	ND	377,710
1996	131,751	61,059	32,465	40,711	ND	265,986
1997	120,873	58,618	32,645	35,762	ND	247,898
1998	95,378	56,342	36,218	28,712	ND	216,650
1999	157,493	69,331	41,573	39,049	ND	307,446
2000	178,460	92,056	41,911	46,142	ND	358,569
2001	153,356	75,249	34,918	35,294	ND	298,817
2002	142,492	78,165	33,228	52,937	5,993	312,815
2003	143,144	90,072	35,804	40,815	11,209	321,044
2004	166,202	100,180	51,188	49,814	8,929	376,313
2005	168,570	111,806	40,903	51,892	15,506	388,677
2006	151,623	91,912	35,667	40,624	9,296	329,122
2007	164,411	110,099	60,820	67,164	7,887	410,381
2008	161,607	90,811	47,204	50,655	10,067	360,344
2009	132,059	87,360	48,661	60,319	8,818	337,217
2010	133,856	105,095	53,375	43,344	12,268	347,938
2011	159,254	107,121	53,315	43,750	2,423	365,863
2012	147,721	127,598	54,024	43,222	2,167	374,732
2013	137,963	144,901	63,948	62,213	2,567	411,592
2014	175,187	157,066	70,741	49,038	3,546	455,578
2015	168,628	135,996	65,826	50,607	1,735	422,792
Average 1977–2015	153,146	84,867	45,882	43,437	5,258	312,781

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] Prior to 2002, these data were listed under the "other streams" category.

Table 3.–Kenai River sport fish harvest by species, 1977–2015.

Year	Chinook salmon	Sockeye salmon	Coho salmon	Pink salmon	Chum salmon	Rainbow trout	Dolly Varden	Lake trout	Arctic grayling	Northern pike	Other [a]	Total
1977	7,585	23,196	9,537	163	0	4,438	7,423	252	187	ND	179	52,960
1978	7,130	33,619	10,823	26,579	0	9,272	17,140	524	90	ND	1,843	107,020
1979	8,843	16,887	15,276	127	0	14,644	34,687	409	127	ND	1,131	92,131
1980	4,942	25,468	26,838	18,580	0	9,807	26,794	112	17	ND	809	113,367
1981	11,318 [b]	19,721	22,324	86	0	18,685	34,862	723	65	ND	810	108,594
1982	11,496 [b]	50,103	39,415	25,572	0	12,673	16,484	628	188	0	576	157,135
1983	17,519 [b]	71,267	22,678	1,825	0	13,658	30,106	650	189	0	534	158,426
1984	14,220 [b]	15,702	59,644	28,562	0	15,687	31,407	535	51	ND	870	166,678
1985	16,540 [b]	57,337	44,635	1,306	186	14,981	26,287	954	104	69	1,889	164,288
1986	18,028 [b]	72,398	60,110	19,924	563	2,425	5,775	972	120	0	924	181,239
1987	26,657 [b]	240,819	33,210	941	144	2,185	7,630	315	156	12	175	312,244
1988	34,904 [b]	152,751	48,785	15,795	849	2,133	10,977	893	692	0	863	268,642
1989	18,085 [b]	277,906	55,275	1,421	520	1,927	10,083	322	151	18	345	366,053
1990	8,704 [b]	120,788	60,325	27,385	312	3,535	11,982	256	51	10	567	233,915
1991	9,848 [b]	161,678	76,163	2,416	8	3,329	14,517	497	0	0	886	269,342
1992	9,797 [b]	242,491	52,310	10,029	0	1,977	14,462	448	0	0	440	331,954
1993	27,117	137,179	50,538	1,003	0	2,574	12,724	335	0	26	380	231,876
1994	26,008	93,616	86,711	8,701	0	1,576	8,486	401	0	0	274	225,773
1995	22,826	125,428	46,183	991	0	2,150	9,523	178	0	29	300	207,608
1996	14,735	186,291	42,293	15,406	464	1,560	7,484	1199	123	92	250	269,897
1997	19,184	177,133	16,164	1,371	154	1,910	6,957	130	131	7	167	223,308
1998	8,685	164,536	26,967	8,926	79	2,015	6,079	117	25	0	610	218,039
1999	21,724	200,574	31,637	1,895	333	3,784	7,568	293	64	0	64	267,936
2000	17,040	230,983	48,519	19,081	350	3,459	7,427	115	93	6	751	327,824
2001	18,879	200,762	49,782	2,069	498	2,422	6,528	156	76	0	1,141	282,313
2002	13,506	225,917	59,650	22,995	959	6,019	5,781	173	146	12	806	335,964
2003	19,782	286,089	46,657	2,847	94	2,278	6,113	243	42	58	274	364,477
2004	20,757	294,793	65,952	20,638	123	3,311	5,845	80	277	58	136	411,970
2005	22,024	294,287	50,411	5,112	52	2,517	4,316	0	62	12	759	379,552

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Table 3.–Page 2 of 2.

Year	Chinook salmon	Sockeye salmon	Coho salmon	Pink salmon	Chum salmon	Rainbow trout	Dolly Varden	Lake trout	Arctic grayling	Northern pike	Other [a]	Total
2006	20,504	173,425	37,639	12,448	52	2,499	3,218	41	10	0	158	249,994
2007	14,934	308,850	38,017	3,308	30	2,666	3,276	0	12	10	144	371,247
2008	14,638	230,030	51,624	15,108	227	3,214	3,766	153	31	25	359	319,175
2009	11,968	252,319	49,960	4,038	89	2,454	2,718	22	13	0	149	323,730
2010	8,538	304,635	52,912	12,959	71	2,403	2,996	129	87	0	246	384,976
2011	8,689	395,840	44,132	3,586	77	1,727	1,789	0	0	0	355	456,195
2012	794	455,454	36,407	17,637	357	2,540	2,144	7	0	11	1,695	517,046
2013	1,405	436,988	48,954	3,130	149	1,771	3,609	0	0	23	495	496,524
2014	1,301	360,831	60,566	24,919	31	1,619	3,927	62	0	29	352	453,637
2015	4,009	376,422	57,067	4,914	190	2,265	3,834	0	0	0	1,196	449,897
Average 1977–2015	14,479	192,167	44,515	10,097	178	4,874	10,942	316	87	15	613	278,281

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] Includes whitefish (*Coregonus clupeaformis*), steelhead, burbot (*Lota lota*), and those fish species not listed in rest of table.

[b] Totals for 1981–1992 revised to include fish originally excluded due to a size range of less than 16 inches or less than 20 inches.

Table 4.–Angler-days of sport fishing effort for other Northern Kenai Peninsula Management Area streams and drainages by fishery, 1977-2015.

Year	Stocked lakes [a]	Quartz Creek	Swanson River	Hidden Lake	Resurrection Creek	Swanson R. Canoe Route	Swan Lakes Canoe Route	Skilak Lake	Kenai Lake	Sixmile Creek	Crescent Lake	Tustemena Lake	Other NKPMA fisheries	Total
1977 [b]	ND	ND	ND [c]	7,462	ND	8,183	ND [c]	ND	ND	ND	ND	ND	29,010	44,655
1978 [b]	ND	ND	ND [c]	4,028	ND	6,376	ND [c]	ND	ND	ND	ND	ND	28,303	38,707
1979 [b]	ND	ND	ND [c]	5,974	ND	5,769	ND [c]	ND	ND	ND	ND	ND	36,030	47,773
1980 [b]	ND	ND	ND [c]	5,783	ND	6,697	ND [c]	ND	ND	ND	ND	ND	33,772	46,252
1981 [b]	ND	ND	ND [c]	4,761	ND	5,235	ND [c]	ND	ND	ND	ND	ND	27,209	37,205
1982 [b]	ND	ND	ND [c]	6,278	ND	6,329	ND [c]	ND	ND	ND	ND	ND	26,579	39,186
1983	3,018	691	2,124	6,761	51	7,014	ND [c]	422	1,180	ND	540	253	14,151	36,205
1984	870	3,413	ND [d]	4,835	301	5,671	3,597	67	502	50	770	351	9,550	29,977
1985	1,473	451	ND [d]	3,676	364	4,058	3,000	121	607	52	243	1,734	9,536	25,315
1986	2,538	4,146	ND [d]	6,254	2,278	9,831	3,608	413	2,722	1,483	1,147	291	9,870	44,581
1987	2,054	5,361	ND [d]	12,532	2,753	7,353	4,980	4,129	580	2,717	960	1,576	8,508	53,503
1988	4,433	3,965	10,368	4,820	3,402	3,674	2,929	3,838	855	1,207	1,255	1,419	9,177	51,342
1989	2,068	4,893	5,484	1,152	1,668	2,180	3,570	2,810	377	1,152	1,052	923	10,339	37,668
1990	3,746	5,655	6,091	4,188	4,348	2,434	2,402	2,817	1,042	2,030	971	2,200	10,799	48,723
1991	3,763	5,354	5,830	4,426	1,234	2,570	2,830	4,120	1,064	679	1,223	1,596	9,672	44,361
1992	5,771	7,906	4,897	4,172	3,724	3,372	2,934	3,820	1,536	971	1,014	1,600	15,230	56,947
1993	5,682	9,152	5,690	5,030	2,264	2,818	2,332	3,289	2,586	1,693	1,713	1,055	13,244	56,548
1994	10,579	7,241	5,039	3,014	5,913	2,432	1,295	1,805	2,624	1,655	1,836	1,587	14,888	59,908
1995	8,447	5,179	4,637	4,443	4,521	2,228	2,262	2,957	3,240	2,044	1,874	1,332	14,038	57,202
1996 [e]	5,380	3,018	3,907	2,305	3,884	2,564	1,184	1,780	878	1,723	756	910	6,456	34,745
1997 [e]	6,088	3,401	3,495	2,575	2,048	2,253	2,272	2,346	1,734	1,224	957	1,699	9,085	39,177
1998 [e]	6,588	3,166	3,422	1,576	6,101	1,671	1,515	1,645	520	1,370	1,145	985	6,857	36,561
1999	5,151	4,708	3,606	2,017	2,167	3,279	2,022	1,182	1,462	445	1,266	599	10,567	38,471
2000	7,880	2,423	5,839	1,804	5,751	2,929	1,742	2,072	1,033	1,207	1,504	1,368	8,920	44,472
2001	6,543	3,105	4,060	1,604	2,377	3,345	816	1,701	2,509	1,024	1,099	731	6,856	35,770
2002	7,641	4,245	4,249	1,412	3,456	1,396	2,296	1,668	2,502	2,001	1,457	871	7,809	41,003
2003	4,802	4,357	3,807	1,761	2,534	1,150	1,148	2,068	1,097	1,089	1,412	802	7,537	33,564
2004	4,978	6,589	2,878	1,902	3,116	762	580	2,460	497	1,297	1,104	972	6,614	33,749

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Table 4.–Page 2 of 2.

Year	Stocked lakes [a]	Quartz Creek	Swanson River	Hidden Lake	Resur-rection Creek	Swanson R Canoe Route	Swan Lakes Canoe Route	Skilak Lake	Kenai Lake	Sixmile Creek	Crescent Lake	Tustemena Lake	Other NKPMA fisheries	Total
2005	8,205	6,106	3,552	1,548	1,708	1,334	932	594	2,072	511	1,028	684	5,112	33,386
2006	6,488	5,582	3,533	1,975	4,550	1,136	794	1,152	619	1,127	790	455	5,053	33,254
2007	3,079	8,694	4,481	2,449	5,030	2,231	2,097	1,462	648	988	1,389	525	5,481	38,554
2008	2,802	7,105	5,006	1,543	5,584	2,221	1,341	1,692	728	641	959	750	5,258	35,630
2009	3,707	6,217	2,698	3,559	6,805	1,923	400	1,126	687	1,535	1,609	764	3,919	34,949
2010	5,510	4,859	2,303	2,393	3,287	900	1,385	1,085	955	1,361	758	348	4,986	30,130
2011	7,192	2,184	3,922	1,314	1,801	247	505	918	869	348	996	134	4,086	24,516
2012	5,867	1,238	700	835	2,511	397	930	538	1,179	655	896	0	4,127	19,873
2013	10,161	3,262	1,916	1,745	2,157	660	1,041	2,060	2,964	742	1,213	539	3,482	31,942
2014	8,485	3,507	2,022	743	5,262	875	660	1,616	3,030	1,108	1,186	ND	5,905	34,399
2015	10,362	3,137	1,470	645	2,844	731	771	1,188	2,048	1,940	1,041	858	4,467	31,502
Average 1977–2015	5,495	4,555	4,035	3,469	3,206	3,237	1,880	1,847	1,423	1,190	1,126	935	11,602	39,531

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] From 1983 to 2004, a yearly combined total of 2 Rainbow Lakes (one stocked, one not) are included because there was no breakdown available.

[b] No breakdown of "Other lakes or streams" is available from 1977 to 1982. Those years contain Kasilof River totals and may contain data from other NKPMA fisheries.

[c] Only Swanson River Canoe Route total or Canoe Route Systems total is listed in the SWHS from 1977 to 1982 and this includes Swanson River, Swanson River Canoe Route, and Swan Lake Canoe Route data.

[d] No separate breakdown of Swanson River and Swanson River Canoe Route data is available for 1984-1987.

[e] SWHS data from revised estimates (September 13, 2000).

Table 5.–Sport fish harvest by species for systems other than the Kenai River mainstem in the Northern Kenai Peninsula Management Area, 1977–2015.

Year	Chinook salmon	Sockeye salmon [a]	Coho salmon [b]	Pink salmon	Chum salmon	Rainbow trout	Dolly Varden	Lake trout	Arctic grayling	Northern pike	Other	Total
1977 [c]	0	51,693	3,918	1,854	36	16,996	10,783	3,426	1,400	ND	928	91,034
1978 [c]	251	66,023	6,389	3,591	351	14,933	12,583	2,594	2,197	ND	505	109,417
1979 [c]	283	41,118	5,884	1,136	18	18,099	19,633	3,208	1,391	ND	490	91,260
1980 [c]	310	59,573	7,027	1,576	34	22,096	19,655	3,457	2,109	ND	103	115,940
1981 [c]	1,307	40,229	7,484	1,976	140	23,003	17,397	2,646	1,826	32	2,560	98,600
1982 [c]	2,367	50,806	8,402	2,544	170	18,208	10,041	3,709	2,015	105	50	98,417
1983	3,189	29,139	6,304	146	0	17,000	16,867	2,307	1,298	294	366	76,910
1984	4,648	59,976	6,460	1,596	0	12,480	11,758	1,719	998	187	261	100,083
1985	3,608	69,919	3,923	459	0	13,265	6,639	1,735	1,075	52	222	100,897
1986	8,012	71,702	8,548	2,330	26	11,483	10,749	5,091	1,758	0	123	119,822
1987	5,623	182,839	11,853	1,449	72	6,771	6,899	2,986	832	0	257	219,581
1988	5,652	87,586	15,971	2,382	72	7,017	5,437	2,947	581	0	36	127,681
1989	4,121	73,906	18,598	892	416	5,217	6,435	1,413	982	49	128	112,157
1990	3,151	63,637	7,986	4,241	238	10,013	9,982	2,164	685	20	554	102,671
1991	5,725	106,892	12,500	790	33	8,680	8,650	2,946	1,419	74	1,130	148,839
1992	7,213	64,554	15,226	5,624	175	13,674	9,243	2,837	775	239	972	120,532
1993	9,829	59,475	16,344	1,500	148	10,598	12,285	3,262	1,198	28	2,324	116,991
1994	7,304	77,913	15,670	2,373	175	11,537	8,953	2,026	1,534	0	1,626	129,111
1995	6,699	41,057	12,276	2,897	198	11,205	6,981	2,615	1,645	160	860	86,593
1996 [d]	6,139	62,054	15,810	4,033	188	7,246	4,032	2,185	893	53	134	102,767
1997 [d]	6,738	55,774	11,627	1,598	157	12,901	6,125	2,032	1,015	0	324	98,291
1998 [d]	4,845	72,572	14,600	7,842	313	10,081	3,196	1,890	872	0	164	116,375
1999	8,255	72,722	10,281	1,022	230	9,763	3,233	2,353	984	47	44	108,934
2000	9,912	79,370	13,043	3,380	0	13,784	4,289	1,559	1,111	48	250	126,746
2001	8,866	60,630	15,377	2,036	116	7,646	2,334	1,577	888	522	647	100,639
2002	5,261	91,209	21,447	4,183	140	13,070	2,915	1,628	982	356	202	141,393
2003	4,234	58,496	14,420	2,459	145	7,674	2,553	624	1,139	459	185	92,388
2004	4,346	64,076	16,279	3,624	125	5,245	3,842	1,703	647	256	102	100,245
2005	4,566	61,778	12,008	1,190	108	4,868	1,690	1,229	739	212	230	88,618

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Table 5.–Page 2 of 2.

Year	Chinook salmon	Sockeye salmon [a]	Coho salmon [b]	Pink salmon	Chum salmon	Rainbow trout	Dolly Varden	Lake trout	Arctic grayling	Northern pike	Other	Total
2006	3,304	89,238	13,502	5,110	388	4,597	1,263	821	387	55	87	118,752
2007	3,731	58,169	8,791	3,485	61	6,373	2,197	669	523	548	37	84,584
2008	3,789	74,264	12,292	6,254	52	4,677	1,815	429	635	229	0	104,436
2009	3,801	100,938	11,239	5,926	184	3,648	1,293	893	883	0	152	128,957
2010	3,549	39,550	8,076	2,256	77	5,145	1,195	609	285	59	269	61,070
2011	3,714	45,625	8,726	1,766	34	5,527	1,138	404	732	0	228	67,894
2012	927	37,118	10,067	2,501	18	4,439	631	359	635	0	267	56,962
2013	1,835	60,721	10,748	1,175	234	6,377	1,266	1,415	1,177	428	282	85,658
2014	637	74,653	9,219	4,026	20	5,560	1,531	613	597	0	142	96,998
2015	1,379	60,757	10,825	3,602	332	6,485	809	655	603	0	55	85,502
Average 1977–2015	4,336	67,122	11,260	2,739	134	10,189	6,624	1,968	1,063	129	443	105,993

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] Includes kokanee (*O. nerka*) as reported in the SWHS.

[b] Includes natural and stocked landlocked salmon as reported in the SWHS.

[c] No breakdown of other lakes or streams is available from 1977–1982. Those years may contain some non-NKPMA data.

[d] SWHS data from revised estimates (September 13, 2000).

Table 6.–Angler-days of effort and harvest for Kenai River and Kasilof River personal use fisheries, 1996–2015.

Fishery	Year	Days open	Angler-days	Sockeye salmon	Chinook salmon	Coho salmon	Pink salmon	Chum salmon	Total
Kasilof River gillnet									
	1996	5	582	9,506	46	0	8	1	9,561
	1997	5	815	17,997	65	1	102	3	18,168
	1998	5	1,075	15,975	126	0	15	12	16,128
	1999	10	1,287	12,832	442	25	10	10	13,319
	2000	13	1,252	14,774	514	9	17	10	15,324
	2001	8	1,001	17,201	174	6	11	7	17,399
	2002	10	1,025	17,980	192	12	30	13	18,227
	2003	10	1,206	15,706	400	107	9	4	16,226
	2004	10	1,272	25,417	163	58	6	0	25,644
	2005	11	1,506	26,609	87	326	16	1	27,039
	2006	10	1,724	28,867	287	420	11	6	29,591
	2007[a]	10	1,570	14,943	343	68	2	0	15,356
	2008[a]	10	1,534	23,432	151	65	35	23	23,706
	2009[a]	10	1,761	26,646	127	165	14	11	26,963
	2010	10	1,855	21,924	136	23	23	1	22,107
	2011	10	1,846	26,780	167	47	23	3	27,020
	2012	10	1,696	15,638	103	161	53	15	15,970
	2013	5	1,082	14,439	46	129	3	5	14,622
	2014	10	1,389	22,567	50	30	105	18	22,770
	2015	10	1,741	27,567	61	191	20	2	27,841
	Min.	5	582	9,506	46	0	2	0	9,561
	Average	9	1,361	19,840	184	92	26	7	20,149
	Max.	13	1,855	28,867	514	420	105	23	29,591
Kasilof River dip net									
	1996	27	1,300	11,197	50	334	103	17	11,701
	1997	27	1,091	9,737	35	90	19	19	9,900
	1998	27	3,421	45,161	134	731	610	74	46,710
	1999	27	3,611	37,176	127	286	264	52	37,905
	2000	27	2,622	23,877	134	1,004	841	34	25,890
	2001	27	3,382	37,612	138	766	307	23	38,846
	2002	44	4,020	46,769	106	1,197	1862	139	50,073
	2003	44	3,874	43,870	57	592	286	30	44,835
	2004	44	4,432	48,315	44	668	396	90	49,513
	2005	44	4,500	43,151	16	538	658	102	44,465
	2006	44	5,763	56,144	55	1,057	992	105	58,353
	2007[a]	44	4,627	43,293	35	487	383	136	44,334
	2008[a]	44	5,552	54,051	46	509	787	143	55,536
	2009[a]	44	7,650	73,035	34	1,441	1,274	173	75,957
	2010	44	7,588	70,774	31	1,768	974	279	73,826
	2011	44	6,571	49,766	24	977	652	144	51,562
	2012	44	6,536	73,419	16	1,170	896	147	75,649
	2013	44	8,556	85,508	38	1,666	683	339	88,233
	2014	44	10,236	88,513	0	2,606	2,769	342	94,230
	2015	44	10,346	89,000	0	2,723	1,607	597	93,927
	Min.	27	1,091	9,737	0	90	19	17	9,900
	Average	39	5,284	51,518	56	1,031	818	149	53,572
	Max.	44	10,346	89,000	138	2,723	2,769	597	94,230

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Table 6.–Page 2 of 2.

Fishery	Year	Days open	Angler-days	Sockeye salmon	Chinook salmon	Coho salmon	Pink salmon	Chum salmon	Total
Kenai River dip net									
	1996	27	10,503	102,821	295	1,932	2,404	175	107,627
	1997	22	11,023	114,619	364	559	619	58	116,219
	1998	18	10,802	103,847	254	1,011	1,032	85	106,229
	1999	22	13,738	149,504	488	1,009	1,666	102	152,769
	2000	22	12,354	98,262	410	1,449	1,457	193	101,771
	2001	22	14,772	150,766	638	1,555	1,326	155	154,440
	2002	22	14,840	180,028	606	1,721	5,662	551	188,568
	2003	22	15,263	223,580	1,016	1,332	1,647	249	227,824
	2004	22	18,513	262,831	792	2,661	2,103	387	268,774
	2005	22	20,977	295,496	997	2,512	1,806	321	301,132
	2006	20	12,685	127,630	1,034	2,235	11,127	551	142,577
	2007[a]	22	21,908	291,270	1,509	2,111	1,939	472	297,301
	2008[a]	22	20,772	234,109	1,362	2,609	10,631	504	249,215
	2009[a]	22	26,171	339,993	1,189	2,401	5,482	285	349,350
	2010	22	28,342	389,552	865	2,870	3,655	508	397,450
	2011	22	32,818	537,765	1,243	4,745	3,914	915	548,583
	2012	22	34,374	526,992	40	4,008	3,770	425	535,236
	2013	22	33,193	347,222	11	3,169	3,625	701	354,727
	2014	22	36,380	379,823	0	4,710	19,140	1,194	404,866
	2015	22	31,487	377,532	66	4,150	4,147	957	386,852
	Min.	18	10,503	98,262	0	559	619	58	101,771
	Average	22	21,046	261,682	659	2,437	4,358	439	269,576
	Max.	27	36,380	537,765	1,509	4,745	19,140	1,194	548,583

Source: Reimer and Sigurdsson (2004); Dunker and Lafferty (2007); Dunker (2010, 2013); K. J. Dunker, Sport Fish Biologist, ADF&G, Anchorage, personal communication.

Note: For 1996–1997, total reported harvest is from returned permits only. For 1998–2015, summaries of returned permits are expanded to include harvest of permits not returned.

[a] Some data for 2007–2009 were revised in 2010 by K. J. Dunker.

Table 7.–Kenai River early-run Chinook salmon population data, 1986–2015.

Year	Cook Inlet marine harvest [a]	Misc. marine [b]	Kenaitze educational harvest [c]	Inriver run [d]	Sport harvest above sonar [e]	Catch-and-release mortality	Spawning escapement	Total run	Harvest rate
1986	144	0	ND	20,100	8,156	242	11,702	20,244	0.41
1987	181	0	ND	21,750	13,557	306	7,887	21,931	0.63
1988	212	0	ND	19,800	15,209	340	4,251	20,012	0.77
1989	193	0	73	12,290	8,394	149	3,747	12,556	0.69
1990	235	0	40	9,842	1,807	378	7,657	10,117	0.21
1991	241	0	2	10,620	1,945	152	8,523	10,863	0.20
1992	300	0	73	11,930	2,241	236	9,453	12,303	0.21
1993	407	0	118	12,490	9,342	286	2,862	13,015	0.76
1994	343	0	56	13,160	8,171	285	4,704	13,559	0.63
1995	412	0	37	12,890	10,217	357	2,316	13,339	0.80
1996	235	0	104	9,764	6,623	287	2,854	10,103	0.69
1997	282	0	122	11,140	6,429	349	4,362	11,544	0.59
1998	289	0	131	11,930	1,170	254	10,506	12,350	0.13
1999	245	0	114	13,480	8,129	261	5,090	13,839	0.61
2000	239	0	124	10,790	1,818	185	8,787	11,153	0.20
2001	184	0	198	14,020	2,399	204	11,417	14,402	0.19
2002	168	0	48	10,860	899	78	9,883	11,076	0.10
2003	202	0	126	20,450	2,839	389	17,222	20,778	0.15
2004	194	0	72	23,460	3,386	257	19,817	23,726	0.15
2005	187	341	76	20,810	3,810	253	16,747	21,414	0.21

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Table 7.–Page 2 of 2.

Year	Cook Inlet marine harvest [a]	Misc. marine [b]	Kenaitze educational harvest [c]	Inriver run [d]	Sport harvest above sonar [e]	Catch-and-release mortality	Spawning escapement	Total run	Harvest rate
2006	252	0	65	18,180	4,693	205	13,282	18,497	0.27
2007	201	41	16	13,630	3,493	220	9,917	13,888	0.27
2008	107	102	40	10,210	3,500	123	6,587	10,459	0.36
2009	71	16	49	7,741	1,466	97	6,178	7,877	0.20
2010	88	48	32	5,874	1,336	90	4,448	6,042	0.25
2011	110	0	42	7,366	1,337	92	5,937	7,518	0.20
2012	48	0	19	3,228	316	10	2,902	3,295	0.12
2013	102	0	11	4,530	0	5	4,525	4,643	0.02
2014	78	18	1	5,776 [f]	0	0	5,776	5,873	0.02
2015	78	72	10	6,190 [g]	0	0	6,190	6,350	0.03
2016	NA	NA	4	9,851 [g]	NA	NA	NA	NA	NA
Average									
1986–2005	245	17	89	14,579	5,827	262	8,489	14,916	0.42
2006–2015	114	30	29	8,273	1,614	84	6,574	8,444	0.17
1986–2015	201	21	67	12,477	4,423	203	7,851	12,759	0.34

Source: Statewide Harvest Surveys from Mills (1987-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; other data from Alexandersdottir and Marsh (1990), Nelson et al. (1999), Hammarstrom and Timmons (2001a), Reimer et al. (2002), Reimer (2003, 2004a-b, 2007), Eskelin (2007, 2009, 2010), Perschbacher (2012a-d, 2014, 2015), McKinley and Fleischman (2013), and J. Perschbacher, Sport Fish Biologist, ADF&G Soldotna, personal communication; 1994-2015 educational data from Kenaitze Indian Tribe.

Note: ND means no data collected. NA means data too preliminary to be reported yet.

[a] Cook Inlet marine sport harvest; calculated as 5% of total Cook Inlet marine sport harvest.

[b] 60% of commercial cost-recovery harvest and eastside setnet harvest before 25 June.

[c] Prior to 1994, there was no educational fishery; this was considered a subsistence fishery.

[d] Estimates for 1986–2009 are based on a run reconstruction model (Fleischman and McKinley 2013); unexpanded estimates for 2010–2012 published in Miller et al. (2013-2015). Estimates for 1986–2012 are sonar estimates at RM 8.6 expanded by the inverse of proportion midriver.

[e] Includes creel survey estimates for the area from Cook Inlet to the Soldotna Bridge and estimates from the SWHS from the Soldotna Bridge to the outlet of Kenai Lake.

[f] Estimate of inriver run for 2013 based on RM 13.7 ARIS sonar estimates of fish greater than 750 mm plus the estimate of the number of fish less than 750 mm based on weir data and radio telemetry.

[g] Preliminary ARIS sonar estimates at RM 13.7 for 2014–2015. Values subject to change until sonar report is published.

Table 8.–Kenai River late-run Chinook salmon population data, 1986–2016.

Year	Deep Creek marine harvest [a]	Eastside setnet harvest [b]	Drift gillnet harvest [c]	Kenaitze edu-cational	Sub-sistence	Personal use dipnet [d]	Sport harvest below sonar [e]	Inriver run estimated by sonar [f]	Sport harvest above sonar [g]	Catch-and-release mortality [h]	Spawning escape-ment	Total run	Harvest rate
1986	378	13,767	1,100	ND	ND	ND	ND	62,740	9,872	316	52,552	77,986	0.32
1987	731	14,693	2,731	ND	ND	235	ND	63,550	13,100	123	50,327	81,940	0.38
1988	892	8,929	1,342	ND	ND	0	ND	61,760	19,695	176	41,889	72,923	0.42
1989	821	7,579	0	ND	22	0	ND	36,370	9,691	88	26,591	44,792	0.40
1990	963	2,874	373	ND	13	ND	ND	34,200	6,897	69	27,234	38,423	0.29
1991	1,023	3,398	148	ND	288	ND	ND	38,940	7,903	16	31,021	43,797	0.29
1992	1,269	7,443	369	ND	402	0	ND	42,290	7,556	234	34,500	51,773	0.33
1993	1,700	9,776	459	ND	27	0	ND	50,210	17,775	478	31,957	62,172	0.48
1994	1,121	10,815	278	1	392	ND	ND	47,440	17,837	572	29,031	60,048	0.51
1995	1,241	8,380	356	3	ND	712	ND	44,770	12,609	472	31,689	55,462	0.42
1996	1,223	8,030	233	1	ND	295	ND	42,790	8,112	337	34,341	52,572	0.34
1997	1,759	7,864	376	20	ND	364	ND	41,120	12,755	570	27,795	51,503	0.45
1998	1,070	3,532	201	2	ND	254	ND	47,110	7,515	595	39,000	52,169	0.24
1999	602	6,571	345	4	ND	488	1,170	43,670	12,425	682	30,563	52,850	0.41
2000	631	2,558	162	6	ND	410	831	47,440	14,391	499	32,550	52,038	0.36
2001	552	4,173	371	8	ND	638	1,336	53,610	15,144	825	37,641	60,688	0.37
2002	256	6,582	249	6	ND	606	1,929	56,800	10,678	665	45,457	66,428	0.31
2003	120	10,284	744	11	ND	1,016	823	85,110	16,120	1,803	67,187	98,108	0.30
2004	996	15,057	662	10	ND	792	2,386	79,690	14,988	1,019	63,683	99,594	0.35
2005	624	14,997 [i]	1,175	11	ND	997	2,287	77,440	15,927	1,267	60,246	97,531	0.37
2006	563	6,913 [i]	1,669	11	ND	1,034	3,322	62,270	12,490	830	48,950	75,783	0.34

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Table 8.–Page 2 of 2.

Year	Deep Creek marine harvest [a]	Eastside setnet harvest [b]	Drift gillnet harvest [c]	Kenaitze educational	Subsistence	Personal use dipnet [d]	Sport harvest below sonar [e]	Inriver run estimated by sonar [f]	Sport harvest above sonar [g]	Catch-and-release mortality [h]	Spawning escapement	Total run	Harvest rate
2007	478	8,536 [i]	547	6	0	1,509	1,750	47,370	9,690	670	37,010	60,196	0.37
2008	310	5,259 [i]	392	15	0	1,362	1,011	42,840	10,128	370	32,342	51,188	0.36
2009	154	3,880	515	4	0	1,189	1,132	29,940	7,904	626	21,410	36,815	0.40
2010	335	4,611	323	21	0	865	445	18,401	6,762	264	11,375	25,001	0.53
2011	528	5,144	356	5	0	1,243	458	23,713	6,894	479	16,340	31,447	0.47
2012	30	490	131	0	0	40	2	21,613	101	95	21,417	22,305	0.04
2013	369	2,293	296	8	0	11	37	19,931	512	77	19,342	22,945	0.15
2014	591	1,405	229	1	0	0	4	17,815	293	71	17,451	20,045	0.13
2015[j]	500	6,007	334	10	0	66	392	24,694	1,823	229	22,642	32,003	0.29
2016[j]	NA	NA	NA	6	1	NA	NA	22,535	NA	NA	NA	NA	NA
Average													
1986–2005	899	8,365	584	7	191	425	1,537	52,853	12,550	540	39,763	63,640	0.37
2006–2015	386	4,454	479	8	0	732	855	30,859	5,660	371	24,828	37,773	0.31
1986–2015	728	7,061	549	7	76	543	1,136	45,521	10,253	484	34,784	55,017	0.35

Source: Statewide Harvest Surveys from Mills (1987-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; other data from Hammarstrom and Timmons (2001b), Brannian and Fox (1996), Ruesch and Fox (1996), Reimer and Sigurdsson (2004), Dunker and Lafferty (2007), Dunker (2010, 2013), Shields and Dupuis (2016) and Fleischman and McKinley (2013); K. J. Dunker, Sport Fish Biologist, ADF&G, Anchorage, personal communication; J. Perschbacher, Sport Fish Biologist, ADF&G, Soldotna, personal communication; T. McKinley, Sport Fish Biologist, ADF&G, Anchorage, personal communication; R. Begich Sport Fish Biologist, ADF&G, Soldotna, personal communication.

Note: ND means no data collected. NA means data too preliminary to be reported yet.

[a] 60% of SWHS estimates of Cook Inlet marine sport harvest after 24 June.

[b] Estimates for 1986–2009 are from Fleischman and McKinley (2013). Estimates for 2010–2015 are from Eskelin et al. (2013), Eskelin and Barclay (2015, 2016).

[c] Estimates for 1986–2009 are from Fleischman and McKinley (2013). Estimates for 2010–2015 are from ESSN genetic stock identification allocation.

[d] Estimates for 1986–1994 from SWHS, estimates for 1995 are from Ruesch and Fox (1996), estimates for 1996–2014 are from returned permits.

[e] Creel survey estimates are from below RM 8.6 prior to 2013 and below RM 13.7 since 2013.

[f] Estimates for 1986–2009 inriver run estimates are model derived RM 8.6 estimates from Fleischman and McKinley (2013). Estimates for 2010–2012 inriver run are RM 8.6 sonar estimates published in Miller et al. (2013-2015) and expanded by inverse of proportion midriver. Estimates for 2013–2015 inriver run are preliminary Adaptive Resolution Imaging Sonar (ARIS) estimates at RM 13.7 plus spawning downstream of RM 13.7 based on radiotelemetry. Values for 2013–2015 are subject to change prior to publishing.

[g] Creel survey and SWHS estimates are from above RM 8.6 sonar prior to 2013 and above RM 13.7 sonar since 2013.

[h] Some catch-and-release mortality (usually less than 100 fish) occurs below the sonar and is not counted towards escapement.

[i] Harvest estimate does not include Kasilof River terminal fishery, which occurred 2005–2008.

[j] These estimates are preliminary until biometrically reviewed and published.

Table 9.–Historical summary of early-run Kasilof River–Crooked Creek Chinook salmon stocks, 1996–2016.

	Harvest [a]			Run to weir [b]			Total run [c]			Spawning escapement [d]		
Year	Total	Naturally-produced	Hatchery-produced	Total	Naturally-produced	Hatchery-produced	Total	Naturally-produced	Hatchery-produced	Total	Naturally-produced	Hatchery-produced
1996	5,295	ND	ND	2,224	ND	ND	7,519	ND	ND	764	ND	ND
1997[e]	5,627	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1998[e]	4,202	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1999	7,597	ND	ND	1,791	1,559	232	9,388	ND	ND	1,397	ND	ND
2000	8,815	ND	ND	1,416	1,224	192	10,231	ND	ND	1,077	ND	ND
2001	7,488	ND	ND	2,586	2,122	464	10,074	ND	ND	2,315	ND	ND
2002[f]	4,791	ND	ND	3,326	2,526	800	8,117	2,526	800	2,705	ND	ND
2003[f]	3,090	0	3,090	4,127	2,923	1,204	7,217	2,923	4,294	3,597	ND	ND
2004[f]	2,407	0	2,407	4,873	2,641	2,232	7,280	2,641	4,639	4,356	2,196	2,160
2005[g]	2,665	572	2,093	3,168	2,108	1,060	5,833	2,680	3,153	2,936	1,909	1,027
2006[g]	2,489	1,057	1,432	2,646	1,589	1,057	5,135	2,646	2,489	2,569	1,516	1,053
2007[g]	2,654	1,107	1,547	1,527	1,038	489	4,181	2,145	2,036	1,452	965	487
2008[g]	1,984	832	1,129	1,414	1,018	396	3,398	1,850	1,525	1,181	879	302
2009[g]	1,532	576	956	929	674	255	2,461	1,250	1,211	734	617	117
2010[g,h]	1,333	273	1,060	1,352	1,090	262	2,685	1,363	1,322	1,348	1,088	260
2011[g,i]	2,054	ND	ND	933	677	256	2,987	ND	ND	782	654	128
2012[j]	872	ND	ND	796	633	163	1,668	ND	ND	731	631	100
2013[k]	1,073	ND	ND	1,409	1,211	198	2,482	ND	ND	1,213	1,102	111
2014[l]	323	ND	ND	2,433	1,522	911	2,756	ND	ND	2,148	1,411	737
2015[m]	589	ND	ND	2,240	1,639	601	2,829	ND	ND	1,903	1,456	447
2016[n]	NA	ND	ND	4,017	1,833	2,184	NA	ND	ND	3,847	1,747	2,100
Average 2005–2016	1,464	736	1,370	1,905	1,253	653	3,035	1,989	1,956	1,737	1,165	572

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; Cope (2012);. J. L. Cope, Sport Fish Biologist, ADF&G, Soldotna, personal communication.

Note: ND means no data collected. NA means data too preliminary to be reported yet.

[a] Excludes ocean-age-1 fish for 2003–2010. Data for 1996–2003 and 2011–2012 are from SWHS. Data for 2004–2010 are from inseason creel surveys. These data do not include harvest from the Kasilof River personal use fishery.

[b] Excludes ocean-age-1 fish for 1999–2016. "Run to weir" includes broodstock collection, facility mortalities, and escapement counts.

[c] Excludes ocean-age-1 fish for 1999–2016. "Total run" includes harvest, broodstock collection, facility mortalities, and escapement counts.

[d] Excludes ocean-age-1 fish for 1999–2016. Run includes broodstock released, escapement (video) counts, and mortalities occurring after video review.

[e] Weir not operational.

[f] Retention of naturally-produced Chinook salmon prohibited by emergency order (EO) for part of the 2002 season. The hatchery contribution to the harvest was not estimated for 2002 due to nonrepresentative sampling and an unmarked fraction of fish, and for 2003 because the creel sampling design did not allow for harvest estimates to be generated. Prior to 2004, hatchery returns were not marked at a rate of 100%.

[g] Retention of naturally-produced Chinook salmon was limited to Tuesdays and Saturdays in 2005, then changed by EO in 2006–2007 to include Thursdays. In 2008, regulations were changed to allow retention of naturally-produced Chinook salmon on Tuesdays, Thursdays, and Saturdays only, with a limit of 2 Chinook salmon per day of which only one may be naturally-produced; annual limits applied.

[h] Retention of naturally-produced Chinook salmon were prohibited by EO from 5 June to 17 June 2010.

[i] The creel survey was discontinued in 2011.

[j] Retention of naturally-produced Chinook salmon was prohibited by EO from 15 June to 30 June 2012. Bait and multiple hooks were prohibited by EO from 22 June to 30 June 2012.

[k] Retention of naturally-produced Chinook salmon was prohibited by EO from 1 May to 30 June. Retention of hatchery-produced Chinook salmon was limited by EO to 1 fish from 20 June to 30 June.

[l] Retention of naturally-produced Chinook salmon and use of bait and multiple hooks was prohibited by EO from 1 May to 30 June 2014. Retention of hatchery-produced Chinook salmon was limited by EO to 1 fish from 1 May to 30 June 2014.

[m] Retention of naturally-produced Chinook salmon was restricted by EO from 1 May to 30 June 2015. Use of bait and multiple hooks was prohibited by EO from 1 May to 24 July 2015. Retention of hatchery-produced Chinook salmon was limited by EO to 1 fish from 1 May to 30 June 2015.

[n] Retention of naturally-produced Chinook salmon and use of bait and multiple hooks was prohibited by EO from 1 May to 17 June 2016.

Table 10.–Late-run Kasilof River Chinook salmon harvest and abundance, 1996–2015.

Year	ESSN harvest [a]	Inriver sport harvest	Inriver abundance [b]
1996	3,365	833	ND
1997	3,296	1,101	ND
1998	1,480	637	ND
1999	2,754	658	ND
2000	1,072	1,086	ND
2001	1,749	1,378	ND
2002	2,758	451	ND
2003	4,310	1,144	ND
2004	6,310	1,038	ND
2005	6,285	1,052	12,097
2006	2,897	883	8,611
2007	3,577	1,062	8,522
2008	2,204	793	8,276
2009	1,626	2,164	ND
2010	2,305	1,310	ND
2011	2,538	1,660	ND
2012	205	55	ND
2013	637	762	ND
2014	891	314	ND
2015	1,564	790	ND
Min.	205	55	8,276
Average	2,591	959	9,377
Max.	6,310	2,164	12,097

Source: Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; Fleischman and McKinley (2013), Eskelin et al. (2013), Eskelin and Barclay. (2015, 2016), and Shields and Dupuis (2016).

Note: ND means no data collected.

[a] Uses 2010, 2011, and 2013–2015 eastside setnet genetic stock allocation estimates to calculate Kasilof River Chinook salmon harvest component.

[b] Mark-recapture tagging abundance estimates from Reimer and Fleischman (2012).

Table 11.–Fishing effort, catch, and harvest of early-run Chinook salmon by angler type from the Kasilof River creel survey, 16 May–30 June, 2004–2010.

Angler type		Year	2004	2005	2006	2007	2008	2009	2010
Shore									
	Guided								
		Anglers	0	0	0	0	57	50	4
		Angler-hours	0	0	0	0	248	204	10
		Catch	0	0	0	0	14	0	0
		Harvest	0	0	0	0	14	0	0
	Unguided								
		Anglers	5,138	5,142	7,910	6,181	6,511	6,242	4,743
		Angler-hours	15,096	16,452	23,199	17,953	19,712	17,091	14,371
		Catch	1,643	1,366	887	747	564	354	660
		Harvest	503	497	296	329	274	169	170
	Total								
		Anglers	5,138	5,142	7,910	6,181	6,568	6,292	4,747
		Angler-hours	15,096	16,452	23,199	17,953	19,960	17,295	14,381
		Catch	1,643	1,366	887	747	578	354	660
		Harvest	503	497	296	329	288	169	170
Boat									
	Guided								
		Year	2,004	2,005	2,006	2,007	2,008	2,009	2,010
		Anglers	4,328	4,615	5,410	4,625	4,420	3,526	4,790
		Angler-hours	24,670	32,840	38,065	32,363	31,113	24,255	33,792
		Catch	3,463	3,446	3,330	3,162	2,303	1,711	2,334
		Harvest	1,479	1,768	1,818	1,940	1,490	1,196	1,089
	Unguided								
		Anglers	2,550	2,297	2,928	2,109	2,325	1,575	963
		Angler-hours	12,089	11,300	13,994	10,926	10,740	7,361	4,800
		Catch	983	743	553	516	304	211	135
		Harvest	426	401	375	384	207	166	74
	Total								
		Anglers	6,878	6,911	8,338	6,734	6,744	5,101	5,753
		Angler-hours	36,759	44,140	52,059	43,290	41,853	31,616	38,592
		Catch	4,446	4,189	3,884	3,678	2,607	1,922	2,468
		Harvest	1,904	2,169	2,193	2,325	1,697	1,362	1,163

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Angler type	Year	2004	2005	2006	2007	2008	2009	2010	Average	% of grand total average
Guided total										
	Anglers	4,328	4,615	5,410	4,625	4,477	3,576	4,794	4,546	36
	Angler-hours	24,670	32,840	38,065	32,363	31,361	24,459	33,802	31,080	53
	Catch	3,463	3,446	3,330	3,162	2,316	1,711	2,334	2,823	67
	Harvest	1,479	1,768	1,818	1,940	1,503	1,196	1,089	1,542	72
Unguided total										
	Anglers	7,688	7,438	10,838	8,290	8,836	7,817	5,706	8,088	64
	Angler-hours	27,185	27,752	37,193	28,879	30,452	24,452	19,172	27,869	47
	Catch	2,626	2,109	1,440	1,263	868	565	795	1,381	33
	Harvest	929	898	672	713	481	336	244	610	28
Grand total										
	Anglers	12,015	12,053	16,248	12,915	13,313	11,393	10,500	12,634	
	Angler-hours	51,854	60,592	75,258	61,243	61,813	48,911	52,974	58,949	
	Catch	6,089	5,555	4,771	4,426	3,184	2,276	3,128	4,204	
	Harvest	2,407	2,665	2,490	2,654	1,984	1,532	1,333	2,152	

Source: Cope (2011, 2012).

Note: Some totals may vary slightly from calculated totals due to rounding differences. The creel survey was discontinued in 2011.

Table 12.–Historical releases of adipose finclipped Crooked Creek Chinook salmon, 1994–2016.

Release year	Broodstock origin	Hatchery	No. of smolt released	No. of AFC smolt released	% AFC	% AFC
1994	Crooked Creek	Elmendorf	224,784	43,609		19.4
1995	Homer (Crooked Creek)[a]	Elmendorf	184,049	40,903		22.2
1996	Homer (Crooked Creek)[a]	Elmendorf	193,180	40,827		21.1
1997	Homer (Crooked Creek)[a]	Elmendorf	223,201	41,049		18.4
1998	Homer (Crooked Creek)[a]	Elmendorf	137,338	42,874		31.2
1999	Homer (Crooked Creek)[a]	Elmendorf	192,304	43,431		22.6
2000	Crooked Creek	Elmendorf	108,507	108,507		100.0
2001	Crooked Creek	Elmendorf	109,201	109,201		100.0
2002	Crooked Creek	Elmendorf	99,547	99,547		100.0
2003	Crooked Creek	Ft. Richardson	98,800	98,800		100.0
2004	Crooked Creek	Ft. Richardson	80,601	80,601		100.0
2005	Crooked Creek	Ft. Richardson	113,613	113,071		99.5
2006	Crooked Creek	Ft. Richardson	111,705	111,705		100.0
2007	Crooked Creek	Ft. Richardson	111,382	111,271		99.9
2008	Crooked Creek	Ft. Richardson	114,588	114,588		100.0
2009	Crooked Creek	Ft. Richardson	115,035	114,734		99.7
2010	Crooked Creek	Ft. Richardson	106,145	106,145		100.0
2011	Crooked Creek	Ft. Richardson	64,578	64,578		100.0
2012	Crooked Creek	Jack Hernandez	52,759	52,759		100.0
2013	Crooked Creek	Jack Hernandez	0	0	ND	ND
2014	Crooked Creek	Jack Hernandez	143,751	143,191		99.6
2015	Crooked Creek	Jack Hernandez	145,855	141,334		96.9
2016	Crooked Creek	Jack Hernandez	143,280	139,054		97.1
Average						
1994–2002			163,568			
2003–2016			100,149			

Source: D. P. Loopstra, Sport Fish Biologist, ADF&G, Anchorage, personal communication.

[a] AFC means adipose finclipped.

[a] Broodstock collection occurred at the Nick Dudiak Fishing Lagoon. Broodstock at this collection site were Crooked Creek progeny.

Table 13.–Proportions of ESSN Chinook salmon harvested by reporting group, 2010–2015.

	Kenai River		Kasilof River	Cook Inlet
Year	Mainstem	Tributaries	Mainstem	Other
2010	0.643	0.011	0.326	0.020
2011	0.667	0.001	0.330	0.002
2013	0.766	0.001	0.213	0.019
2014	0.609	0.002	0.387	0.002
2015	0.770	0.002	0.201	0.027
Average	0.691	0.003	0.291	0.014

Source: Eskelin et al. (2013); Eskelin and Barclay (2015, 2016)

Table 14.–Chinook salmon escapements as estimated by weir counts for Russian River, Funny River, and Killey River, 2006–2016.

Year	Russian River	Funny River	Killey River	Quartz Creek
2006	35	2,779	ND	ND
2007	87	2,075	ND	ND
2008	110	1,246	ND	ND
2009	227	1,114	ND	ND
2010	162	1,187	ND	ND
2011	52	990	ND	ND
2012	43	879	1,602 [a]	ND
2013	110	1,027 [b]	1,881	280
2014	220	1,308	1,713	325
2015	276	1,727	2,656	448
2016	360	NA	NA	NA
Average	153	1,433	1,963	351

Source: Gates and Palmer (2007, 2008a); Gates and Boersma (2009a, 2009b, 2011, 2014); S. K. Simons, Sport Fish Technician III, ADF&G, Soldotna, personal communication.

Note: ND means no data collected. NA means data too preliminary to be reported yet.

[a] Actual passage through the weir was 1,471 Chinook salmon, with 131 estimated to have passed during 2 periods of high water events.

[b] Actual passage through the weir was 988 Chinook salmon, with an additional 39 counted below the weir during a foot survey.

Table 15.–Angler effort, harvest, and escapement for Russian River early-run (ER) and late-run (LR) sockeye salmon, 1963–2016.

		Sport harvest [b]		Subsistence harvest [c]		Spawning escapement [d]		Local run [e]	
Year	Effort [a]	ER	LR	ER	LR	ER	LR	ER	LR
1963 [f]	7,880	3,670	1,390	ND	ND	14,384	43,816	18,054	45,206
1964 [f]	5,330	3,550	2,450	ND	ND	12,695	40,104	16,245	42,554
1965 [f]	9,720	10,030	2,160	ND	ND	21,514	17,616	31,544	19,776
1966 [f]	18,280	14,950	7,290	ND	ND	16,658	29,696	31,608	36,986
1967 [f]	16,960	7,240	5,720	ND	ND	13,710	42,336	20,950	48,056
1968 [f]	17,280	6,920	5,820	ND	ND	9,192	41,952	16,112	47,772
1969	14,930	5,870	1,150	ND	ND	5,000 [g]	28,872	10,870	30,022
1970	10,700	5,750	600	ND	ND	5,451	26,200	11,201	26,800
1971	15,120	2,810	10,730	ND	ND	2,654	54,421	5,464	65,151
1972	25,700	5,040	16,050	ND	ND	9,273	79,115	14,313	95,165
1973	30,690	6,740	8,930	ND	ND	13,120	25,068	19,860	33,998
1974	21,120	6,440	8,500	ND	ND	13,164	24,904	19,604	33,404
1975	16,510	1,400	8,390	ND	ND	5,645	31,961	7,045	40,351
1976	26,310	3,380	13,700	ND	ND	14,736	31,939	18,116	45,639
1977	69,510	20,400	27,440	ND	ND	16,061	21,362	36,461	48,802
1978	69,860	37,720	24,530	ND	ND	34,240	34,334	71,960	58,864
1979 [h]	55,000	8,400	26,840	ND	ND	19,749	87,852	28,149	114,692
1980	56,330	27,220	33,500	ND	ND	28,624	83,984	55,844	117,484
1981	51,030	10,720	23,720	ND	ND	21,142	44,523	31,862	68,243
1982	51,480	34,500	10,320	ND	ND	56,106	30,800	90,606	41,120
1983	31,860	8,360	16,000	ND	ND	21,272	33,734	29,632	49,734
1984	49,550	35,880	21,970	ND	ND	28,908	92,659	64,788	114,629
1985	50,770	12,300	58,410	ND	ND	30,605	136,969	42,905	195,379
1986	52,250	35,100	30,810	ND	ND	36,338	40,281	71,438	71,091
1987	113,010	154,200	40,580	ND	ND	61,513	53,932	215,713	94,512
1988	72,030	54,780	19,540	ND	ND	50,406	42,476	105,186	62,016
1989	60,570	11,290	55,210	ND	ND	15,278	138,377	26,628	193,587
1990	84,710	30,215	56,180	ND	ND	25,144	83,434	56,931	139,614
1991	85,741	65,390	31,450	ND	ND	31,660	78,175	97,779	109,625
1992	60,499	30,512	26,101	ND	ND	37,117	62,584	67,629	88,685
1993	58,093	37,261	26,772	ND	ND	39,857	99,259	77,118	126,031
1994	64,134	48,923	26,375	ND	ND	44,872	122,277	93,795	148,652
1995	48,185	23,572	11,805	ND	ND	28,603	61,982	52,175	73,787
1996	50,122	39,075	19,136	ND	ND	52,905	34,691	91,980	53,827
1997	46,914	36,788	12,910	ND	ND	36,280	65,905	73,068	78,815
1998	47,942	42,711	25,110	ND	ND	34,143	113,480	76,854	138,590
1999	64,536	34,283	32,335	ND	ND	36,607	139,863	70,890	172,198
2000	69,864	40,732	30,229	ND	ND	32,736	56,580	73,468	86,809
2001	55,972	35,400	18,550	ND	ND	78,255	74,964	113,655	93,514

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Year	Effort [a]	Sport harvest [b]		Subsistence harvest [c]		Spawning escapement [d]		Local run [e]	
		ER	LR	ER	LR	ER	LR	ER	LR
2002	68,263	52,139	31,999	ND	ND	85,943	62,115	138,082	94,114
2003	50,448	22,986	28,085	ND	ND	23,650	157,469	46,636	185,554
2004	60,784	32,727	22,417	ND	ND	56,582	110,244	89,309	132,661
2005	55,801	37,139	18,503	ND	ND	52,903	59,473	90,042	77,976
2006	70,804	51,167	29,694	ND	ND	80,524	89,160	131,691	118,854
2007	57,755	36,805	16,863	380	316	27,298	53,068	64,483	70,247
2008	55,444	42,492	23,680	928	478	30,989	46,638	74,409	70,796
2009	64,518	59,097	33,935	605	369	52,178	80,088	111,880	114,392
2010	39,873	23,412	9,333	615	246	27,074	38,848	51,101	48,427
2011	47,264	22,697	14,412	684	315	29,129	41,529	52,510	56,256
2012	41,152	15,231	15,074	867	461	24,115	54,911	40,213	70,446
2013	59,682	27,162	20,146	768	567	35,776	31,573	63,706	52,286
2014	57,544	35,870	17,864	1,276	496	44,920	52,277	82,066	70,637
2015	55,420	29,997	13,744	989	704	50,226	46,223	81,212	60,671
2016	NA	NA	NA	NA	NA	38,739	37,837	NA	NA
Average									
1963–2015	47,948	28,084	20,650			31,640	61,813	59,903	82,538
2006–2015	54,946	34,393	19,475	790	439	40,223	53,432	75,327	73,301

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; other data from Pappas and Marsh (2004); subsistence data from USFWS.

Note: ND means no data collected. NA means data too preliminary to be reported yet.

[a] Effort is angler-days of effort in the fishery. Estimates for 1963–1995 are from an inseason creel survey and only measure effort primarily for sockeye salmon from 11 June to 20 August. Estimates for 1996–2015 are from the SWHS and include effort for the whole year and for other species.

[b] Harvest from 1963 to1995 was estimated from an inseason creel survey. Harvest from 1996 to 2015 was estimated from the annual SWHS.

[c] The subsistence fishery started in 2007 and includes Russian River Falls and Upper Kenai dipnet and rod-and-reel; it does not include Moose Range Meadows data.

[d] Escapements for the early run are the number of fish counted passing the weir from its installation in June through 14 July. Escapements for the late run are the number of fish counted passing the weir from 15 July through to when the weir is shut off after reaching 3 days of 1% of seasonal fish passage prior to 10 September or whichever is later.

[e] Local run is determined from escapement above the weir plus harvest; data for 1989–1991 include 60 fish (in 1989) used to test brood source for disease, and 1,572 fish (in 1990) and 729 fish (in 1991) used as a brood source for stocking in Resurrection Bay.

[f] Fish tower counts were used from 1963 through 1968. A weir was used to count sockeye salmon from 1969 to present.

[g] There was a breach in the weir during the early-run so a footsurvey at Upper Russian Creek was used to estimate the number of early-run Russian River sockeye salmon.

[h] First year of operation of fish pass near Barrier Falls.

Table 16.–Daily counts through the weir of early- (through July 14) and late-run (July 15 and later) sockeye salmon at the Russian River weir, 2013–2016.

	2013			2014			2015			2016		
Date	Daily count	Total count	Cumulative proportion by day	Daily count	Total count	Cumulative proportion by day	Daily count	Total count	Cumulative proportion by day	Daily count	Total count	Cumulative proportion by day
5 Jun				9	9	0.000	0	0	0.000	2	2	0.000
6 Jun				134	143	0.003	0	0	0.000	3	5	0.000
7 Jun	0	0	0.000	104	247	0.005	59	59	0.001	16	21	0.001
8 Jun	23	23	0.001	224	471	0.010	76	135	0.003	17	38	0.001
9 Jun	105	128	0.004	436	907	0.020	132	267	0.005	31	69	0.002
10 Jun	211	339	0.009	519	1,426	0.032	476	743	0.015	205	274	0.007
11 Jun	184	523	0.015	620	2,046	0.046	599	1,342	0.027	599	873	0.023
12 Jun	1,659	2,182	0.061	1,038	3,084	0.069	707	2,049	0.041	553	1,426	0.037
13 Jun	3,442	5,624	0.157	923	4,007	0.089	611	2,660	0.053	371	1,797	0.046
14 Jun	2,184	7,808	0.218	960	4,967	0.111	659	3,319	0.066	231	2,028	0.052
15 Jun	1,359	9,167	0.256	1,031	5,998	0.134	1,705	5,024	0.100	967	2,995	0.077
16 Jun	3,011	12,178	0.340	1,433	7,431	0.165	1,990	7,014	0.140	710	3,705	0.096
17 Jun	2,837	15,015	0.420	1,440	8,871	0.197	4,177	11,191	0.223	1,156	4,861	0.125
18 Jun	3,775	18,790	0.525 [a]	2,579	11,450	0.255	3,601	14,792	0.295	764	5,625	0.145
19 Jun	2,740	21,530	0.602	2,767	14,217	0.316	2,381	17,173	0.342	626	6,251	0.161
20 Jun	2,179	23,709	0.663	2,945	17,162	0.382	5,228	22,401	0.446	1,029	7,280	0.188
21 Jun	2,094	25,803	0.721	3,023	20,185	0.449	3,526	25,927	0.516 [a]	988	8,268	0.213
22 Jun	1,632	27,435	0.767	4,171	24,356	0.542 [a]	2,575	28,502	0.567	1,987	10,255	0.265
23 Jun	1,017	28,452	0.795	3,568	27,924	0.622	2,875	31,377	0.625	2,338	12,593	0.325
24 Jun	843	29,295	0.819	3,059	30,983	0.690	2,689	34,066	0.678	2,211	14,804	0.382
25 Jun	572	29,867	0.835	2,713	33,696	0.750	170	34,236	0.682	2,163	16,967	0.438
26 Jun	444	30,311	0.847	1,948	35,644	0.793	1,919	36,155	0.720	1,630	18,597	0.480
27 Jun	399	30,710	0.858	1,466	37,110	0.826	390	36,545	0.728	752	19,349	0.499
28 Jun	348	31,058	0.868	626	37,736	0.840	134	36,679	0.730	726	20,075	0.518 [a]
29 Jun	248	31,306	0.875	508	38,244	0.851	405	37,084	0.738	633	20,708	0.535
30 Jun	204	31,510	0.881	339	38,583	0.859	2,334	39,418	0.785	1,121	21,829	0.563
1 Jul	258	31,768	0.888	548	39,131	0.871	1,911	41,329	0.823	2,011	23,840	0.615
2 Jul	572	32,340	0.904	453	39,584	0.881	1,302	42,631	0.849	1,629	25,469	0.657
3 Jul	354	32,694	0.914	482	40,066	0.892	625	43,256	0.861	1,130	26,599	0.687

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Date	2013 Daily count	2013 Total count	2013 Cumulative proportion by day	2014 Daily count	2014 Total count	2014 Cumulative proportion by day	2015 Daily count	2015 Total count	2015 Cumulative proportion by day	2016 Daily count	2016 Total count	2016 Cumulative proportion by day
4 Jul	119	32,813	0.917	379	40,445	0.900	702	43,958	0.875	1,308	27,907	0.720
5 Jul	101	32,914	0.920	453	40,898	0.910	991	44,949	0.895	1,051	28,958	0.748
6 Jul	146	33,060	0.924	421	41,319	0.920	699	45,648	0.909	1,118	30,076	0.776
7 Jul	232	33,292	0.931	438	41,757	0.930	1,026	46,674	0.929	1,198	31,274	0.807
8 Jul	438	33,730	0.943	516	42,273	0.941	989	47,663	0.949	1,265	32,539	0.840
9 Jul	361	34,091	0.953	546	42,819	0.953	263	47,926	0.954	514	33,053	0.853
10 Jul	382	34,473	0.964	342	43,161	0.961	182	48,108	0.958	339	33,392	0.862
11 Jul	283	34,756	0.971	414	43,575	0.970	357	48,465	0.965	109	33,501	0.865
12 Jul	615	35,371	0.989	678	44,253	0.985	225	48,690	0.969	2,334	35,835	0.925
13 Jul	240	35,611	0.995	337	44,590	0.993	458	49,148	0.979	2,028	37,863	0.977
14 Jul	165	35,776	1.000	330	44,920	1.000	1,078	50,226	1.000	876	38,739	1.000
15 Jul	179	179	0.006	390	390	0.007	1,411	1411	0.031	1,103	1103	0.029
16 Jul	694	873	0.028	293	683	0.013	1,056	2,467	0.053	878	1,981	0.052
17 Jul	396	1,269	0.040	128	811	0.016	902	3,369	0.073	844	2,825	0.075
18 Jul	413	1,682	0.053	306	1,117	0.021	769	4,138	0.090	1,433	4,258	0.113
19 Jul	443	2,125	0.067	291	1,408	0.027	818	4,956	0.107	1,267	5,525	0.146
20 Jul	306	2,431	0.077	302	1,710	0.033	852	5,808	0.126	1,428	6,953	0.184
21 Jul	272	2,703	0.086	161	1,871	0.036	1,033	6,841	0.148	623	7,576	0.200
22 Jul	461	3,164	0.100	180	2,051	0.039	260	7,101	0.154	974	8,550	0.226
23 Jul	1,285	4,449	0.141	351	2,402	0.046	387	7,488	0.162	1,228	9,778	0.258
24 Jul	827	5,276	0.167	217	2,619	0.050	506	7,994	0.173	984	10,762	0.284
25 Jul	653	5,929	0.188	324	2,943	0.056	316	8,310	0.180	744	11,506	0.304
26 Jul	1,837	7,766	0.246	368	3,311	0.063	516	8,826	0.191	904	12,410	0.328
27 Jul	2,891	10,657	0.338	501	3,812	0.073	499	9,325	0.202	574	12,984	0.343
28 Jul	1,638	12,295	0.389	458	4,270	0.082	699	10,024	0.217	668	13,652	0.361
29 Jul	578	12,873	0.408	1,129	5,399	0.103	688	10,712	0.232	705	14,357	0.379
30 Jul	432	13,305	0.421	1,365	6,764	0.129	579	11,291	0.244	915	15,272	0.404
31 Jul	622	13,927	0.441	1,742	8,506	0.163	1,212	12,503	0.270	593	15,865	0.419

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Date	2013 Daily count	2013 Total count	2013 Cumulative proportion by day	2014 Daily count	2014 Total count	2014 Cumulative proportion by day	2015 Daily count	2015 Total count	2015 Cumulative proportion by day	2016 Daily count	2016 Total count	2016 Cumulative proportion by day
1 Aug	942	14,869	0.471	1,146	9,652	0.185	1,013	13,516	0.292	741	16,606	0.439
2 Aug	1,534	16,403	0.520 [a]	1,261	10,913	0.209	1,339	14,855	0.321	876	17,482	0.462
3 Aug	751	17,154	0.543	1,238	12,151	0.232	778	15,633	0.338	810	18,292	0.483
4 Aug	564	17,718	0.561	1,774	13,925	0.266	1,045	16,678	0.361	880	19,172	0.507 [a]
5 Aug	819	18,537	0.587	2,872	16,797	0.321	1,975	18,653	0.404	999	20,171	0.533
6 Aug	580	19,117	0.605	1,805	18,602	0.356	1,203	19,856	0.430	634	20,805	0.550
7 Aug	1,059	20,176	0.639	1,976	20,578	0.394	1,298	21,154	0.458	947	21,752	0.575
8 Aug	972	21,148	0.670	1,774	22,352	0.428	1,035	22,189	0.480	1,566	23,318	0.616
9 Aug	1,143	22,291	0.706	1,123	23,475	0.449	817	23,006	0.498	1,100	24,418	0.645
10 Aug	918	23,209	0.735	1,891	25,366	0.485	1,287	24,293	0.526 [a]	1,126	25,544	0.675
11 Aug	796	24,005	0.760	1,638	27,004	0.517 [a]	1,408	25,701	0.556	809	26,353	0.696
12 Aug	637	24,642	0.780	1,645	28,649	0.548	1,252	26,953	0.583	836	27,189	0.719
13 Aug	725	25,367	0.803	1,353	30,002	0.574	1,346	28,299	0.612	763	27,952	0.739
14 Aug	472	25,839	0.818	1,499	31,501	0.603	963	29,262	0.633	982	28,934	0.765
15 Aug	302	26,141	0.828	1,220	32,721	0.626	1,063	30,325	0.656	823	29,757	0.786
16 Aug	517	26,658	0.844	1,211	33,932	0.649	904	31,229	0.676	646	30,403	0.804
17 Aug	344	27,002	0.855	1,341	35,273	0.675	1,128	32,357	0.700	952	31,355	0.829
18 Aug	335	27,337	0.866	1,452	36,725	0.703	1,528	33,885	0.733	633	31,988	0.845
19 Aug	288	27,625	0.875	1,070	37,795	0.723	1,364	35,249	0.763	863	32,851	0.868
20 Aug	277	27,902	0.884	1,402	39,197	0.750	1,135	36,384	0.787	584	33,435	0.884
21 Aug	342	28,244	0.895	819	40,016	0.765	1,068	37,452	0.810	526	33,961	0.898
22 Aug	240	28,484	0.902	810	40,826	0.781	730	38,182	0.826	348	34,309	0.907
23 Aug	210	28,694	0.909	509	41,335	0.791	685	38,867	0.841	364	34,673	0.916
24 Aug	410	29,104	0.922	775	42,110	0.806	761	39,628	0.857	532	35,205	0.930
25 Aug	395	29,499	0.934	915	43,025	0.823	1,309	40,937	0.886	356	35,561	0.940
26 Aug	316	29,815	0.944	937	43,962	0.841	1,527	42,464	0.919	388	35,949	0.950
27 Aug	343	30,158	0.955	1,407	45,369	0.868	987	43,451	0.940	414	36,363	0.961
28 Aug	277	30,435	0.964	1,227	46,596	0.891	641	44,092	0.954	384	36,747	0.971
29 Aug	208	30,643	0.971	895	47,491	0.908	734	44,826	0.970	410	37,157	0.982

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	2013			2014			2015			2016		
Date	Daily count	Total count	Cumulative proportion by day	Daily count	Total count	Cumulative proportion by day	Daily count	Total count	Cumulative proportion by day	Daily count	Total count	Cumulative proportion by day
30 Aug	224	30,867	0.978	920	48,411	0.926	563	45,389	0.982	244	37,401	0.988
31 Aug	204	31,071	0.984	902	49,313	0.943	421	45,810	0.991	238	37,639	0.995
1 Sep	175	31,246	0.990	634	49,947	0.955	363	46,173	0.999	171	37,810	0.999
2 Sep	118	31,364	0.993	442	50,389	0.964	50	46,223	1.000	27	37,837	1.000
3 Sep	209	31,573	1.000	667	51,056	0.977						
4 Sep				501	51,557	0.986						
5 Sep				273	51,830	0.991						
6 Sep				208	52,038	0.995						
7 Sep				190	52,228	0.999						
8 Sep				49	52,277	1.000						

Source: S. K. Simons, Fisheries Technician III, Crew leader, Russian River Sockeye Salmon Project, unpublished data, 2013–2016.

[a] Midpoint of run.

Table 17.–Kenai River sport harvest of sockeye salmon by river section as determined by the Statewide Harvest Survey, 1981–2015.

	Cook Inlet to Soldotna Bridge		Soldotna Bridge to Moose River		Moose River to Skilak Lake		Skilak Lake to Kenai Lake		Kenai River reach not specified [a]			Total effort for all species
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Total harvest	(angler-days)
1981	5,270	26.7	5,336	27.1	4,266	21.6	4,849	24.6	ND	ND	19,721	178,716
1982	11,706	23.4	14,829	29.6	12,136	24.2	11,432	22.8	ND	ND	50,103	231,948
1983	22,961	32.2	22,454	31.5	15,180	21.3	10,672	15.0	ND	ND	71,267	229,312
1984	4,419	28.1	2,183	13.9	2,300	14.6	6,800	43.3	ND	ND	15,702	270,489
1985	14,941	26.1	13,025	22.7	13,299	23.2	15,948	27.8	124	0.2	57,337	323,045
1986	21,177	29.3	13,846	19.1	13,533	18.7	23,842	32.9	ND	ND	72,398	335,051
1987	85,020	35.3	65,841	27.3	39,926	16.6	50,032	20.8	ND	ND	240,819	289,165
1988	49,627	32.5	43,494	28.5	29,178	19.1	30,452	19.9	0	0.0	152,751	374,630
1989	111,889	40.3	90,550	32.6	45,844	16.5	28,942	10.4	681	0.2	277,906	377,892
1990	33,213	27.5	37,201	30.8	22,083	18.3	28,291	23.4	0	0.0	120,788	342,711
1991	53,331	33.0	56,059	34.7	24,768	15.3	27,444	17.0	76	0.0	161,678	323,662
1992	80,535	33.2	85,942	35.4	40,616	16.7	35,398	14.6	ND	ND	242,491	332,573
1993	46,873	34.2	41,466	30.2	18,724	13.6	30,116	22.0	0	0.0	137,179	324,355
1994	30,363	32.4	24,307	26.0	12,374	13.2	26,572	28.4	ND	ND	93,616	340,904
1995	49,806	39.7	38,602	30.8	17,606	14.0	19,414	15.5	ND	ND	125,428	377,710
1996	67,324	36.1	51,866	27.8	29,391	15.8	37,710	20.2	ND	ND	186,291	265,986
1997	73,805	41.7	56,784	32.1	23,626	13.3	22,918	12.9	ND	ND	177,133	247,898
1998	57,464	34.9	61,763	37.5	24,315	14.8	20,994	12.8	ND	ND	164,536	216,650
1999	77,865	38.8	61,344	30.6	27,569	13.7	33,796	16.8	ND	ND	200,574	307,446
2000	98,048	42.4	74,132	32.1	30,825	13.3	27,978	12.1	ND	ND	230,983	358,569
2001	86,880	43.3	73,841	36.8	19,616	9.8	20,425	10.2	ND	ND	200,762	298,817
2002	78,964	35.0	79,608	35.2	23,488	10.4	40,115	17.8	3,742	1.7	225,917	312,815
2003	102,689	35.9	116,383	40.7	30,914	10.8	25,771	9.0	10,332	3.6	286,089	321,044
2004	105,521	35.8	111,048	37.7	42,489	14.4	29,185	9.9	6,550	2.2	294,793	376,313
2005	98,114	33.3	115,270	39.2	32,655	11.1	34,779	11.8	13,469	4.6	294,287	389,379
2006	52,364	30.2	71,854	41.4	22,177	12.8	19,941	11.5	7,089	4.1	173,425	330,085
2007	102,521	33.2	116,719	37.8	47,448	15.4	35,248	11.4	6,914	2.2	308,850	410,381
2008	77,882	33.9	82,061	35.7	33,461	14.5	28,803	12.5	7,823	3.4	230,030	360,344
2009	77,568	30.7	88,668	35.1	36,831	14.6	42,247	16.7	7,005	2.8	252,319	337,217

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Year	Cook Inlet to Soldotna Bridge		Soldotna Bridge to Moose River		Moose River to Skilak Lake		Skilak Lake to Kenai Lake		Kenai River reach not specified [a]		Total harvest	Total effort for all species (angler-days)
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent		
2010	100,878	33.1	125,606	41.2	45,969	15.1	23,359	7.7	8,823	2.9	304,635	347,938
2011	155,964	39.4	158,797	40.1	52,040	13.1	23,322	5.9	5,717	1.4	395,840	365,863
2012	173,143	38.0	202,429	44.4	55,414	12.2	20,856	4.6	3,612	0.8	455,454	374,732
2013	133,323	30.5	199,849	45.7	63,212	14.5	36,065	8.3	4,539	1.0	436,988	411,592
2014	132,004	36.6	154,057	42.7	45,861	12.7	27,082	7.5	1,827	0.5	360,831	455,578
2015	140,554	37.3	157,267	41.8	53,438	14.2	24,205	6.4	958	0.3	376,422	422,792
Min.	4,419	23.4	2,183	13.9	2,300	9.8	4,849	4.6	958	0.0	15,702	178,716
Average	74,686	34.1	77,557	33.6	30,073	15.2	26,429	16.1	4,464	1.6	211,296	330,389
Max.	173,143	43.3	202,429	45.7	63,212	24.2	50,032	43.3	13,469	4.6	455,454	455,578

Source: Statewide Harvest Surveys from Mills (1982-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] SWHS began consistently reporting in 2002.

Table 18.–Kenai River drainage sockeye salmon escapement and inriver harvest, 1981–2015.

Year	Personal use dip net and edu. harvest [a]	Sport harvest below sonar [b]	Kenai R. sonar count [c]	Total inriver run	Kenai R. below Soldotna Bridge [d]	Kenai R. sonar to Soldotna Bridge	Harvest above sonar						Total harvest above sonar	Spawning escapement
							Kenai R. above Soldotna Bridge	Kenai R. reach not specified [e]	Skilak Lake and Kenai River tribs. [f]	Russian River late run	Hidden Lake–Creek personal use and sport [g]	Inriver Federal subsist. [h]		
1981	ND	3,116	575,848	578,965	5,270	2,154	14,451	ND	ND	23,720	0	ND	40,325	535,524
1982	[i]	6,922	809,173	816,095	11,706	4,784	38,397	ND	ND	10,320	ND	ND	53,501	755,672
1983	7,562	13,577	866,455	887,594	22,961	9,384	48,306	ND	0	16,000	0	ND	73,690	792,765
1984	ND	2,613	481,473	484,086	4,419	1,806	11,283	ND	100	21,970	17	ND	35,176	446,297
1985	ND	8,835	680,897	689,732	14,941	6,106	42,272	124	75	58,410	149	ND	107,136	573,761
1986	ND	12,522	645,906	658,428	21,177	8,655	51,221	ND	13	30,810	0	ND	90,699	555,207
1987	24,090	50,274	2,245,615	2,319,979	85,020	34,746	155,799	ND	2,144	40,580	689	ND	233,958	2,011,657
1988	16,880	29,345	1,356,958	1,403,183	49,627	20,282	103,124	ND	564	19,540	583	ND	144,093	1,212,865
1989	51,192	66,162	2,295,576	2,412,931	111,889	45,727	165,336	681	1,673	55,210	331	ND	268,958	2,026,619
1990	3,477	19,657	950,358	973,492	33,242	13,585	85,074	0	796	56,180	107	ND	155,742	794,616
1991	13,433	31,536	954,843	999,812	53,331	21,795	108,271	76	2,424	31,450	63,681	ND	227,697	727,146
1992	30,454	47,622	1,429,864	1,507,940	80,535	32,913	161,956	ND	1,044	26,101	468	ND	222,482	1,207,382
1993	35,592	27,742	1,134,922	1,198,256	46,916	19,174	90,306	0	844	26,772	133	ND	137,229	997,693
1994	15,804	17,954	1,412,047	1,445,805	30,363	12,409	63,253	ND	239	26,375	102	ND	102,378	1,309,669
1995	15,720	29,451	884,922	930,094	49,806	20,355	75,622	ND	211	11,805	83	ND	108,076	776,847
1996	104,110	39,810	1,129,274	1,273,194	67,324	27,514	118,967	ND	324	19,136	225	ND	166,166	963,108
1997	116,107	43,642	1,512,733	1,672,482	73,805	30,163	103,328	ND	382	12,910	274	ND	147,057	1,365,676
1998	105,497	33,980	1,084,996	1,224,472	57,464	23,484	107,072	ND	158	25,110	81	ND	155,905	929,090
1999	150,993	46,043	1,137,001	1,334,037	77,865	31,822	122,709	ND	0	32,335	859	ND	187,725	949,276
2000	99,571	57,978	900,700	1,058,249	98,048	40,070	132,935	ND	377	30,229	190	ND	203,801	696,899
2001	152,580	51,374	906,333	1,110,287	86,880	35,506	113,882	ND	24	18,550	142	ND	168,104	738,229
2002	182,229	46,693	1,339,682	1,568,604	78,964	32,271	143,211	3,742	1,535	31,999	308	ND	213,066	1,126,616
2003	227,207	60,722	1,656,026	1,943,955	102,689	41,967	173,068	10,168	144	28,085	302	ND	253,734	1,402,292
2004	266,937	62,397	1,945,383	2,274,717	105,521	43,124	182,722	5,795	276	22,417	502	ND	254,836	1,690,547
2005	300,105	58,017	1,908,821	2,266,943	98,114	40,097	182,704	13,469	45	18,503	0	ND	254,818	1,654,003
2006	130,486	30,964	2,064,728	2,226,178	52,364	21,400	113,972	7,089	98	29,694	385	ND	172,638	1,892,090
2007	293,941	60,623	1,229,945	1,584,509	102,521	41,898	199,415	6,876	94	16,863	240	316	265,702	964,243

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Year	Personal use dip net and edu. harvest [a]	Sport harvest below sonar [b]	Kenai R. sonar count [c]	Total inriver run	Kenai R. below Soldotna Bridge [d]	Kenai R. sonar to Soldotna Bridge	Harvest above sonar: Kenai R. above Soldotna Bridge	Harvest above sonar: Kenai R. reach not specified [e]	Harvest above sonar: Skilak Lake and Kenai River tribs. [f]	Harvest above sonar: Russian River late run	Harvest above sonar: Hidden Lake–Creek personal use and sport [g]	Harvest above sonar: Inriver Federal subsist. [h]	Total harvest above sonar	Spawning escapement
2008	236,355	46,053	917,139	1,199,547	77,882	31,829	144,325	7,823	199	23,680	0	478	208,334	708,805
2009	343,302	45,868	1,090,055	1,479,225	77,568	31,700	167,746	7,005	102	33,935	1,019	431	241,938	848,117
2010	393,317	59,651	1,294,884	1,747,852	100,878	41,227	194,934	8,823	275	9,333	1,744	246	256,582	1,038,302
2011	543,043	92,225	1,599,217	2,234,485	155,964	63,739	234,159	5,717	13	14,412	97	347	318,484	1,280,733
2012	530,128	102,376	1,581,555	2,214,059	173,132	70,756	278,675	3,611	20	15,074	37	461	368,634	1,212,921
2013	350,302	78,837	1,359,893	1,789,032	133,323	54,486	299,126	4,539	735	20,146	86	567	379,685	980,208
2014	384,018	78,057	1,520,340	1,982,415	132,004	53,947	227,000	1,827	740	17,864	0	620	301,998	1,218,342
2015	384,095	83,112	1,709,051	2,176,258	140,554	57,442	234,910	958	1,171	13,744	0	779	309,004	1,400,047
Average														
2011–2015	438,320	86,920	1,554,010	2,079,250	147,000	60,070	254,770	3,330	540	16,250	40	550	335,560	1,218,450
2006–2015	358,900	67,780	1,436,680	1,863,360	114,620	46,840	209,430	5,430	340	19,470	360	470	282,300	1,154,380
1996–2015	264,720	58,920	1,394,390	1,718,020	99,640	40,720	173,740	6,250	340	21,700	320	470	241,410	1,152,980
1981–2015	183,620	44,160	1,274,650	1,476,200	74,690	30,520	133,990	4,650	510	25,410	2,140	470	195,120	1,079,520

Source: Statewide Harvest Surveys from Mills (1982-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; other data from Brannian and Fox (1996), Reimer and Sigurdsson (2004), Dunker and Lafferty (2007), and Dunker (2010, 2013); K. J. Dunker, Sport Fish biologist, Anchorage, personal communication; King (1996, 1997); Pappas and Marsh (2004); Shields and Dupuis (2016); educational harvest data from Kenaitze Indian Tribe; 2007-2015 Subsistence data, USFWS.

Note: ND means no data available

[a] Personal use harvest was not known in 1982; personal use (1981–1995), subsistence dip net harvest (1991–1995), and Kenaitze educational harvest (1989–1995) from Brannian and Fox (1996). From 1994 to present, the educational harvest is the total late-run harvest.

[b] In 1994 and 1995, creel surveys were conducted to estimate harvest below the sonar. In 1994, 49.7% of the below Soldotna Bridge harvest was taken below the sonar. In 1995, 68.6 % was taken below the sonar. The average of these 2 percentages is applied to all other years' below-bridge harvest to estimate the harvest below the sonar.

[c] Bendix sonar counts were converted to DIDSON estimates (equivalents) for 1981–2006. Estimates after these dates are actual DIDSON generated estimates.

[d] Sport harvest from Beaver Creek reported in 1990 and 1993 is included in total.

[e] SWHS began reporting these data consistently in 2002.

[f] Tributaries include Cooper Creek, Funny River, Kelly Lake, Moose River, Ptarmigan Creek, Quartz Creek, Soldotna Creek, Swan Lake (Kenai River), Swan Canoe Route lakes.

[g] Sport harvest and 1991 Hidden Lake personal use from SWHS.

[h] Federal subsistence started in 2007 and occurs in the Russian River, the Upper Kenai River, and the Lower Kenai River with both dip nets and rod-and-reel. This includes harvest from late-run sockeye salmon only.

[i] Insignificant.

Table 19.–Estimated sport harvest of Kenai River coho salmon by river section, 1977–2015.

Year	Cook Inlet to Soldotna Bridge			Soldotna Bridge to Moose River			Moose River to Skilak Lake			Skilak Lake to Kenai Lake			Kenai River reach not specified [a]			All sections		
	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total
1977	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9,537
1978	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10,823
1979	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15,276
1980	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	26,838
1981	ND	ND	12,280	ND	ND	3,326	ND	ND	6,178	ND	ND	540	ND	ND	ND	ND	ND	22,324
1982	ND	ND	26,582	ND	ND	3,904	ND	ND	7,200	ND	ND	1,729	ND	ND	ND	ND	ND	39,415
1983	ND	ND	12,231	ND	ND	4,007	ND	ND	4,867	ND	ND	1,573	ND	ND	ND	ND	ND	22,678
1984	ND	ND	40,173	ND	ND	7,596	ND	ND	8,065	ND	ND	3,810	ND	ND	ND	ND	ND	59,644
1985	ND	ND	22,579	ND	ND	6,781	ND	ND	12,774	ND	ND	2,401	ND	ND	100	ND	ND	44,635
1986	ND	ND	38,338	ND	ND	10,336	ND	ND	8,348	ND	ND	3,088	ND	ND	ND	ND	ND	60,110
1987	ND	ND	19,612	ND	ND	6,222	ND	ND	4,077	ND	ND	3,299	ND	ND	ND	ND	ND	33,210
1988	ND	ND	34,690	ND	ND	4,863	ND	ND	5,714	ND	ND	3,427	ND	ND	91	ND	ND	48,785
1989	ND	ND	36,668	ND	ND	7,921	ND	ND	8,236	ND	ND	2,434	ND	ND	16	ND	ND	55,275
1990	ND	ND	40,567	ND	ND	8,446	ND	ND	7,281	ND	ND	4,031	ND	ND	ND	ND	ND	60,325
1991	ND	ND	49,499	ND	ND	13,438	ND	ND	9,520	ND	ND	3,699	ND	ND	7	ND	ND	76,163
1992	ND	ND	33,175	ND	ND	7,579	ND	ND	7,547	ND	ND	4,009	ND	ND	ND	ND	ND	52,310
1993	ND	ND	29,135	ND	ND	9,677	ND	ND	6,771	ND	ND	4,955	ND	ND	ND	ND	ND	50,538
1994	ND	ND	46,345	ND	ND	15,249	ND	ND	12,286	ND	ND	12,831	ND	ND	ND	ND	ND	86,711
1995	20,031	11,808	31,839	4,842	1,131	5,973	2,785	2,794	5,579	2,065	727	2,792	ND	ND	ND	29,723	16,460	46,183
1996	17,551	5,010	22,561	8,347	2,076	10,423	4,371	1,682	6,053	2,457	799	3,256	ND	ND	ND	32,726	9,567	42,293
1997	5,570	1,293	6,863	2,858	1,319	4,177	1,752	1,330	3,082	1,587	455	2,042	ND	ND	ND	11,767	4,397	16,164
1998	9,955	5,506	15,461	3,667	1,430	5,097	2,373	1,833	4,206	1,764	439	2,203	ND	ND	ND	17,759	9,208	26,967
1999	14,413	6,029	20,442	4,732	654	5,386	1,268	1,812	3,080	1,951	778	2,729	ND	ND	ND	22,364	9,273	31,637
2000	22,392	8,444	30,836	8,185	1,880	10,065	3,894	1,159	5,053	1,652	913	2,565	ND	ND	ND	36,123	12,396	48,519
2001	23,501	8,977	32,478	7,381	1,947	9,328	3,565	1,986	5,551	1,672	753	2,425	ND	ND	ND	36,119	13,663	49,782
2002	27,062	9,641	36,703	8,220	2,630	10,850	2,663	2,406	5,069	3,965	886	4,851	1,552	625	2,177	43,462	16,188	59,650
2003	20,093	5,963	26,056	8,961	2,029	10,990	3,160	1,517	4,677	2,690	490	3,180	1,367	352	1,754	36,271	10,351	46,657
2004	29,606	12,010	41,616	9,145	4,055	13,200	3,492	2,234	5,726	2,733	868	3,601	1,135	637	1,809	46,111	19,804	65,952

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Table 19.–Page 2 of 2.

Year	Cook Inlet to Soldotna Bridge			Soldotna Bridge to Moose River			Moose River to Skilak Lake			Skilak Lake to Kenai Lake			Kenai River reach not specified [a]			All sections		
	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total	Prior to 1 Sep	After 1 Sep	Total
2005	17,331	7,810	25,141	10,793	3,563	14,356	1,697	2,739	4,436	2,310	2,103	4,413	1,671	339	2,065	33,802	16,554	50,411
2006	13,817	7,132	20,949	4,800	2,331	7,131	1,890	2,939	4,829	2,638	890	3,528	797	405	1,202	23,942	13,697	37,639
2007	12,891	7,443	20,334	6,322	1,133	7,455	3,230	2,361	5,591	2,390	1,400	3,790	621	226	847	25,454	12,563	38,017
2008	20,602	10,562	31,164	6,122	3,161	9,283	2,262	3,012	5,274	3,110	1,426	4,536	796	571	1,367	32,892	18,732	51,624
2009	19,022	9,044	28,066	5,509	2,907	8,416	4,016	3,879	7,895	2,391	1,966	4,357	1,146	80	1,226	32,084	17,876	49,960
2010	20,001	8,134	28,135	7,140	3,889	11,029	5,671	3,213	8,884	2,115	618	2,733	2,005	126	2,131	36,932	15,980	52,912
2011	16,784	10,562	27,346	6,509	2,430	8,939	2,185	3,346	5,531	1,038	1,175	2,213	61	42	103	26,577	17,555	44,132
2012	14,842	8,123	22,965	4,819	2,668	7,487	2,202	1,862	4,064	768	494	1,262	375	254	629	23,006	13,401	36,407
2013	17,414	6,417	23,831	12,090	2,860	14,950	3,669	3,232	6,901	1,649	1,329	2,978	212	82	294	35,034	13,920	48,954
2014	18,930	11,829	30,759	9,224	3,654	12,878	3,940	5,644	9,584	4,928	2,288	7,216	89	40	129	37,111	23,455	60,566
2015	20,317	13,685	34,002	7,673	4,467	12,140	2,881	5,210	8,091	2,356	404	2,760	45	29	74	33,272	23,795	57,067
Average																		
2011–2015	17,657	10,123	27,781	8,063	3,216	11,279	2,975	3,859	6,834	2,148	1,138	3,286	156	89	246	31,000	18,425	49,425
2006–2015	17,462	9,293	26,755	7,021	2,950	9,971	3,195	3,470	6,664	2,338	1,199	3,537	615	186	800	30,630	17,097	47,728
1996–2015	18,105	8,181	26,285	7,125	2,554	9,679	3,009	2,670	5,679	2,308	1,024	3,332	848	272	1,129	31,140	14,619	45,766
1981–2015			28,555			8,826			6,515			3,464			890			47,818

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] SWHS began reporting consistently in 2002.

Table 20.–Northern Kenai Peninsula Management Area (except Kenai River drainage) coho salmon sport harvest, 1981–2015.

	Kasilof River drainage				Swanson River drainage			Other NKPMA drainages				
Year	Tustumena Lake[a]	Kasilof River	Crooked Creek	Total	Swanson River	Swanson Canoe Route Lakes	Total	Six Mile Creek	Resurrection Creek	Chickaloon River	Other[b]	Total
1981	ND	335	ND	335	ND	ND	ND	ND	ND	ND	ND	ND
1982	ND	325	ND	325	ND	ND	ND	ND	ND	ND	ND	ND
1983	ND	409	ND	409	525	ND	525	ND	ND	ND	ND	ND
1984	ND	1,085	ND	1,085	1,484	ND	1,484	ND	ND	ND	ND	ND
1985	ND	560	ND	560	ND	187	187	ND	ND	ND	ND	ND
1986	ND	1,783	497	2,280	ND	969	969	45	13	ND	0	58
1987	36	3,785	ND	3,821	ND	1,485	1,485	72	36	ND	0	108
1988	200	2,928	291	3,419	5,603	546	6,149	236	18	ND	55	309
1989	111	4,222	1,952	6,285	6,379	127	6,506	79	127	ND	0	206
1990	236	1,590	486	2,312	1,501	0	1,501	316	125	ND	0	441
1991	52	4,754	265	5,071	811	81	892	125	29	ND	0	154
1992	32	3,304	251	3,587	1,984	49	2,033	49	89	154	97	389
1993	258	3,698	867	4,823	3,477	10	3,487	344	171	439	0	954
1994	30	4,457	1,026	5,513	1,876	0	1,876	534	81	18	27	660
1995	218	5,349	98	5,665	1,132	0	1,132	472	39	0	0	511
1996	144	2,612	471	3,227	2,578	76	2,654	551	224	155	0	930
1997	345	1,286	0	1,631	1,153	0	1,153	381	84	20	56	541
1998	119	2,107	0	2,226	2,371	123	2,494	470	274	115	0	859
1999	48	3,269	0	3,317	2,054	0	2,054	92	233	0	0	325
2000	229	2,965	0	3,194	2,506	0	2,506	429	52	136	0	617
2001	90	3,173	110	3,373	1,959	117	2,076	459	125	19	86	689
2002	93	6,046	35	6,174	2,467	0	2,467	1,025	114	22	163	1,324
2003	46	4,082	0	4,128	3,087	80	3,167	262	125	23	0	410
2004	338	4,217	270	4,825	1,466	45	1,511	582	138	0	0	720
2005	117	3,124	117	3,358	2,367	0	2,367	146	39	120	72	377
2006	85	3,782	54	3,921	2,028	32	2,060	545	121	0	0	666
2007	15	1,740	0	1,755	1,660	10	1,670	252	289	0	0	541
2008	252	3,613	0	3,865	2,814	0	2,814	354	195	0	0	549

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	Kasilof River drainage				Swanson River drainage			Other NKPMA drainages				
Year	Tustumena Lake[a]	Kasilof River	Crooked Creek	Total	Swanson River	Swanson Canoe Route Lakes	Total	Six Mile Creek	Resurrection Creek	Chickaloon River	Other[b]	Total
2009	61	2,725	63	2,849	1,790	0	1,790	664	103	0	0	767
2010	45	2,327	0	2,372	1,074	19	1,093	691	422	60	0	1,173
2011	0	2,359	0	2,359	1,348	0	1,348	150	0	0	0	150
2012	0	3,610	0	3,610	264	19	283	294	36	0	0	330
2013	77	4,037	32	4,146	815	0	815	547	63	0	126	736
2014	0	3,693	0	3,693	702	80	782	50	233	0	0	283
2015	229	3,735	0	3,964	766	203	969	789	200	499	0	1,488
Average												
1981–2005	144	2,859	355	3,238	2,339	185	2,203	333	107	87	28	529
2006–2015	76	3,162	15	3,253	1,326	36	1,362	434	166	56	13	668
1981–2015	121	2,945	237	3,242	2,001	137	1,948	367	127	74	23	576

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] Tustumena Lake data includes harvests from creeks draining into Tustumena Lake (Nikolai Creek: 1998, 2000; Glacier Creek 2004).

[b] Harvest data from Ingram Creek (1988, 2001, 2002), Otter Creek (1992, 1994, 1997), Sunrise Creek (2005, 2013).

Table 21.–Sport catch and harvest of pink salmon in the Northern Kenai Peninsula Management Area, 1977–2015.

	Kenai River		Resurrection Creek		Russian River		Kasilof River		Sixmile Creek		Other [a]	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1977	ND	163	ND	ND	ND	37	ND	ND	ND	ND	ND	ND
1978	ND	26,579	ND	ND	ND	1,300	ND	ND	ND	ND	ND	ND
1979	ND	127	ND	ND	ND	0	ND	ND	ND	ND	ND	ND
1980	ND	18,580	ND	ND	ND	930	ND	ND	ND	ND	ND	ND
1981	ND	86	ND	ND	ND	0	ND	ND	ND	ND	ND	ND
1982	ND	25,572	ND	ND	ND	1,142	ND	187	ND	ND	ND	ND
1983	ND	1,825	ND	63	ND	52	ND	31	ND	ND	ND	ND
1984	ND	28,562	ND	661	ND	461	ND	337	ND	ND	ND	137
1985	ND	1,306	ND	261	ND	112	ND	62	ND	12	ND	12
1986	ND	19,924	ND	1,105	ND	521	ND	245	ND	278	ND	181
1987	ND	941	ND	815	ND	254	ND	145	ND	181	ND	54
1988	ND	15,795	ND	1,728	ND	54	ND	145	ND	73	ND	309
1989	ND	1,421	ND	475	ND	187	ND	87	ND	129	ND	14
1990	126,251	27,385	10,911	3,265	1,313	627	558	186	2,208	139	175	24
1991	5,192	2,416	757	424	175	100	233	233	158	33	0	0
1992	74,021	10,029	17,871	4,983	1,823	311	449	193	321	137	861	0
1993	3,001	1,003	3,936	1,011	566	274	184	0	1,270	215	9	0
1994	42,357	8,701	6,150	1,582	671	272	313	114	1,043	286	408	119
1995	2,724	991	8,627	2,237	1,503	200	344	228	788	203	122	29
1996	84,974	15,406	13,190	3,286	1,007	409	583	509	1,461	98	655	140
1997	4,339	1,371	4,032	866	1,419	524	115	93	73	30	626	85
1998	81,776	8,926	31,739	7,418	790	244	1,038	105	1,233	75	229	0
1999	6,806	1,895	4,947	691	758	246	100	47	348	0	144	38
2000	185,915	19,081	31,030	2,661	3,467	357	2,582	137	1,466	184	950	41
2001	8,774	2,069	11,584	1,586	2,140	272	198	91	1,112	87	281	0
2002	186,967	22,995	12,010	2,362	3,933	933	3,607	618	792	48	2,954	222
2003	9,319	2,847	7,046	1,750	3,291	431	551	116	1,181	94	173	39
2004	155,910	20,638	9,212	2,087	4,163	1,222	1,929	187	231	15	464	113
2005	17,277	5,112	6,602	836	788	123	432	197	140	21	149	31
2006	154,671	12,448	22,645	4,122	4,737	539	1,517	291	879	158	134	0
2007	15,118	3,308	26,482	2,876	1,352	312	219	0	1,129	91	409	103

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Table 21.–Page 2 of 2.

	Kenai River		Resurrection Creek		Russian River		Kasilof River		Sixmile Creek		Other [a]	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
2008	186,789	15,108	25,524	5,500	2,853	244	4,612	424	810	66	2,047	146
2009	14,099	4,038	31,700	4,801	1,604	582	675	343	3,270	200	456	0
2010	104,698	12,959	9,557	1,499	1,230	51	2,533	553	1,350	29	779	124
2011	10,058	3,586	6,044	1,310	1,077	227	267	152	89	0	767	77
2012	135,114	17,637	6,357	917	9,353	688	4,972	896	898	0	240	0
2013	10,565	3,130	8,494	972	1,728	48	114	83	946	30	407	42
2014	174,252	24,919	13,982	2,795	3,346	375	4,415	841	436	15	506	0
2015	18,018	4,914	6,600	2,133	766	411	1,550	757	1,298	281	121	20
Average	69,961	10,097	12,963	2,093	2,148	386	1,311	254	959	103	541	66

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data collected.

[a] Includes all other NKPMA area catch and harvest not already listed on this table; does not include the SWHS categories “other streams” or “other lakes,” which may contain some non-NKPMA data.

Table 22.–Estimated Kenai River rainbow trout catch (C), harvest (H), and percent of Kenai River total harvest (%H) by river section, 1984–2015.

	Cook Inlet to Soldotna Bridge			Soldotna Bridge to Moose River			Moose River to Skilak Outlet			Skilak Inlet to Kenai Lake			Kenai River reach not specified [a]			Kenai River total		
Year	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H
1984 [c]	3,464	766	22.1	2,911	644	22.1	5,112	1,130	22.1	4,200	928	22.1	ND	ND	ND	15,687	3,468	22.1
1985 [c]	3,398	880	25.9	2,653	850	32.0	5,410	1,500	27.7	3,520	710	20.2	ND	0	ND	14,981	3,940	26.3
1986	2,570	623	24.2	2,380	168	7.1	1,750	901	51.5	2,020	733	36.3	ND	ND	ND	8,720	2,425	27.8
1987	2,220	522	23.5	3,450	670	19.4	6,430	629	9.8	3,870	364	9.4	ND	ND	ND	15,970	2,185	13.7
1988	2,780	295	10.6	1,560	216	13.8	5,880	1,063	18.1	7,580	559	7.4	ND	0	ND	17,800	2,133	12.0
1989	2,020	481	23.8	2,230	354	15.9	6,470	829	12.8	6,870	253	3.7	ND	10	ND	17,590	1,927	11.0
1990	2,624	510	19.4	3,571	943	26.4	5,366	937	17.5	11,995	1,145	9.5	0	0	0.0	23,556	3,535	15.0
1991	3,672	516	14.1	3,844	1,123	29.2	7,930	940	11.9	18,108	740	4.1	31	10	32.3	33,585	3,329	9.9
1992	4,448	427	9.6	3,879	411	10.6	15,127	736	4.9	28,702	403	1.4	ND	ND	ND	52,156	1,977	3.8
1993	6,190	1,149	18.6	5,556	580	10.4	12,651	653	5.2	37,755	192	0.5	0	0	0.0	62,152	2,574	4.1
1994	3,796	506	13.3	3,980	364	9.1	10,968	543	5.0	35,089	163	0.5	ND	ND	ND	53,833	1,576	2.9
1995	4,516	620	13.7	4,087	440	10.8	13,072	780	6.0	33,475	310	0.9	ND	ND	ND	55,150	2,150	3.9
1996	5,513	304	5.5	4,777	646	13.5	8,650	373	4.3	45,471	237	0.5	ND	ND	ND	64,411	1,560	2.4
1997	7,411	739	10.0	6,641	539	8.1	20,047	632	3.2	61,053	0	0.0	ND	ND	ND	95,152	1,910	2.0
1998	5,502	608	11.1	5,380	670	12.5	12,158	737	6.1	42,224	0	0.0	ND	ND	ND	65,264	2,015	3.1
1999	11,415	1,516	13.3	8,325	695	8.3	32,050	1,573	4.9	50,189	0	0.0	ND	ND	ND	101,979	3,784	3.7
2000	16,477	1,292	7.8	9,428	1,083	11.5	18,990	1,084	5.7	78,836	0	0.0	ND	ND	ND	123,731	3,459	2.8
2001	11,216	987	8.8	7,473	868	11.6	22,392	567	2.5	51,130	0	0.0	ND	ND	ND	92,211	2,422	2.6
2002	12,641	995	7.9	8,157	944	11.6	19,355	864	4.5	71,753	0	0.0	2,269	216	9.5	114,175	3,019	2.6
2003	12,844	1,026	8.0	10,913	700	6.4	41,204	372	0.9	54,552	0	0.0	3,536	180	5.1	123,049	2,278	1.9
2004	15,080	1,452	9.6	13,310	978	7.3	34,026	831	2.4	91,443	0	0.0	5,651	50	0.9	159,510	3,311	2.1
2005	14,119	953	6.7	11,585	647	5.6	34,675	607	1.8	57,936	267	0.5	7,949	43	0.5	126,264	2,517	2.0
2006	13,168	588	4.5	13,683	1,109	8.1	33,222	472	1.4	67,741	289	0.4	4,005	41	1.0	131,819	2,499	1.9
2007	11,829	542	4.6	18,832	769	4.1	52,701	684	1.3	90,757	661	0.7	4,851	10	0.2	178,970	2,666	1.5
2008	26,385	696	2.6	20,943	794	3.8	47,956	772	1.6	103,095	941	0.9	4,496	11	0.2	202,875	3,214	1.6
2009	11,502	625	5.4	16,165	543	3.4	67,940	828	1.2	102,745	399	0.4	3,280	59	1.8	201,632	2,454	1.2
2010	9,397	553	5.9	16,944	786	4.6	63,655	696	1.1	79,663	237	0.3	3,642	131	3.6	173,301	2,403	1.4
2011	19,849	571	2.9	27,305	464	1.7	80,908	318	0.4	71,088	374	0.5	615	0	0.0	199,765	1,727	0.9

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	Cook Inlet to Soldotna Bridge			Soldotna Bridge to Moose River			Moose River to Skilak Outlet			Skilak Inlet to Kenai Lake			Kenai River reach not specified [a]			Kenai River total		
Year	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H
2012	16,119	843	5.2	23,866	878	3.7	47,253	396	0.8	81,349	386	0.5	856	37	4.3	169,443	2,540	1.5
2013	11,140	464	4.2	13,174	461	3.5	52,992	400	0.8	90,301	446	0.5	435	0	0.0	168,042	1,771	1.1
2014	12,123	616	5.1	14,216	502	3.5	43,059	273	0.6	69,629	135	0.2	166	93	56.0	139,193	1,619	1.2
2015	29,097	797	2.7	22,093	534	2.4	67,020	648	1.0	123,441	286	0.2	0	0	0.0	241,651	2,265	0.9
Average																		
2011–2015	17,666	658	4.0	20,131	568	3.0	58,246	407	0.7	87,162	325	0.4	414	26	12.1	183,619	1,984	1.1
2006–2015	16,061	630	4.3	18,722	684	3.9	55,671	549	1.0	87,981	415	0.5	2,235	38	6.7	180,669	2,316	1.3
1984–2015	9,829	733	11.0	9,791	668	10.7	28,013	743	7.5	52,424	349	3.8				101,363	2,520	6.0

Source: Statewide Harvest Surveys from Mills (1979-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/. Catch estimates from 1984 to 1989 are unpublished estimates from the SWHS database, M. J. Mills, Sport Fish Biometrician, ADF&G, Anchorage, personal communication.

Note: ND means no data available.

[a] SWHS began consistently reporting in 2002.

[b] Retention of rainbow trout was prohibited from 1997 through 2004.

[c] In 1984 and 1985, catch estimates were mistakenly reported as harvest in Mills (1985, 1986). Corrected harvest numbers are presented here.

Table 23.–Historical abundance estimates of rainbow trout in the upper Kenai River index area, 1986–2009.

	Number of rainbow trout in the upper Kenai River index area				Number of rainbow trout in the middle Kenai River index area	
Year[a]	≥200 mm	SE	≥300 mm	SE	≥200 mm	SE
1986	3,640	456	2,520	363	ND	ND
1987	4,950	376	3,472	482	1,750	453
1995	ND	ND	5,598	735	ND	ND
1999	ND	ND	ND	ND	7,883	1,276
2001	8,553	806	6,365	625	ND	ND
2009	5,916	481	5,106	431	ND	ND

Source: Lafferty (1989); Larson and Hansen (2000); Hayes and Hasbrouck (1996); King and Breakfield (2007); Eskelin and Evans (2013); Eskelin, A., Sport Fish Biologist, ADF&G, Soldotna, personal communication.

[a] Abundance estimates for 2001 were reevaluated using techniques implemented in 2009.

Table 24.–Estimated Kenai River Dolly Varden, catch (C), harvest (H), and percent harvest of Kenai River total (%H) by river section, 1984–2015.

	Cook Inlet to Soldotna Bridge			Soldotna Bridge to Moose River			Moose River to Skilak Outlet			Skilak Inlet to Kenai Lake			Kenai River reach not specified [a]			Kenai River total		
Year	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H
1984 [b]	ND	7,506	ND	ND	1,966	ND	ND	11,211	ND	ND	10,724	ND	ND	ND	ND	ND	31,407	ND
1985 [b]	ND	7,560	ND	ND	3,277	ND	ND	8,930	ND	ND	6,468	ND	ND	52	ND	ND	26,287	ND
1986	ND	1,249	ND	ND	771	ND	ND	1,928	ND	ND	1,827	ND	ND	ND	ND	ND	5,775	ND
1987	ND	2,429	ND	ND	1,671	ND	ND	2,139	ND	ND	1,391	ND	ND	ND	ND	ND	7,630	ND
1988	ND	3,531	ND	ND	1,266	ND	ND	3,527	ND	ND	2,653	ND	ND	0	ND	ND	10,977	ND
1989	ND	3,414	ND	ND	1,371	ND	ND	3,649	ND	ND	1,630	ND	ND	19	ND	ND	10,083	ND
1990	7,795	2,738	35.1	5,094	2,424	47.6	7,537	2,741	36.4	14,151	4,079	28.8	0	0	0.0	34,577	11,982	34.7
1991	10,665	4,211	39.5	8,116	3,285	40.5	19,363	4,268	22.0	30,601	2,740	9.0	52	13	25.0	68,797	14,517	21.1
1992	11,822	3,777	31.9	5,899	2,516	42.7	26,348	4,900	18.6	34,754	3,269	9.4	ND	ND	ND	78,823	14,462	18.3
1993	13,019	4,599	35.3	6,079	1,539	25.3	20,778	3,503	16.9	36,451	3,057	8.4	26	26	ND	76,353	12,724	16.7
1994	8,752	3,276	37.4	5,185	1,107	21.4	14,584	2,051	14.1	33,168	2,052	6.2	ND	ND	ND	61,689	8,486	13.8
1995	10,146	4,069	40.1	5,399	1,732	32.1	12,447	2,113	17.0	27,103	1,609	5.9	ND	ND	ND	55,095	9,523	17.3
1996	9,787	2,411	24.6	5,973	1,797	30.1	14,506	1,995	13.8	26,245	1,281	4.9	ND	ND	ND	56,511	7,484	13.2
1997	9,955	2,518	25.3	5,268	1,042	19.8	22,266	2,824	12.7	48,883	573	1.2	ND	ND	ND	86,372	6,957	8.1
1998	7,560	1,977	26.2	5,961	1,787	30.0	11,732	1,847	15.7	35,659	468	1.3	ND	ND	ND	60,912	6,079	10.0
1999	14,752	3,867	26.2	6,316	1,086	17.2	20,053	1,932	9.6	31,826	683	2.1	ND	ND	ND	72,947	7,568	10.4
2000	18,261	3,916	21.4	9,122	1,759	19.3	21,291	1,403	6.6	56,375	349	0.6	ND	ND	ND	105,049	7,427	7.1
2001	16,304	3,763	23.1	8,367	1,613	19.3	28,312	789	2.8	54,802	363	0.7	ND	ND	ND	107,785	6,528	6.1
2002	16,414	2,191	13.3	7,751	1,431	18.5	13,384	1,105	8.3	38,481	766	2.0	1,324	288	21.8	77,354	5,781	7.5
2003	15,520	2,996	19.3	9,765	1,318	13.5	25,972	1,066	4.1	50,969	487	1.0	1,459	246	16.9	103,685	6,113	5.9
2004	14,386	1,759	12.2	13,591	2,129	15.7	23,833	1,220	5.1	89,318	452	0.5	5,072	285	5.6	146,200	5,845	4.0
2005	13,501	1,548	11.5	9,629	934	9.7	27,398	1,243	4.5	62,798	565	0.9	5,615	26	0.5	118,941	4,316	3.6
2006	11,405	971	8.5	8,135	1,061	13.0	24,499	515	2.1	52,048	414	0.8	2,211	257	11.6	98,298	3,218	3.3
2007	8,048	1,201	14.9	10,261	764	7.4	52,701	687	1.3	90,757	584	0.6	4,851	40	0.8	166,618	3,276	2.0
2008	19,177	1,154	6.0	17,063	961	5.6	30,579	604	2.0	78,489	1,003	1.3	2,293	44	1.9	147,601	3,766	2.6
2009	8,278	1,003	12.1	7,825	842	10.8	34,973	384	1.1	91,815	412	0.4	1,053	77	7.3	143,944	2,718	1.9
2010	7,732	956	12.4	9,298	825	8.9	30,930	777	2.5	63,254	402	0.6	851	36	4.2	112,065	2,996	2.7
2011	11,377	928	8.2	13,356	539	4.0	34,250	172	0.5	50,768	150	0.3	507	0	0.0	110,258	1,789	1.6

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Table 24.–Page 2 of 2.

	Cook Inlet to Soldotna Bridge			Soldotna Bridge to Moose River			Moose River to Skilak Outlet			Skilak Inlet to Kenai Lake			Kenai River reach not specified [a]			Kenai River total		
Year	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H	C	H	% H
2012	11,398	843	7.4	15,330	614	4.0	28,715	372	1.3	66,323	304	0.5	748	11	1.5	122,514	2,144	1.8
2013	11,229	1,134	10.1	12,687	1,557	12.3	33,199	413	1.2	70,350	492	0.7	228	13	5.7	127,693	3,609	2.8
2014	15,689	1,902	12.1	17,101	1,161	6.8	32,974	488	1.5	66,551	287	0.4	103	89	86.4	132,418	3,927	3.0
2015	22,163	1,530	6.9	12,681	1,247	9.8	30,375	422	1.4	86,330	621	0.7	14	14	100.0	151,563	3,834	2.5
Average																		
2011–2015	14,371	1,267	8.9	14,231	1,024	7.4	31,903	373	1.2	68,064	371	0.5	320	25	38.7	128,889	3,061	2.3
2006–2015	12,650	1,162	9.9	12,374	957	8.3	33,320	483	1.5	71,669	467	0.6	1,286	58	21.9	131,297	3,128	2.4
1984–2015	12,505	2,716	16.3	9,279	1,481	18.7	24,731	2,226	8.6	53,395	1,630	3.4				100,925	8,101	6.9

Source: Statewide Harvest Surveys from Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/. Catch estimates from 1984 to 1989 are unpublished estimates from the SWHS database, M. J. Mills, Sport Fish Biometrician, ADF&G, Anchorage, personal communication.

Note: ND means no data available.

[a] SWHS began consistently reporting in 2002.

[b] In 1984 and 1985, catch estimates were mistakenly reported as harvest in Mills (1985, 1986). Corrected harvest numbers are presented here.

Table 25.–Rainbow trout catch (C) and harvest (H) , and effort (E) for all species for the Russian River, Swanson River drainage, Quartz Creek, Ptarmigan Creek, Skilak Lake, and Kenai Lake, 1984–2015.

				Swanson River drainage															
	Russian River				Canoe route		Swanson River		Quartz Creek			Ptarmigan Creek			Skilak Lake			Kenai Lake		
Year	E [a]	C	H	E [a,b]	C	H	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H
1984	55,861	ND	324	5,671	ND	0	ND	3,492	3,413	ND	87	1,857	ND	237	67	ND	12	502	ND	25
1985	80,054	ND	0	4,058	ND	3,069	ND	ND	451	ND	69	988	ND	295	121	ND	0	607	ND	ND
1986	70,729	ND	0	9,831	ND	4,939	ND	ND	4,146	ND	122	1,483	ND	474	413	ND	0	2,722	ND	15
1987	91,600	ND	91	7,353	ND	1,940	ND	ND	5,361	ND	54	942	ND	18	4,129	ND	145	580	ND	36
1988	76,180	ND	91	14,042	ND	1,365	ND	928	3,965	ND	54	1,946	ND	18	3,838	ND	72	855	ND	36
1989	53,598	ND	96	7,664	ND	1,190	ND	552	4,893	ND	67	790	ND	29	2,810	ND	67	377	ND	20
1990	68,861	4,789	198	8,578	3,664	1,510	6,996	1,520	5,655	500	198	2,041	906	260	2,817	458	115	1,042	73	42
1991	76,433	7,221	230	8,416	4,065	1,233	4,316	1,118	5,354	648	94	1,200	700	115	4,120	637	125	1,064	1,400	115
1992	67,443	8,312	253	8,294	8,573	2,462	4,583	1,100	7,906	1,314	237	1,750	499	24	3,820	522	95	1,536	135	87
1993	61,018	12,377	284	8,508	6,877	1,588	2,431	424	9,152	2,182	174	1,742	1,709	415	3,289	857	68	2,586	1,306	615
1994	65,996	11,744	134	7,537	5,885	1,331	2,433	585	7,241	2,088	268	1,425	912	311	1,805	614	35	2,524	1,189	356
1995	58,090	15,381	151	6,865	5,301	1,576	4,040	747	5,179	780	66	1,914	574	131	2,957	1,335	56	3,240	654	233
1996	50,122	23,041	127	6,471	3,716	1,107	2,390	221	3,018	914	53	336	464	40	1,780	1,536	21	878	90	90
1997	46,914	30,852	130	5,748	5,564	1,271	2,583	411	3,422	1,539	0	758	1,461	0	2,346	3,042	14	1,745	504	152
1998	47,942	20,088	351	5,093	3,985	1,248	3,235	535	3,166	2,252	0	701	2,053	0	1,645	625	209	520	183	43
1999	64,536	37,764	83	6,885	6,853	1,759	1,840	267	4,708	2,132	0	883	3,382	0	1,182	1,904	119	1,462	1,753	93
2000	69,864	34,948	44	5,250	7,952	1,701	4,630	1,142	2,423	1,212	0	732	1,026	0	2,072	2,578	181	1,033	327	117
2001	55,972	16,007	215	4,161	5,299	2,262	2,899	528	3,105	1,814	0	430	625	0	1,701	568	65	2,509	762	153
2002	68,263	29,484	16	3,692	2,714	992	4,347	679	4,245	2,617	0	888	3,268	0	1,668	939	63	2,502	1,312	58
2003	50,448	21,204	182	2,298	1,691	476	5,146	362	4,357	3,359	0	899	424	0	2,068	1,009	0	1,097	386	0
2004	60,784	42,875	49	3,640	1,523	482	1,504	373	6,589	7,939	0	687	3,027	0	2,460	911	436	497	140	93
2005	55,801	20,026	232	4,886	1,695	609	1,674	144	6,106	2,897	0	599	1,253	0	594	851	32	2,072	252	55
2006	70,804	28,059	256	4,669	2,610	348	1,435	425	5,582	5,698	0	1,061	3,612	0	1,152	1,045	0	619	52	52
2007	57,755	25,718	261	6,712	7,195	1,559	2,753	904	8,694	6,193	0	896	1,291	0	1,462	484	0	648	494	49
2008	55,444	20,333	219	7,227	4,918	691	2,540	360	7,105	5,900	0	389	1,087	0	1,692	962	18	728	313	88
2009	64,518	21,047	214	4,621	4,942	1,005	1,635	167	6,217	8,770	0	441	1,750	0	1,126	998	0	687	28	18
2010	39,873	14,710	97	3,203	2,165	477	972	189	4,859	2,859	0	317	1,366	0	1,085	372	15	955	263	63

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Table 25.–Page 2 of 2.

				Swanson River drainage															
	Russian River				Canoe route		Swanson River		Quartz Creek			Ptarmigan Creek			Skilak Lake			Kenai Lake		
Year	E [a]	C	H	E [a,b]	C	H	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H
2011	47,264	17,817	108	4,296	158	283	1,684	650	2,184	1,457	0	389	744	0	918	345	0	869	116	0
2012	41,152	21,275	216	1,097	439	0	528	168	1,238	644	0	227	518	11	538	11	0	1,179	147	0
2013	59,682	27,869	275	2,576	485	41	592	116	3,262	1,540	31	263	1,485	0	2,060	1,500	345	2,964	761	231
2014	57,544	32,711	514	2,897	675	277	437	84	3,507	2,605	46	756	1,805	0	1,616	524	36	3,030	1,002	86
2015	55,420	31,208	277	2,201	1,054	255	702	102	3,137	8,431	41	1,150	4,385	0	1,188	464	87	2,048	1,313	89
Average	60,811	22,187	179	5,764	3,846	1,220	2,628	631	4,676	3,011	52	965	1,551	74	1,892	965	76	1,427	575	100

Source: Statewide Harvest Surveys from Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data available.

[a] Effort (angler-days) directed toward all species.

[b] Total effort for both Swanson River and Swanson River Canoe Route.

Table 26.–Dolly Varden catch (C) and harvest (H), and effort (E) for all species, for Quartz Creek, Russian River, Ptarmigan Creek, Swanson River drainage, Skilak Lake, and Kenai Lake, 1984–2015.

													Swanson River drainage							
	Quartz Creek			Russian River			Ptarmigan Creek			Skilak Lake				Swanson canoe route		Swanson River		Kenai Lake		
Year	E [a]	C	H	E [a]	C	Ht	E [a]	C	H	E [a]	C	H	E [a,b]	C	Ht	C	H	E [a]	C	H
1984	3,413	ND	3,791	55,861	ND	1,072	1,857	ND	2,120	67	ND	0	5,671	ND	0	ND	324	502	ND	224
1985	451	ND	121	80,054	ND	399	988	ND	1,387	121	ND	0	4,058	ND	277	ND	ND	607	ND	69
1986	4,146	ND	1,605	70,729	ND	826	1,483	ND	2,508	413	ND	0	9,831	ND	367	ND	ND	2,722	ND	76
1987	5,361	ND	181	91,600	ND	72	942	ND	417	4,129	ND	91	7,353	ND	240	ND	ND	580	ND	109
1988	3,965	ND	1,292	76,180	ND	473	1,946	ND	527	3,838	ND	110	14,042	ND	272	ND	36	855	ND	546
1989	4,893	ND	2,399	53,598	ND	361	790	ND	628	2,810	ND	438	7,664	ND	86	ND	86	377	ND	134
1990	5,655	8,672	2,842	68,861	2,290	760	2,041	4,081	1,041	2,817	583	187	8,578	531	271	104	42	1,042	926	302
1991	5,354	14,329	1,905	76,433	6,134	1,148	1,200	3,445	705	4,120	1,240	378	8,416	626	104	365	131	1,064	757	326
1992	7,906	9,864	2,441	67,443	3,629	664	1,750	4,342	1,188	3,820	1,352	172	8,294	1,270	418	49	16	1,536	246	98
1993	9,152	21,473	4,317	61,018	4,141	1,001	1,742	8,202	1,057	3,289	653	145	8,508	954	419	201	88	2,586	1,656	764
1994	7,241	11,702	2,175	65,996	4,443	595	1,425	1,877	296	1,805	772	233	7,537	1,069	655	773	81	2,624	1,017	443
1995	5,179	4,659	1,004	58,090	6,430	554	1,914	1,642	801	2,957	1,031	224	6,865	860	95	332	272	3,240	2,730	606
1996	3,018	3,186	339	50,122	5,983	135	336	231	0	1,780	1,311	146	6,471	1,653	519	655	509	878	230	48
1997	3,422	13,766	350	46,914	6,564	376	758	2,128	54	2,346	5,878	327	5,748	1,118	533	135	0	1,745	362	160
1998	3,166	16,990	396	47,942	5,957	73	701	4,195	185	1,645	214	17	5,093	899	248	244	40	520	67	25
1999	4,708	8,051	223	64,536	11,791	196	883	3,191	77	1,182	782	110	6,885	1,534	348	23	0	1,462	611	88
2000	2,423	6,318	80	69,864	11,596	168	732	821	44	2,072	1,487	175	5,250	2,275	963	334	59	1,033	333	95
2001	3,105	10,280	65	55,972	11,087	253	430	3,096	11	1,701	243	48	4,161	1,313	457	613	145	2,509	456	176
2002	4,245	11,510	114	68,263	8,566	175	888	1,242	0	1,668	1,414	134	3,692	643	221	313	79	2,502	935	309
2003	4,357	19,627	123	50,448	10,504	263	899	1,028	50	2,068	825	64	2,298	221	37	0	0	1,097	107	54
2004	6,589	31,267	342	60,784	25,713	324	687	3,609	68	2,460	653	152	3,640	25	13	388	99	497	40	13
2005	6,106	23,953	216	55,801	9,218	232	599	3,018	0	594	464	0	4,886	125	99	134	38	2,072	262	165
2006	5,582	31,731	219	70,804	11,390	261	1,061	4,291	0	1,152	321	39	4,669	245	99	51	13	619	143	24
2007	8,694	44,588	442	57,755	7,857	196	896	2,126	143	1,462	607	22	6,712	208	89	1,868	317	648	376	77
2008	7,105	34,401	152	55,444	9,481	354	389	954	29	1,692	405	0	7,227	250	98	167	70	728	0	0
2009	6,217	40,456	135	64,518	10,741	146	441	1,185	0	1,126	754	0	4,621	447	252	0	0	687	11	11
2010	4,859	14,416	182	39,873	7,645	45	317	2,058	0	1,085	552	0	3,203	747	48	56	12	955	161	29

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	Quartz Creek			Russian River			Ptarmigan Creek			Skilak Lake			Swanson River drainage							
														Swanson canoe route		Swanson River		Kenai Lake		
Year	E [a]	C	H	E [a]	C	Ht	E [a]	C	H	E [a]	C	H	E [a,b]	C	Ht	C	H	E [a]	C	H
2011	2,184	5,399	345	47,264	7,375	165	389	704	21	918	26	16	4,296	52	64	20	10	869	145	25
2012	1,238	6,157	37	41,152	7,659	47	227	1,106	10	538	10	10	1,097	269	10	0	0	1,179	108	0
2013	3,262	5,977	177	59,682	14,505	198	263	1,302	17	2,060	751	35	2,576	515	0	35	0	2,964	63	16
2014	3,507	18,540	90	57,544	13,647	332	756	4,970	0	1,616	40	0	2,897	101	20	0	0	3,030	446	106
2015	3,137	21,539	143	55,420	11,897	189	1,150	4,083	0	1,188	216	20	2,201	35	16	39	0	2,048	312	0
Average	4,676	16,879	883	60,811	9,086	377	965	2,651	418	1,892	869	103	5,764	692	229	265	85	1,431	481	160

Source: Statewide Harvest Surveys from Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data available.

[a] Effort (angler-days) directed toward all species.

[b] Total effort for both Swanson River and Swanson River Canoe Route.

Table 27.–Kenai Peninsula stocked lakes total effort, catch, catch per unit effort (CPUE), harvest, and harvest per unit effort (HPUE) of stocked species 1983–2015.

Year	Number of fish stocked	Effort [a]	Catch	CPUE	Harvest	HPUE
1983	ND	3,018	ND	ND	3,618	1.20
1984	ND	870	ND	ND	386	0.44
1985	ND	1,473	ND	ND	1,266	0.86
1986	ND	2,538	ND	ND	1,472	0.58
1987	ND	2,054	ND	ND	669	0.33
1988	ND	4,433	ND	ND	2,000	0.45
1989	ND	2,068	ND	ND	804	0.39
1990	ND	3,746	5,058	1.35	2,530	0.68
1991	ND	3,763	6,697	1.78	2,186	0.58
1992	ND	5,750	11,489	2.00	5,422	0.94
1993	ND	5,682	15,428	2.72	5,324	0.94
1994	ND	10,579	17,912	1.69	7,418	0.70
1995	ND	8,447	13,106	1.55	4,654	0.55
1996	ND	5,380	19,830	3.69	6,604	1.23
1997	ND	6,369	17,849	2.80	9,759	1.53
1998	ND	6,588	20,652	3.13	8,898	1.35
1999	409,500	5,151	11,076	2.15	4,723	0.92
2000	255,373	7,880	28,050	3.56	7,851	1.00
2001	311,220	6,543	16,423	2.51	4,985	0.76
2002	210,420	7,641	19,809	2.59	10,977	1.44
2003	236,893	4,802	10,578	2.20	3,927	0.82
2004	266,668	4,978	16,375	3.29	4,612	0.93
2005	202,077	8,205	10,276	1.25	4,850	0.59
2006	187,388	6,488	12,571	1.94	3,440	0.53
2007	296,816	3,079	5,687	1.85	3,158	1.03
2008	277,219	2,802	6,137	2.19	2,135	0.76
2009	378,652	3,707	8,030	2.17	1,564	0.42
2010	300,399	5,510	8,072	1.46	3,135	0.57
2011	251,151	7,192	9,113	1.27	3,627	0.50
2012	295,738	5,867	16,029	2.73	4,099	0.70
2013	279,279	10,161	9,857	0.97	4,479	0.44
2014	279,321	8,485	11,960	1.41	5,439	0.64
2015	274,034	10,362	18,003	1.74	5,105	0.49
Average	277,185	5,503	13,310	2.15	4,276	0.77

Source: Statewide Harvest Surveys from Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; other data from Loopstra, D., ADF&G Anchorage, personal communication.

Note: ND means no data available.

[a] Effort in angler-days fished

Table 28.–Kenai Peninsula lake trout catch (C) and harvest (H) as determined by the Statewide Harvest Survey, 1977–2015.

	Hidden Lake		Kenai Lake		Kenai River		Skilak Lake		Tustumena Lake		Kasilof River		Other lakes [a]		Other rivers [a]		Total	
Year	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H
1977	ND	1,542	ND	ND	ND	252	ND	ND	ND	ND	ND	ND	ND	1,347	ND	537	ND	3,678
1978	ND	850	ND	ND	ND	524	ND	ND	ND	ND	ND	ND	ND	1,681	ND	63	ND	3,118
1979	ND	1,109	ND	ND	ND	409	ND	ND	ND	ND	ND	ND	ND	1,554	ND	545	ND	3,617
1980	ND	1,860	ND	ND	ND	112	ND	ND	ND	ND	ND	ND	ND	1,433	ND	164	ND	3,569
1981	ND	1,069	ND	ND	ND	723	ND	ND	ND	ND	ND	151	ND	1,264	ND	162	ND	3,369
1982	ND	2,117	ND	ND	ND	628	ND	ND	ND	ND	ND	42	ND	1,540	ND	10	ND	4,337
1983	ND	1,437	ND	157	ND	650	ND	94	ND	0	ND	0	ND	976	ND	0	ND	3,314
1984	ND	1,047	ND	62	ND	535	ND	12	ND	125	ND	25	ND	486	ND	0	ND	2,292
1985	ND	1,405	ND	17	ND	954	ND	35	ND	173	ND	35	ND	295	ND	35	ND	2,949
1986	ND	3,761	ND	688	ND	972	ND	76	ND	92	ND	92	ND	1,421	ND	0	ND	7,102
1987	ND	1,050	ND	145	ND	315	ND	706	ND	181	ND	145	ND	850	ND	0	ND	3,392
1988	ND	1,183	ND	236	ND	893	ND	546	ND	473	ND	146	ND	599	ND	91	ND	4,167
1989	ND	619	ND	105	ND	322	ND	86	ND	48	ND	48	ND	507	ND	248	ND	1,983
1990	2,020	1,260	344	167	670	256	1,049	260	479	271	177	94	581	258	0	0	5,320	2,566
1991	2,302	1,494	592	485	961	497	579	363	162	162	175	80	739	362	27	0	5,537	3,443
1992	2,005	995	424	185	925	448	833	455	517	231	447	371	1,249	670	62	23	6,462	3,378
1993	2,358	1,449	1,640	816	921	335	1,050	233	92	92	202	71	1,601	660	225	57	8,089	3,713
1994	1,271	822	857	489	716	401	302	74	154	110	198	155	1,917	816	286	264	5,701	3,131
1995	1,103	852	846	552	650	178	1,203	626	66	22	88	30	818	627	0	0	4,774	2,887
1996	2,082	1,131	624	385	1,699	1,199	627	325	455	157	0	0	636	332	76	11	6,199	3,540
1997	1,091	524	771	299	633	130	1,701	504	110	70	224	204	657	657	54	94	5,241	2,482
1998	1,012	550	374	181	539	117	553	355	334	239	66	66	838	546	434	361	4,150	2,415
1999	1,452	545	1,950	623	2,155	293	1,408	621	89	81	690	284	473	446	36	27	8,253	2,920
2000	437	318	221	202	988	115	1,561	543	184	175	182	155	631	350	27	0	4,231	1,858
2001	734	160	1,490	980	658	156	249	72	118	44	332	81	384	270	0	0	3,965	1,763
2002	653	200	3,220	886	1,228	173	824	147	248	20	466	293	424	180	0	0	7,063	1,899
2003	443	285	405	226	1,423	243	713	230	87	45	15	0	90	68	224	0	3,400	1,097
2004	1,188	482	199	199	400	80	696	529	287	151	275	211	130	115	16	32	3,191	1,799
2005	728	216	890	631	0	0	145	54	468	130	160	128	156	70	0	0	2,547	1,229

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	Hidden Lake		Kenai Lake		Kenai River		Skilak Lake		Tustumena Lake		Kasilof River		Other lakes [a]		Other rivers [a]		Total	
Year	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H
2006	580	386	306	190	224	41	94	23	110	10	239	161	42	20	31	31	1,626	862
2007	1,084	420	540	226	352	0	42	14	230	9	0	0	35	0	0	0	2,283	669
2008	891	210	0	0	392	153	153	122	36	21	8	0	75	61	23	23	1,578	590
2009	2,351	616	1,011	185	541	22	47	0	129	58	11	0	78	34	0	0	4,168	915
2010	1,396	235	1,099	117	447	129	51	51	274	206	0	0	41	0	0	0	3,308	738
2011	1,124	61	12	12	17	0	33	16	320	104	0	0	348	211	0	0	1,854	404
2012	369	123	171	114	15	7	27	27	0	0	95	79	64	16	0	0	741	366
2013	612	197	820	639	43	0	856	343	172	172	0	0	0	0	85	64	2,588	1,415
2014	330	61	1,458	466	203	62	160	37	0	0	0	0	283	49	0	0	2,434	675
2015	741	82	1,304	375	218	0	59	20	0	0	40	0	178	178	0	0	2,540	655
Average	1,168	839	830	335	655	316	578	230	197	111	157	90	480	537	62	73	4,125	2,418

Source: Statewide Harvest Surveys from Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data available.

[a] Includes other NKPMA not listed here individually; does not include "unspecified" category in the SWHS.

Table 29.–Arctic grayling catch (C) and harvest (H), and effort (E) for all species, for Crescent Lake, Paradise Lakes, Lower Fuller Lake, Grayling Lake, Twin Lakes, and Bench Lake, 1984–2015.

	Crescent Lake			Paradise Lakes [b]			Fuller Lakes [b]			Grayling Lake			Twin Lake			Bench Lake		
Year	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H
1984	770	ND	574	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1985	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1986	1,147	ND	826	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1987	960	ND	163	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1988	1,255	ND	382	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1989	1,052	ND	238	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1990	971	2,530	260	160	3,123	239	107	73	21	49	42	0	ND	ND	ND	96	62	21
1991	1,223	6,262	736	49	13	0	167	710	536	98	27	0	65	67	0	ND	ND	ND
1992	1,014	5,966	398	228	1,254	91	37	15	0	96	128	120	160	120	60	75	8	0
1993	1,713	6,716	619	80	222	82	177	2,253	101	146	141	65	ND	ND	ND	56	205	44
1994	1,836	7,400	672	214	1,060	106	415	1,198	215	122	653	296	83	907	82	90	98	0
1995	1,874	4,448	677	701	4,764	462	364	1,448	384	167	209	17	ND	ND	ND	14	18	0
1996	756	2,990	423	409	5,149	123	349	1,205	190	95	291	170	43	495	0	55	50	50
1997	957	3,623	357	206	1,661	203	222	687	208	140	131	9	68	848	229	15	54	0
1998	1,145	6,784	536	207	2,652	181	210	896	208	282	276	34	24	50	50	13	307	0
1999	1,266	3,187	550	1,006	6,944	322	104	338	22	68	135	0	91	339	90	15	11	0
2000	1,504	6,782	462	493	5,793	660	336	1,174	200	91	188	38	27	100	0	0	0	0
2001	1,099	6,493	245	528	1,863	261	197	730	223	90	184	126	0	0	0	44	16	7
2002	1,457	6,656	427	808	2,993	636	242	1,324	0	28	120	0	0	0	0	91	977	15
2003	1,412	6,785	1,008	134	1,126	14	208	1,437	47	80	117	12	50	140	0	0	0	0
2004	1,104	5,510	101	218	2,260	488	182	1,029	32	33	79	0	0	0	0	33	57	57
2005	1,028	5,231	438	404	2,893	236	289	1,091	64	37	0	0	35	321	0	0	0	0
2006	790	3,161	166	104	3,421	0	296	329	0	52	386	55	49	207	0	0	0	0
2007	1,389	6,202	365	124	303	70	74	234	46	37	117	35	0	0	0	0	0	0
2008	959	2,542	306	163	234	101	294	5,348	0	197	1,979	228	0	0	0	35	0	0
2009	1,609	7,456	814	0	0	0	261	1,550	54	14	50	0	21	67	33	0	0	0
2010	758	1,916	170	17	1,114	0	334	741	60	17	35	0	84	683	55	34	92	23

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	Crescent Lake			Paradise Lakes [b]			Fuller Lakes [b]			Grayling Lake			Twin Lake			Bench Lake		
Year	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H	E [a]	C	H
2011	996	3,150	606	133	347	13	234	697	99	30	53	0	0	0	0	36	196	0
2012	896	2,857	446	143	1,292	189	71	112	0	69	50	0	0	0	0	0	0	0
2013	1,213	6,786	653	105	265	43	165	571	0	261	374	231	0	0	0	114	1,079	34
2014	1,186	2,554	263	133	1,248	101	38	206	0	33	33	0	0	0	0	57	186	0
2015	1,041	2,196	251	0	0	0	166	196	196	43	283	0	0	0	0	44	808	0
Average	1,174	4,853	456	260	2,000	178	213	984	112	91	234	55	35	189	26	37	169	10

Source: Statewide Harvest Surveys from Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data available.

[a] Effort (angler-days) directed toward all species.

[b] Includes data for upper and lower Paradise Lakes and unspecified Paradise Lake.

Table 30.–Northern Kenai Peninsula Management Area catch (C) and harvest (H) of northern pike, 1981–2015.

	Kenai River		Mackeys Lakes		Sevena Lake		Stormy Lake		Tote Road lakes		Other lakes or streams [a]		Total NKPMA	
Year	C	H	C	H	C	H	C	H	C	H	C	H	C	H
1981 [b]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	32	ND	32
1982 [b]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	105	ND	105
1983	ND	ND	ND	294	ND	ND	ND	ND	ND	ND	ND	0	ND	294
1984	ND	ND	ND	187	ND	ND	ND	ND	ND	ND	ND	0	ND	187
1985	ND	69	ND	52	ND	ND	ND	ND	ND	ND	ND	0	ND	121
1986	ND	0	ND	0	ND	ND	ND	ND	ND	ND	ND	0	ND	0
1987	ND	12	ND	0	ND	ND	ND	ND	ND	ND	ND	0	ND	12
1988	ND	0	ND	0	ND	ND	ND	ND	ND	ND	ND	0	ND	0
1989	ND	18	ND	10	ND	ND	ND	ND	ND	ND	ND	39	ND	67
1990	10	10	156	10	0	0	0	0	0	0	104	10	270	30
1991	0	0	260	74	0	0	0	0	0	0	0	0	260	74
1992	9	0	9	9	179	85	0	0	0	0	102	102	299	196
1993	26	26	56	28	0	0	0	0	0	0	0	0	82	54
1994	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	29	29	225	131	68	29	0	0	0	0	0	0	322	189
1996	158	92	0	0	32	0	0	0	0	0	53	53	243	145
1997	14	7	213	0	0	0	0	0	0	0	0	0	227	7
1998	7	0	0	0	0	0	0	0	0	0	0	0	7	0
1999	0	0	0	0	47	47	0	0	0	0	0	0	47	47
2000	6	6	76	38	0	0	0	0	0	0	10	10	92	54
2001	0	0	13	13	155	155	103	103	0	0	601	251	872	522
2002	94	12	0	0	322	322	34	34	0	0	0	0	450	368
2003	58	58	0	0	218	218	241	241	0	0	24	0	541	517
2004	553	58	241	241	0	0	45	15	0	0	0	0	839	314
2005	12	12	47	47	0	0	165	165	0	0	0	0	224	224
2006	0	0	0	0	0	0	55	55	0	0	0	0	55	55
2007	41	10	0	0	0	0	150	135	413	413	0	0	604	558
2008	33	25	0	0	0	0	12	12	349	204	13	13	407	254
2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	59	59	59	59

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	Kenai River		Mackeys Lakes		Sevena Lake		Stormy Lake		Tote Road lakes		Other lakes or streams [a]		Total NKPMA	
Year	C	H	C	H	C	H	C	H	C	H	C	H	C	H
2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	11	11	0	0	0	0	10	0	0	0	0	0	21	11
2013	108	23	428	428	0	0	0	0	0	0	0	0	536	451
2014	65	29	0	0	0	0	0	0	0	0	0	0	65	29
2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average	47	16	66	47	39	33	31	29	29	24	37	19	251	142

Source: Statewide Harvest Surveys from Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/.

Note: ND means no data available.

[a] Includes data from Arc lake, Derks Lake, Island Lake, Seven Lake, SixMile Creek, Swanson River, and Union Lake. Does not include data from "Other Lakes" or "Other Streams" categories in the SWHS, except 1981–1982.

[b] No breakdown of individual lakes or streams is available for 1981–1982. Those years may contain Kasilof River data and some non-NKPMA data.

Table 31.–Kenai River salmon harvest in the Kenaitze tribal educational fishery, 1989–2016.

Year	Chinook salmon				Sockeye salmon				Coho salmon				Pink Salmon		Total salmon harvest
	Early-run [a]	%	Late-run [b]	%	Early-run [a]	%	Late-run [b]	%	Early-run [c]	%	Late-run [d]	%	Harvest	%	
1989 [e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,121
1990 [e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,973
1991 [e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	4,948
1992 [e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3,987
1993 [e]	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2,156
1994 [e]	56	1.9	1	0.0	436	14.9	1,471	50.3	346	11.8	483	16.5	134	4.6	2,927
1995 [e]	37	1.5	3	0.1	130	5.3	1,368	56.0	275	11.3	593	24.3	35	1.4	2,441
1996 [e]	104	3.3	1	0.0	953	30.3	1,289	40.9	261	8.3	331	10.5	211	6.7	3,150
1997 [e]	122	4.4	20	0.7	922	33.6	1,488	54.1	28	1.0	163	5.9	5	0.2	2,748
1998 [e]	131	3.8	2	0.1	971	28.1	1,650	47.8	252	7.3	386	11.2	58	1.7	3,450
1999 [e]	114	4.4	4	0.2	455	17.5	1,489	57.3	258	9.9	272	10.5	5	0.2	2,597
2000 [e]	124	3.6	6	0.2	779	22.3	1,309	37.5	319	9.1	337	9.7	617	17.7	3,491
2001 [e]	198	4.6	8	0.2	1,627	37.6	1,814	41.9	310	7.2	262	6.1	107	2.5	4,326
2002	48	1.1	6	0.1	650	15.1	2,201	51.1	489	11.4	432	10.0	482	11.2	4,308
2003	126	2.4	11	0.2	1,038	19.5	3,627	68.1	192	3.6	272	5.1	63	1.2	5,329
2004	72	1.1	10	0.2	1,201	18.3	4,106	62.5	366	5.6	399	6.1	417	6.3	6,571
2005	76	1.1	11	0.2	1,696	24.6	4,609	66.9	47	0.7	442	6.4	12	0.2	6,893
2006	65	1.2	11	0.2	1,456	27.5	2,856	53.9	201	3.8	488	9.2	223	4.2	5,300
2007	16	0.4	6	0.1	1,213	26.6	2,671	58.5	220	4.8	323	7.1	119	2.6	4,568
2008	40	0.9	15	0.3	1,112	25.2	2,246	50.9	346	7.8	176	4.0	481	10.9	4,416
2009	49	0.7	4	0.1	2,374	33.7	3,309	46.9	485	6.9	769	10.9	63	0.9	7,053
2010	32	0.5	21	0.3	1,366	20.8	3,765	57.3	419	6.4	794	12.1	170	2.6	6,567

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Year	Chinook salmon				Sockeye salmon				Coho salmon				Pink Salmon		Total salmon harvest
	Early-run [a]	%	Late-run [b]	%	Early-run [a]	%	Late-run [b]	%	Early-run [c]	%	Late-run [d]	%	Harvest	%	
2011	42	0.6	5	0.1	1,595	21.7	5,278	71.7	217	2.9	222	3.0	5	0.1	7,363
2012	19	0.5	0	0.0	275	6.7	3,136	76.1	100	2.4	40	1.0	553	13.4	4,123
2013	11	0.2	8	0.2	1,458	28.3	3,080	59.8	383	7.4	183	3.6	24	0.5	5,147
2014	1	0.0	1	0.0	1,920	28.0	4,195	61.1	261	3.8	138	2.0	352	5.1	6,868
2015	10	0.1	10	0.1	1,546	18.9	6,563	80.1	63	0.8	0	0.0	4	0.0	8,196
2016 [f]	4	0.1	6	0.1	864	11.7	5,843	78.8	220	3.0	273	3.7	203	2.7	7,413
Average	65	1.7	7	0.2	1,132	22.4	3,016	57.8	263	6.0	338	7.8	189	4.2	4,837

Source: Harvest data, Kenaitze Indian Tribe.

Note: ND means no data available.

[a] Defined as fish caught from 1 May through 30 June.

[b] Defined as fish caught from 1 July through 30 September.

[c] Defined as coho salmon caught from 1 June through 31 August.

[d] Defined as coho salmon caught from 1 September through 30 November.

[e] Prior to 2002, reported harvest included Kenai, Kasilof, and Swanson River.

[f] Kenaitze Indian Tribe also reported harvest on 17 September 2016 of 9 coho salmon and 1 sockeye salmon in the Swanson River.

Table 32.–Kasilof River salmon harvest in Kasilof area educational fisheries, 2002–2016.

	Chinook salmon				Sockeye salmon				Coho salmon				Pink salmon		Total
Year	Early-run [a]	%	Late-run [b]	%	Early-run [a]	%	Late-run [b]	%	Early-run [c]	%	Late-run [d]	%	Harvest	%	salmon harvest
2002	16	29.6	0	0.0	38	70.4	0	0.0	0	0.0	0	0.0	0	0.0	54
2003	6	25.0	0	0.0	18	75.0	0	0.0	0	0.0	0	0.0	0	0.0	24
2004	3	10.0	0	0.0	20	66.7	7	23.3	0	0.0	0	0.0	0	0.0	30
2005	13	50.0	0	0.0	12	46.2	0	0.0	0	0.0	1	3.8	0	0.0	26
2006	10	16.7	0	0.0	38	63.3	0	0.0	0	0.0	12	20.0	0	0.0	60
2007 [e]	3	5.0	0	0.0	57	95.0	0	0.0	0	0.0	0	0.0	0	0.0	60
2008	6	5.0	0	0.0	23	19.0	13	10.7	0	0.0	45	37.2	34	28.1	121
2009	4	4.1	0	0.0	60	61.9	1	1.0	18	18.6	14	14.4	0	0.0	97
2010	8	2.6	0	0.0	260	85.2	0	0.0	2	0.7	35	11.5	0	0.0	305
2011 [f]	3	4.5	0	0.0	25	37.3	0	0.0	15	22.4	24	35.8	0	0.0	67
2012	2	1.4	0	0.0	116	78.9	0	0.0	0	0.0	27	18.4	2	1.4	147
2013	3	0.9	0	0.0	299	86.2	1	0.3	28	8.1	16	4.6	0	0.0	347
2014 [f]	0	0.0	0	0.0	18	39.1	0	0.0	0	0.0	28	60.9	0	0.0	46
2015 [f]	1	1.3	0	0.0	31	40.8	1	1.3	7	9.2	36	47.4	0	0.0	76
2016	2	2.6	0	0.0	45	59.2	2	2.6	9	11.8	18	23.7	0	0.0	76
Average	5	10.6	0	0.0	71	61.6	2	2.6	5	4.7	17	18.5	2	2.0	102

Source: Harvest data, Kenaitze Indian Tribe and Kasilof Regional Historical Association.

[a] Defined as fish caught from 1 May through 30 June.

[b] Defined as fish caught from 1 July through 30 September.

[c] Defined as coho caught from 1 June through 31 August.

[d] Defined as coho caught from 1 September through 30 November.

[e] Prior to 2007, all data are from the Kenaitze Educational Fishery; 2007–2016 includes data from the Kasilof Regional Historical Fishery.

[f] Kenaitze Indian Tribe did not fish this area in 2011, 2014, or 2015.

Table 33.–Alaska Territorial Lodge educational fishery salmon harvest in Northern Cook Inlet, 2008–2016.

	Chinook salmon				Sockeye salmon				Coho salmon				Pink salmon		Chum salmon		Total
Year	Early-run [a]	%	Late-run [b]	%	Early-run [a]	%	Late-run [b]	%	Early-run [c]	%	Late-run [d]	%	Harvest	%	Harvest	%	salmon harvest
2007	49	16.8	0	0.0	9	3.1	95	32.6	121	41.6	5	1.7	8	2.7	4	1.4	291
2008	6	3.3	0	0.0	35	19.4	29	16.1	103	57.2	0	0.0	7	3.9	0	0.0	180
2009	9	9.1	1	1.0	10	10.1	33	33.3	30	30.3	0	0.0	12	12.1	4	4.0	99
2010	14	13.0	0	0.0	36	33.3	9	8.3	27	25.0	3	2.8	19	17.6	0	0.0	108
2011	6	8.7	0	0.0	16	23.2	11	15.9	32	46.4	0	0.0	4	5.8	0	0.0	69
2012	4	4.0	0	0.0	70	70.7	0	0.0	14	14.1	0	0.0	1	1.0	10	10.1	99
2013	7	3.8	0	0.0	31	17.0	69	37.9	27	14.8	4	2.2	33	18.1	11	6.0	182
2014	8	4.0	0	0.0	67	33.2	51	25.2	25	12.4	0	0.0	51	25.2	0	0.0	202
2015	2	0.8	0	0.0	50	21.1	102	43.0	29	12.2	0	0.0	53	22.4	1	0.4	237
2016 [e]	2	12.5		0.0	14	87.5		0.0		0.0		0.0		0.0		0.0	16
Average	11	7.6	0	0.1	34	31.9	44	21.3	45	25.4	1	0.7	21	8.8	3	2.2	148

Source: Harvest data, Alaska Territorial Lodge.

[a] Defined as fish caught from 1 May through 30 June.

[b] Defined as fish caught from 1 July through 30 September.

[c] Defined as coho salmon caught from 1 June through 31 August.

[d] Defined as coho salmon caught from 1 September through 30 November.

[e] Preliminary data; final totals will be available in 2017.

Table 34.–Number of Kenai River fishing guides and vessels registered with Alaska State Parks, 1982–2016.

	Guide business type		Vessels registered		
Year	Fishing	Nonfishing	Motorized	Drift	Total [a]
1982	207	10	ND	ND	217
1983	198	10	ND	ND	208
1984	214	10	ND	ND	224
1985	160	11	131	40	171
1986	187	11	138	60	198
1987	222	10	155	77	232
1988	252	16	184	84	268
1989	292	20	215	97	312
1990	310	20	243	87	330
1991	290	25	229	86	315
1992	238	37	212	63	275
1993	222	41	194	69	263
1994	257	47	214	90	304
1995	314	43	263	94	357
1996	335	40	292	83	375
1997	354	46	312	88	400
1998	325	35	278	82	360
1999	329	39	288	80	368
2000	341	39	300	80	380
2001	335	39	296	78	374
2002	348	35	304	79	383
2003	339	36	301	74	375
2004	352	32	303	81	384
2005	365	42	324	83	407
2006	396	41	369	68	437
2007	396	29	372	53	425
2008	380	32	361	51	412
2009	338	46	322	62	384
2010	316	46	300	62	362
2011	319	60	297	82	379
2012	301	52	279	74	353
2013	284	66	259	91	350
2014	267	69	239	97	336
2015	258	74	226	106	332
2016	267	73	241	99	340

Source: Guide and vessel data, Alaska State Parks.

Note: ND means no data available.

Table 35.–Guided freshwater logbook catch (C) and harvest (H) data for the Northern Kenai Peninsula Management Area, 2006–2015.

		Chinook salmon		Sockeye salmon		Coho salmon		Rainbow trout		Dolly Varden		Arctic grayling		Lake trout		Other [a]	
River	Year	C	H	C	H	C	H	C	H	C	H	C	H	C	H	C	H
Kenai																	
	2006	15,117	8,757	12,884	6,719	9,122	7,839	46,610	622	34,031	356	1,140	18	0	0	16,548	2,687
	2007	12,634	7,410	11,818	7,442	9,545	8,573	60,774	643	44,346	293	52	5	35	2	65	11
	2008	9,770	7,183	8,620	5,372	12,069	11,249	50,799	238	42,303	178	39	0	51	6	8,474	1,577
	2009	6,451	4,039	11,722	8,001	10,722	9,878	47,533	165	44,291	149	72	0	0	0	149	13
	2010	4,951	3,557	11,886	7,921	10,620	9,839	46,541	136	36,234	187	41	0	59	1	5,042	1,021
	2011	5,567	3,642	18,021	12,331	11,342	10,777	48,004	144	38,325	215	88	0	22	1	152	0
	2012	1,242	309	37,884	28,976	7,696	7,312	42,596	139	35,882	131	25	3	73	0	13,033	1,664
	2013	1,408	766	19,867	15,498	13,874	13,153	42,716	198	34,966	200	154	0	12	0	145	17
	2014	765	299	25,606	21,524	11,865	11,041	40,172	123	36,951	239	176	1	21	0	15,881	3,563
	2015	2,401	1,760	32,140	26,777	13,216	12,570	48,859	418	39,231	394	76	0	57	5	146	22
	Average	6,031	3,772	19,045	14,056	11,007	10,223	47,460	283	38,656	234	186	3	33	2	5,964	1,058
Kasilof																	
	2006	3,569	1,982	291	252	1,785	1,709	226	3	1,221	135	30	3	0	0	276	54
	2007	4,203	2,635	338	304	963	932	633	6	1,489	146	0	0	1	0	23	4
	2008	3,325	2,272	197	168	1,443	1,413	153	1	1,036	94	0	0	7	0	211	41
	2009	3,132	2,350	173	165	939	896	39	3	682	62	5	1	4	0	175	2
	2010	3,138	1,977	147	139	878	833	94	36	861	69	0	0	1	0	374	34
	2011	3,670	2,701	308	282	1,024	1,003	168	5	490	32	0	0	0	0	118	10
	2012	1,321	700	1,190	1,084	909	891	82	6	457	28	0	0	4	0	994	65
	2013	2,143	1,128	2,314	2,205	1,123	1,101	272	0	695	86	2	0	0	0	142	16
	2014	607	272	3,934	3,750	724	722	39	0	223	11	0	0	0	0	305	71
	2015	848	528	5,817	5,615	968	948	79	17	345	11	0	0	2	0	52	20
	Average	2,596	1,655	1,471	1,396	1,076	1,045	179	8	750	67	4	0	2	0	267	32

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River	Year	Chinook salmon C	Chinook salmon H	Sockeye salmon C	Sockeye salmon H	Coho salmon C	Coho salmon H	Rainbow trout C	Rainbow trout H	Dolly Varden C	Dolly Varden H	Arctic grayling C	Arctic grayling H	Lake trout C	Lake trout H	Other [a] C	Other [a] H
Other NKPMA [b]																	
	2006	24	4	390	134	134	64	2,552	83	1,460	4	527	19	0	0	858	91
	2007	5	4	346	222	109	42	1,868	22	1,275	43	198	5	7	4	829	53
	2008	2	0	628	384	78	25	1,443	17	963	17	795	126	9	1	400	19
	2009	1	0	293	110	120	49	943	17	1,192	1	911	34	1	0	31	27
	2010	0	0	248	133	23	19	937	2	1,145	1	126	9	3	3	60	3
	2011	0	0	314	68	47	38	716	8	1,104	0	367	2	0	0	209	14
	2012	0	0	475	215	150	30	899	8	867	5	352	0	48	0	169	23
	2013	1	0	676	249	133	37	1,459	18	1,654	1	565	25	0	0	202	0
	2014	0	0	687	313	142	80	1,983	49	1,077	1	460	0	0	0	628	17
	2015	0	0	380	258	126	56	2,026	148	1,313	1	161	1	0	0	270	7
	Average	3	1	444	209	106	44	1,483	37	1,205	7	446	22	7	1	366	25

Source: Freshwater Logbook Program from Sigurdsson and Powers (2009–2013); R.H. Powers, Program Coordinator, ADF&G Anchorage, personal communication.

[a] Other species include primarily pink salmon.

[b] Other NKPMA fresh waters include primarily the Russian River drainage, the Swanson River drainage, and tributaries of the Kenai River.

Table 36.–Guided freshwater logbook data of fishing effort (number of trips and number of resident and nonresident anglers) for the Kenai River from May to October, 2006–2015.

Month	Year	Number of trips	Number of anglers		
			Resident	Nonresident	Total
May					
	2006	165	132	419	551
	2007	192	123	435	558
	2008	160	70	382	452
	2009	149	154	264	418
	2010	129	125	278	403
	2011	130	94	271	365
	2012	128	84	299	383
	2013	21	11	48	59
	2014	14	2	32	34
	2015	3	4	4	8
	Average	109	80	243	323
June					
	2006	2,777	1,337	8,090	9,427
	2007	2,719	1,220	7,643	8,863
	2008	2,526	1,256	7,010	8,266
	2009	1,892	1,172	4,784	5,956
	2010	1,510	675	4,114	4,789
	2011	1,664	843	4,443	5,286
	2012	1,238	576	3,250	3,826
	2013	939	370	2,389	2,759
	2014	813	332	2,145	2,477
	2015	895	234	2,429	2,663
	Average	1,697	802	4,630	5,431
July					
	2006	6,415	2,624	21,045	23,669
	2007	6,361	2,914	19,769	22,683
	2008	6,088	2,725	18,613	21,338
	2009	4,736	2,570	13,591	16,161
	2010	4,560	2,388	13,205	15,593
	2011	4,415	1,984	13,261	15,245
	2012	3,414	1,030	10,216	11,246
	2013	3,625	1,039	11,063	12,102
	2014	3,591	951	11,036	11,987
	2015	3,615	1,040	11,024	12,064
	Average	4,682	1,927	14,282	16,209

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Month	Year	Number of trips	Number of anglers		
			Resident	Nonresident	Total
August					
	2006	2,549	589	7,872	8,461
	2007	2,752	968	7,920	8,888
	2008	3,042	1,026	8,975	10,001
	2009	2,354	973	6,367	7,340
	2010	2,916	1,118	8,458	9,576
	2011	3,046	1,277	8,741	10,018
	2012	3,124	1,105	9,032	10,137
	2013	3,243	1,327	9,437	10,764
	2014	3,319	1,282	9,658	10,940
	2015	3,400	1,421	9,942	11,363
	Average	2,975	1,109	8,640	9,749
September					
	2006	1,031	462	2,598	3,060
	2007	1,009	544	2,532	3,076
	2008	1,125	654	2,801	3,455
	2009	1,179	900	2,576	3,476
	2010	1,146	883	2,434	3,317
	2011	1,238	929	2,822	3,751
	2012	1,094	671	2,520	3,191
	2013	1,261	910	2,897	3,807
	2014	1,201	872	2,714	3,586
	2015	1,237	801	2,908	3,709
	Average	1,152	763	2,680	3,443
October					
	2006	64	96	70	166
	2007	92	114	149	263
	2008	83	130	115	245
	2009	64	102	66	168
	2010	94	114	142	256
	2011	82	110	122	232
	2012	92	139	132	271
	2013	38	42	58	100
	2014	77	144	90	234
	2015	84	145	106	251
	Average	77	114	105	219

Source: Freshwater Logbook Program from Sigurdsson and Powers (2009–2013); R.H. Powers, Program Coordinator, ADF&G Anchorage, personal communication.

Table 37.–Kenai River corridor shoreline: summary of land ownership and lands with closed or restricted sport fishing access.

	Upper section of the Kenai River [a]				Lower section of the Kenai River [b]				All Kenai River corridor		
Land owner	Miles	Percent of total miles owned	Miles closed by ADF&G	Percent of total miles closed	Miles	Percent of total miles owned	Miles closed by ADF&G	Percent of total miles closed	Miles	Miles closed by ADF&G	Percent of total miles closed
State	3.8	8.05%	0.38	10.00%	31.5	24.19%	12.55	39.84%	35.3	12.93	36.63%
Federal	40.6	86.02%	0.20	0.49%	17.9	13.75%	3.99	22.29%	58.5	4.19	7.16%
Private	0.2	0.42%	0.00	0.00%	52.6	40.40%	0.00	0.00%	52.8	0.00	0.00%
Other	2.6	5.51%	0.00	0.00%	28.2	21.66%	2.69	9.54%	30.8	2.69	8.73%
All	47.2	100.00%	0.58	1.23%	130.2	100.00%	19.23	14.77%	177.4	19.81	11.17%

Source: Kenai Peninsula Borough land ownership map data.

[a] Kenai River shoreline from the Kenai Lake outlet downstream to the Skilak Lake inlet.

[b] Kenai River shoreline from the Skilak Lake outlet downstream to Cook Inlet.

Table 38.–Kenai River personal use sockeye salmon dip net fishery summary, 1981–2015.

Year	Date opened	Date closed	Total days	Dip net harvest of sockeye salmon [a]	Sport harvest of sockeye salmon below sonar	Sockeye salmon run to sonar [b]	Percent of inriver run harvested by dip net fishery	Effort (days fished) [c]
1981 [d]	ND	ND	ND	ND	3,116	575,848	0.0	ND
1982	26 Jul	5 Aug	10	Unknown	6,922	809,173	0.0	ND
1983	20 Jul	5 Aug	16	7,562	13,577	866,455	0.9	3,203
1984 [d]	ND	ND	ND	ND	2,613	481,473	0.0	ND
1985 [d]	ND	ND	ND	ND	8,835	680,897	0.0	ND
1986 [d]	ND	ND	ND	ND	12,522	645,906	0.0	ND
1987	23 Jul	5 Aug	14	24,086	50,274	2,245,615	1.0	22,547
1988	22 Jul	5 Aug	15	16,880	29,345	1,356,958	1.2	29,013
1989	21 Jul	5 Aug	15	48,976	66,162	2,295,576	2.0	31,312
1990 [d]	ND	ND	ND	ND	19,640	950,358	0.0	ND
1991 [e]	ND	ND	ND	ND	31,536	954,843	0.0	ND
1992 [f]	27 Jul	5 Aug	7	12,189	47,622	1,429,864	0.8	10,371
1993	17 Jul	31 Jul	15	33,467	27,717	1,134,922	2.8	14,896
1994 [e]	ND	ND	ND	ND	17,954	1,412,047	0.0	ND
1995	25 Jul	31 Jul	5	14,352	29,451	884,922	1.5	11,122
1996	10 Jul	5 Aug	27	102,821	39,810	1,129,274	8.1	10,503
1997	10 Jul	31 Jul	22	114,619	43,642	1,512,733	6.9	11,023
1998	10 Jul	28 Jul	18	103,847	33,980	1,084,996	8.5	10,802
1999	10 Jul	31 Jul	22	149,504	46,043	1,137,001	11.2	13,738
2000	10 Jul	31 Jul	22	98,262	57,978	900,700	9.3	12,354
2001	10 Jul	31 Jul	22	150,766	51,374	906,333	13.6	14,722
2002	10 Jul	31 Jul	22	180,028	46,693	1,339,682	11.5	14,840
2003	10 Jul	31 Jul	22	223,580	60,722	1,656,026	11.5	15,263
2004	10 Jul	31 Jul	22	262,831	62,397	1,945,383	11.6	18,513
2005	10 Jul	31 Jul	22	295,496	58,017	1,908,821	13.1	20,977
2006	10 Jul	10 Aug	13	127,630	30,964	2,064,728	5.7	12,685
2007	10 Jul	31 Jul	22	291,270	60,623	1,229,945	18.4	21,908
2008	10 Jul	31 Jul	22	234,109	46,053	917,139	19.6	20,772
2009	10 Jul	31 Jul	22	339,993	45,868	1,090,055	23.0	26,171
2010	10 Jul	31 Jul	22	389,552	59,651	1,294,884	22.3	28,342

-continued-

Table 38.–Page 2 of 2.

Year	Date opened	Date closed	Total days	Dip net harvest of sockeye salmon [a]	Sport harvest of sockeye salmon below sonar	Sockeye salmon run to sonar [b]	Percent of inriver run harvested by dip net fishery	Effort (days fished) [c]
2011	10 Jul	31 Jul	22	537,765	85,720	1,599,217	24.2	32,818
2012	10 Jul	31 Jul	22	526,992	102,414	1,581,555	23.8	34,374
2013	10 Jul	31 Jul	22	347,222	78,837	1,359,893	19.4	33,193
2014	10 Jul	31 Jul	22	379,823	78,057	1,520,340	19.2	36,380
2015	10 Jul	31 Jul	22	377,532	83,113	1,709,051	17.4	31,487
2016	10 Jul	31 Jul	22	NA	NA	1,383,692	NA	NA
Average								
2011–2015				433,867	85,628	1,525,625	20.8	33,650
2006–2015				355,189	67,130	1,431,864	19.3	27,813
1996–2015				261,682	58,598	1,393,878	14.9	21,043

Source: Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; Brannian and Fox (1996); Reimer and Sigurdsson (2004); Dunker and Lafferty (2007); Dunker (2010, 2013); K. J. Dunker, Sport Fish Biologist, ADF&G, Anchorage, personal communication; W. J. Glick, Commercial Fish Biologist, ADF&G Soldotna, personal communication.

Note: ND means no data collected. NA means data too preliminary to be reported yet.

[a] Harvest not known in 1982; 1996–2015 reported harvest from returned permits, expanded to include permits not returned.

[b] Bendix sonar counts were converted to DIDSON estimates (equivalents) for 1981–2006. Estimates after these dates are actual DIDSON generated estimates.

[c] Data for 1981–1995 are individual-days fished. Data for 1996–2015 are household-days fished. Each household-day fished may include fishing effort by more than one household member named on the household's permit.

[d] No fishery.

[e] Subsistence fishery only.

[f] A subsistence dip net fishery also occurred in 1992.

[g] Fishery closed on Wednesday and Saturday to avoid conflict with concurrent subsistence permit fishery. Total days reflect this closure.

[h] By emergency order, the personal use fishery closed on 21 July at 11:00 PM; it reopened on 31 July from 6:00 AM to 11:00 PM; and it reopened a final time from 3 August at 5:00 PM until 10 August at 11:59 PM. Total days reflect this closure.

Table 39.–Kasilof River personal use sockeye salmon dip net fishery summary, 1981–2015.

Year	Date opened	Date closed	Total days	Dip net harvest of sockeye salmon [a]	Sport harvest of sockeye salmon below sonar	Sockeye salmon run to sonar [b]	Percent of inriver run harvested by dip net fishery	Effort (days fished) [c]
1981	4 Jul	31 Jul	28	10,300	443	256,625	3.9	5,370
1982	21 Jul	5 Aug	16	1,800	653	180,239	1.0	2,580
1983	15 Jul	5 Aug	21	11,124	1,863	215,731	4.9	4,417
1984	16 Jul	5 Aug	21	12,771	3,212	238,413	5.0	5,956
1985	15 Jul	5 Aug	22	16,284	1,903	512,827	3.1	9,260
1986	15 Jul	5 Aug	22	38,674	2,171	283,054	11.9	13,929
1987 [d]	10 Jul	5 Aug	26	18,454	10,872	256,707	6.5	8,910
1988	22 Jul	5 Aug	15	3,547	2,365	204,336	1.7	6,930
1989 [e]	ND	ND	ND	ND	4,632	164,952	ND	ND
1990 [e]	ND	ND	ND	ND	971	147,663	ND	ND
1991 [e,f]	ND	ND	ND	ND	5,216	233,646	ND	ND
1992 [e,f]	ND	ND	ND	ND	3,501	188,819	ND	ND
1993 [e]	ND	ND	ND	ND	2,308	151,801	ND	ND
1994	22 Jul	5 Aug	11 [g]	3,679	2,489	218,826	1.6	2,361
1995	17 Jul	31 Jul	11 [g]	4,160	3,535	202,428	2.0	2,845
1996	10 Jul	5 Aug	27	11,197	2,502	264,511	4.0	1,300
1997	10 Jul	5 Aug	27	9,737	4,128	263,780	3.5	1,091
1998	10 Jul	5 Aug	27	45,161	3,449	259,045	14.7	3,421
1999	10 Jul	5 Aug	27	37,176	4,654	312,481	10.5	3,611
2000	10 Jul	5 Aug	27	23,877	5,599	263,631	8.1	2,622
2001	10 Jul	5 Aug	27	37,612	6,005	318,735	10.4	3,382
2002	25 Jun	7 Aug	44	46,769	4,424	235,731	16.3	4,020
2003	25 Jun	7 Aug	44	43,870	5,971	353,526	10.9	3,874
2004	25 Jun	7 Aug	44	48,315	7,407	523,653	8.3	4,432
2005	25 Jun	7 Aug	44	43,151	5,982	360,065	10.5	4,500
2006	25 Jun	7 Aug	44	56,144	7,723	389,645	12.4	5,763
2007	25 Jun	7 Aug	44	43,293	3,843	365,184	10.5	4,627
2008	25 Jun	7 Aug	44	54,051	7,470	327,018	13.9	5,552
2009	25 Jun	7 Aug	44	73,035	6,763	326,285	18.0	7,650
2010	25 Jun	7 Aug	44	70,774	4,470	295,265	19.1	7,588

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Table 39.–Page 2 of 2.

Year	Date opened	Date closed	Total days	Dip net harvest of sockeye salmon [a]	Sport harvest of sockeye salmon below sonar	Sockeye salmon run to sonar [b]	Percent of inriver run harvested by dip net fishery	Effort (days fished) [c]
2011	25 Jun	7 Aug	44	49,766	8,182	245,721	16.4	6,571
2012	25 Jun	7 Aug	44	73,419	6,740	374,523	16.1	6,536
2013	25 Jun	7 Aug	44	85,508	12,257	489,654	14.6	8,556
2014	25 Jun	7 Aug	44	88,513	19,819	440,192	16.1	10,236
2015	25 Jun	7 Aug	44	89,000	15,553	470,667	15.5	10,346
2016	25 Jun	7 Aug	44	NA	NA	239,981	NA	NA
Average								
2011–2015				77,241		376,790	15.7	8,449
2006–2015				68,350		360,376	15.3	7,343
1996–2015				51,518		339,014	12.5	5,284

Source: Mills (1985-1994), Howe et al. (1995, 1996), and Alaska Sport Fishing Survey database [Internet]. 1996– . Anchorage, AK: Alaska Department of Fish and Game, Division of Sport Fish (cited December 2016). Available from: http://www.adfg.alaska.gov/sf/sportfishingsurvey/; Brannian and Fox (1996); Reimer and Sigurdsson (2004); Dunker and Lafferty (2007); Dunker (2010, 2013); K. J. Dunker, Sport Fish Biologist, ADF&G, Anchorage, personal communication; W. J. Glick, Commercial Fish Biologist, ADF&G Soldotna, personal communication.

Note: ND means no data collected. NA means data too preliminary to be reported yet.

[a] Harvest and participation during 1981 and 1982 are field creel survey estimates. Data for 1982–1995 from Statewide Harvest Survey, data for 1996–2015 from total reported harvest from returned permits, expanded to include permits not returned.

[b] Bendix sonar counts were converted to DIDSON estimates (equivalents) for 1983–2007. Estimates after these dates are actual DIDSON–generated estimates.

[c] Data for 1981–1995 are individual-days fished. Data for 1996–2015 are household-days fished. Each household-day fished may include fishing effort by more than one household member named on the household's permit.

[d] The fishery was closed from 14 July at 6:00 AM to 15 July at 6:00 PM as a precautionary measure due to possible oil contamination.

[e] No fishery.

[f] Subsistence fishery only.

[g] Fishery closed on Wednesday and Saturday due to subsistence and personal use permit fisheries. Total days reflect this closure.

FIGURES

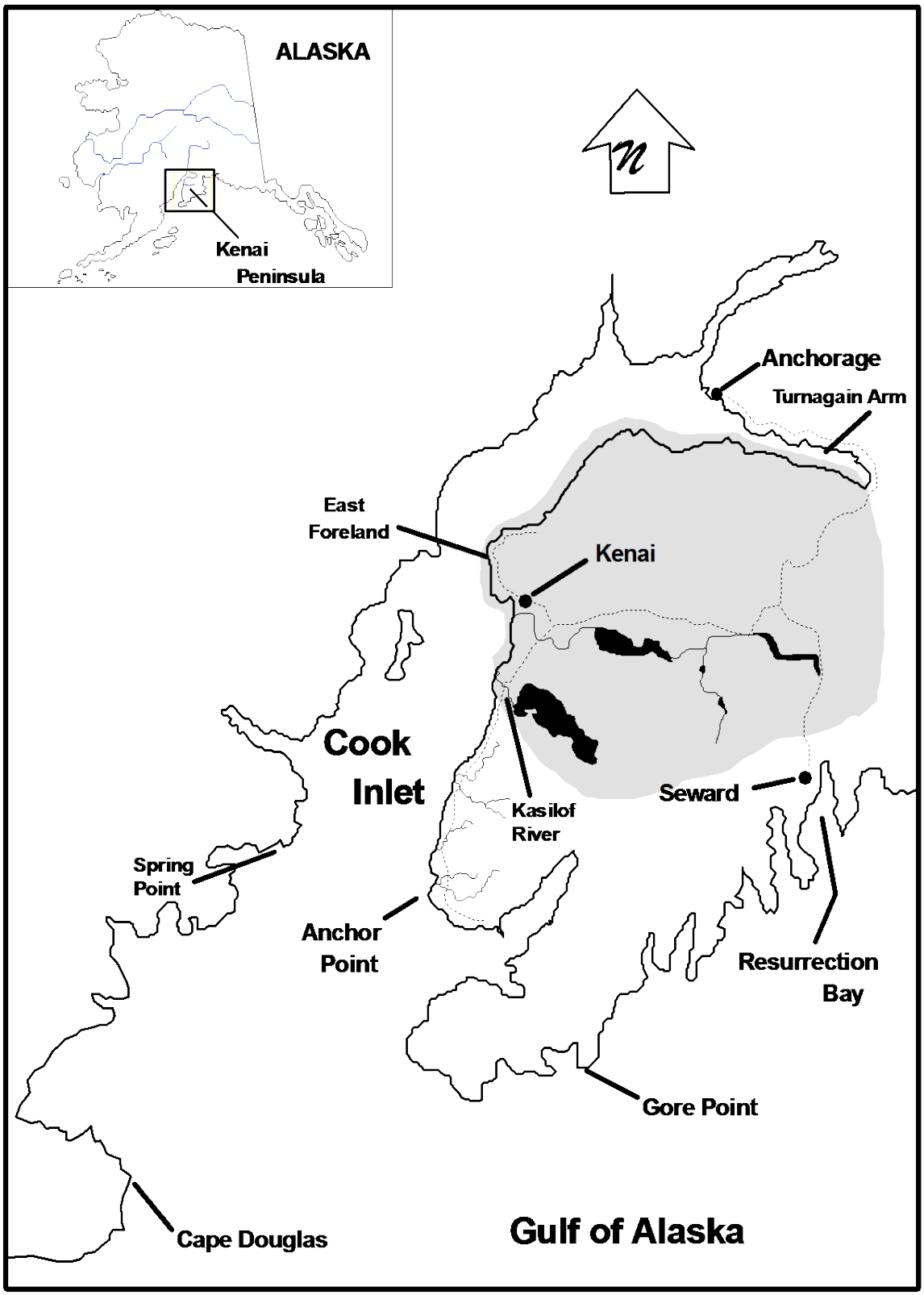

Figure 1.–The Northern Kenai Peninsula Management Area (shaded) includes all freshwater drainages and saltwater fisheries from the Kasilof River north to Turnagain Arm on the Kenai Peninsula.

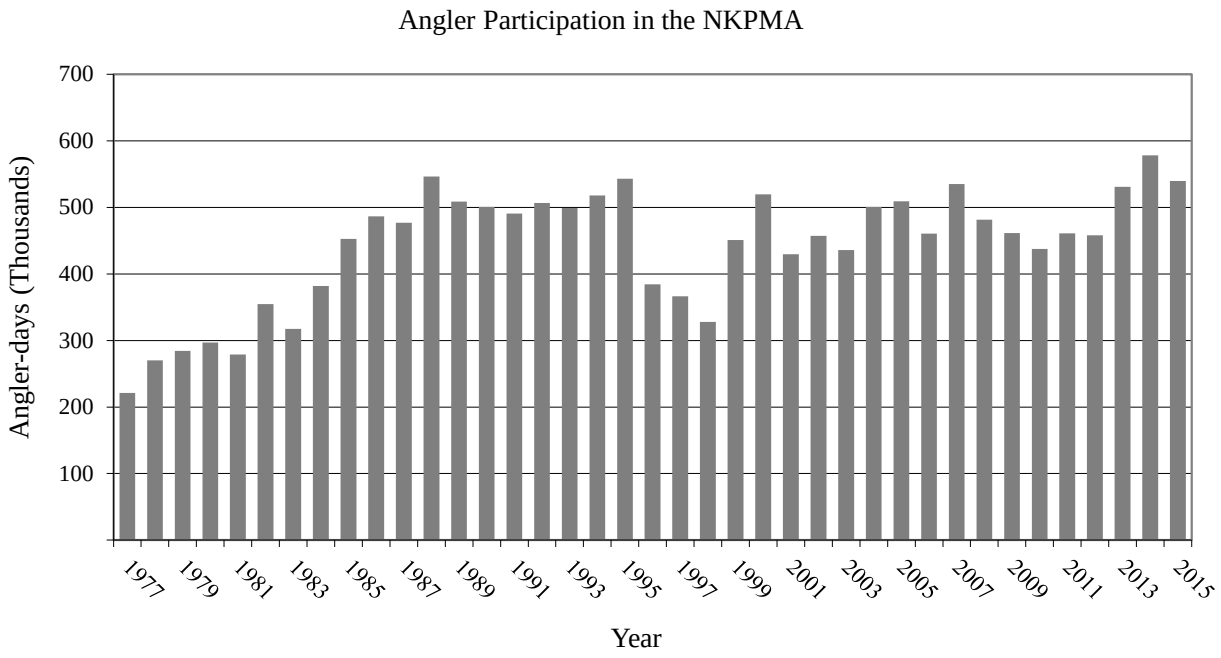

Figure 2.–Sport angler participation in the Northern Kenai Peninsula Management Area, 1977–2015.

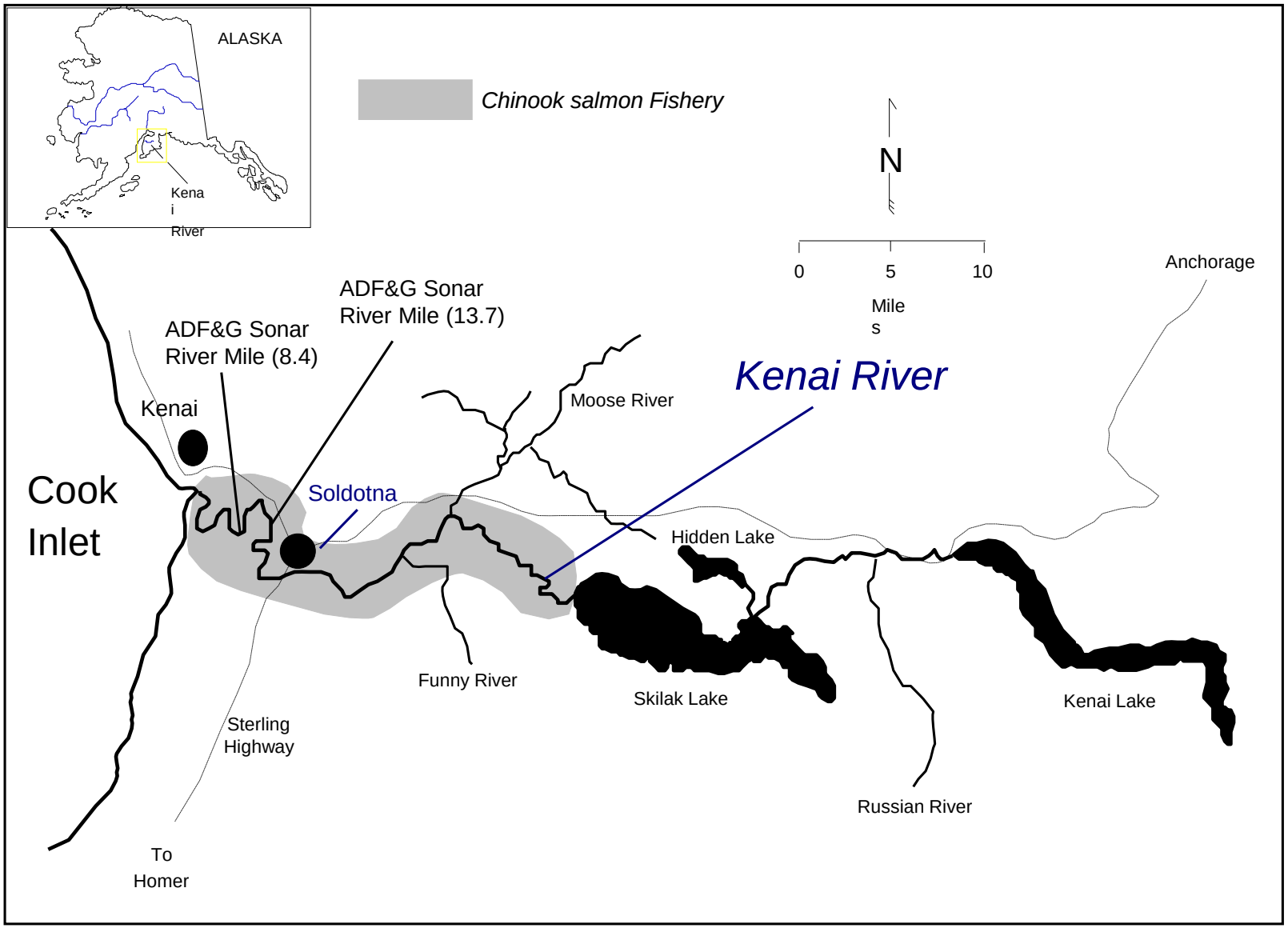

Figure 3.–Kenai River Chinook salmon fishery.

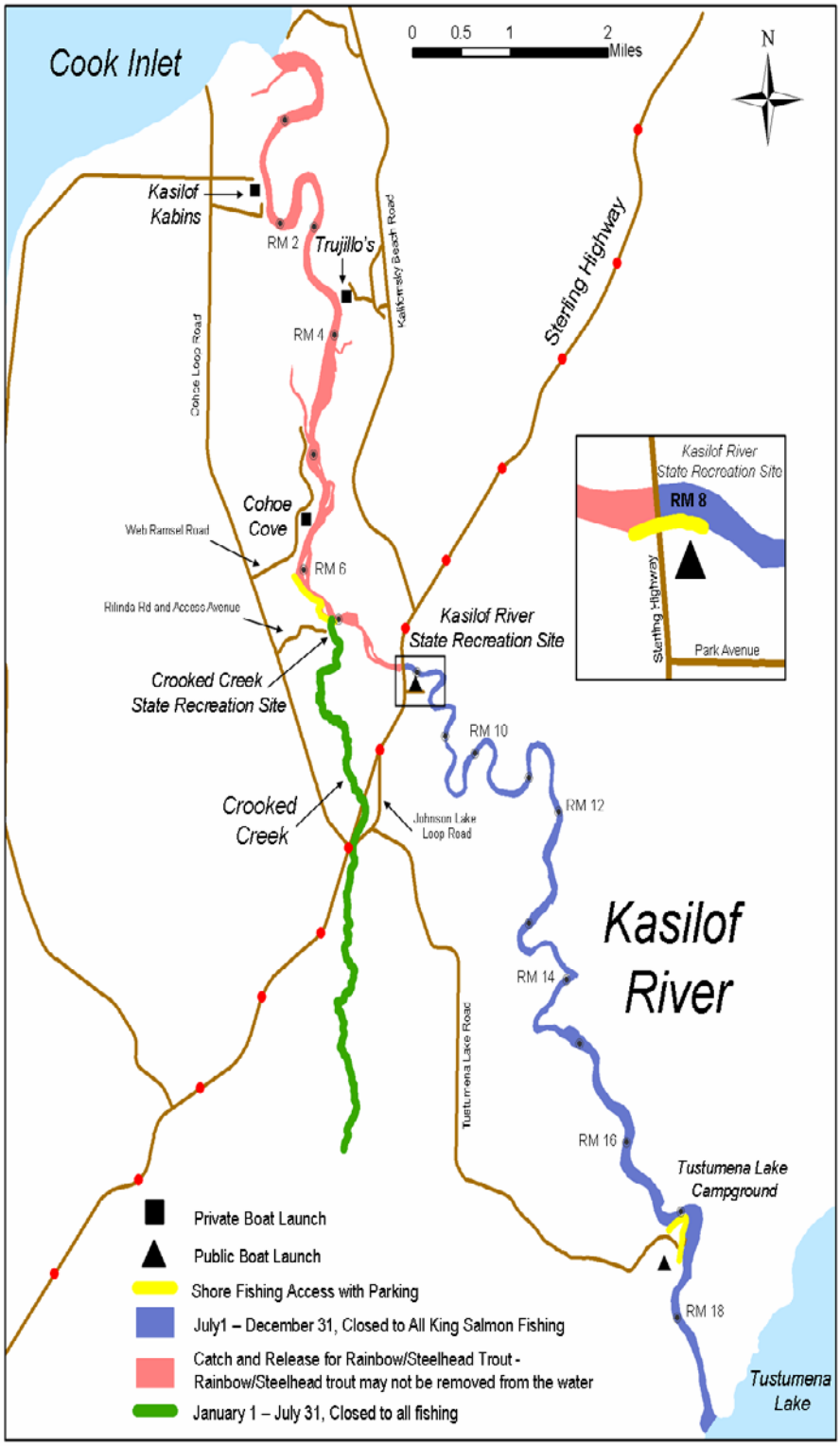

Figure 4.–Map of Kasilof River showing public access and specific regulatory areas.

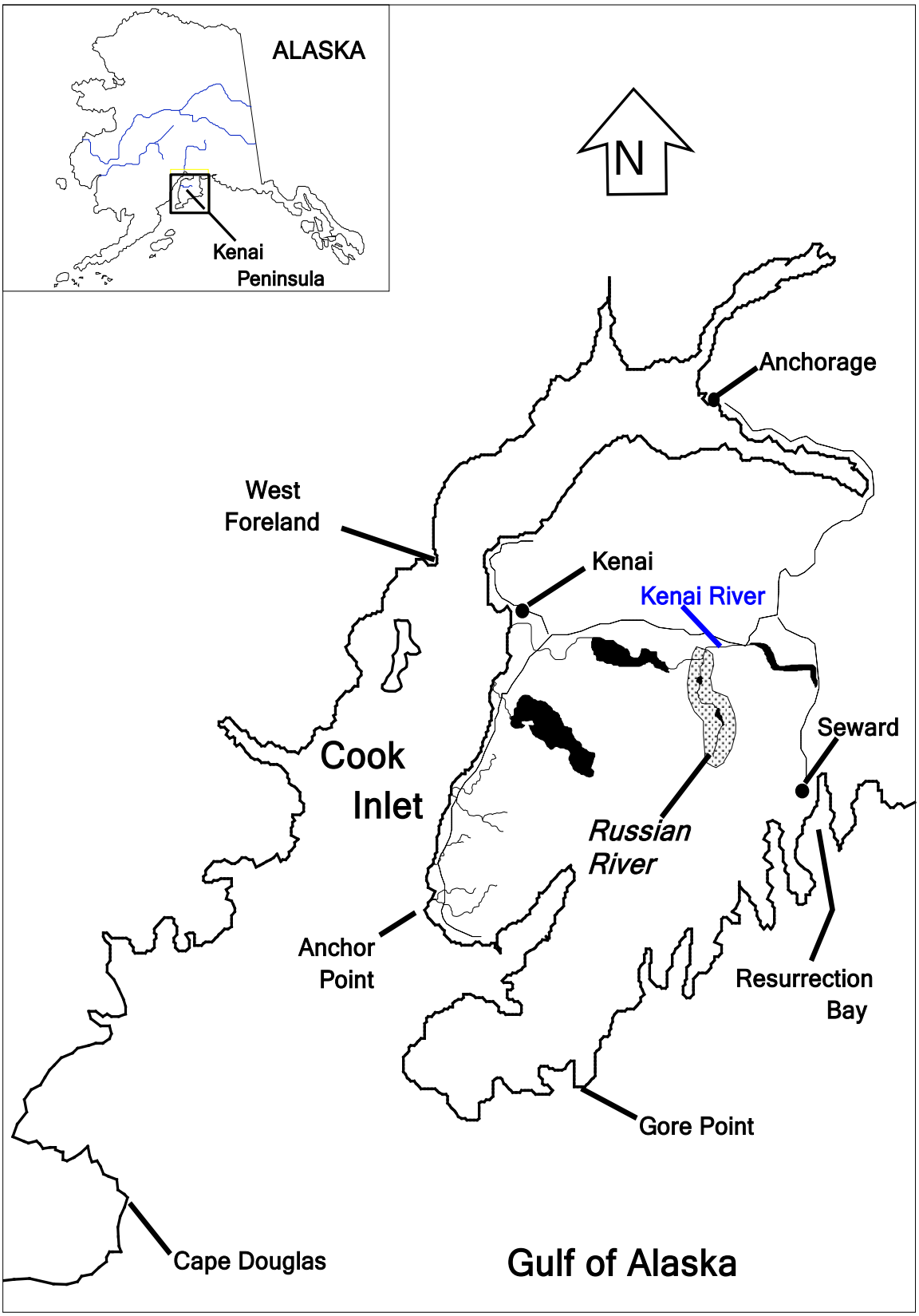

Figure 5.–Location of the Russian River on the Kenai Peninsula, Alaska.

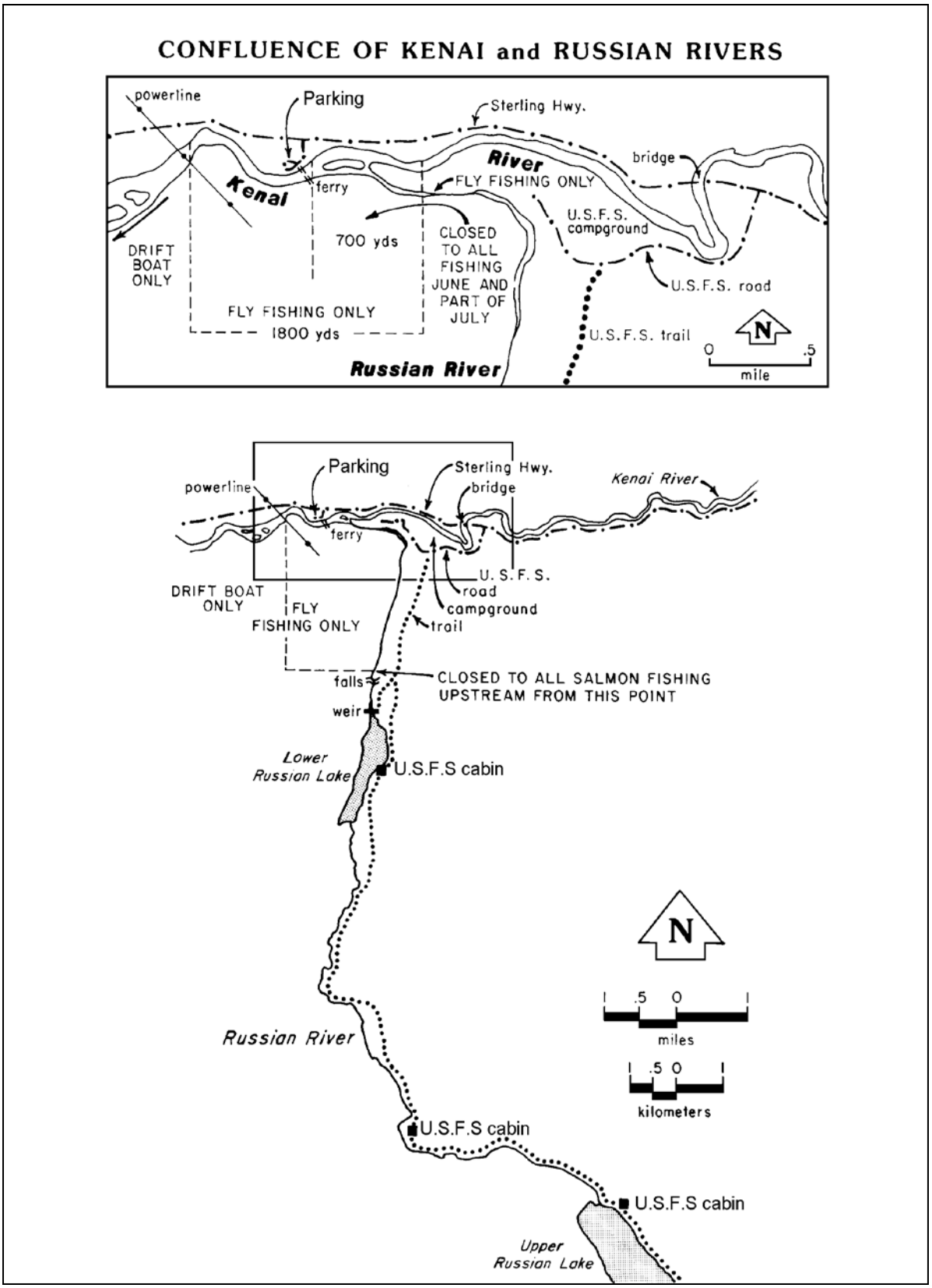

Figure 6.–Map of the Russian River drainage.

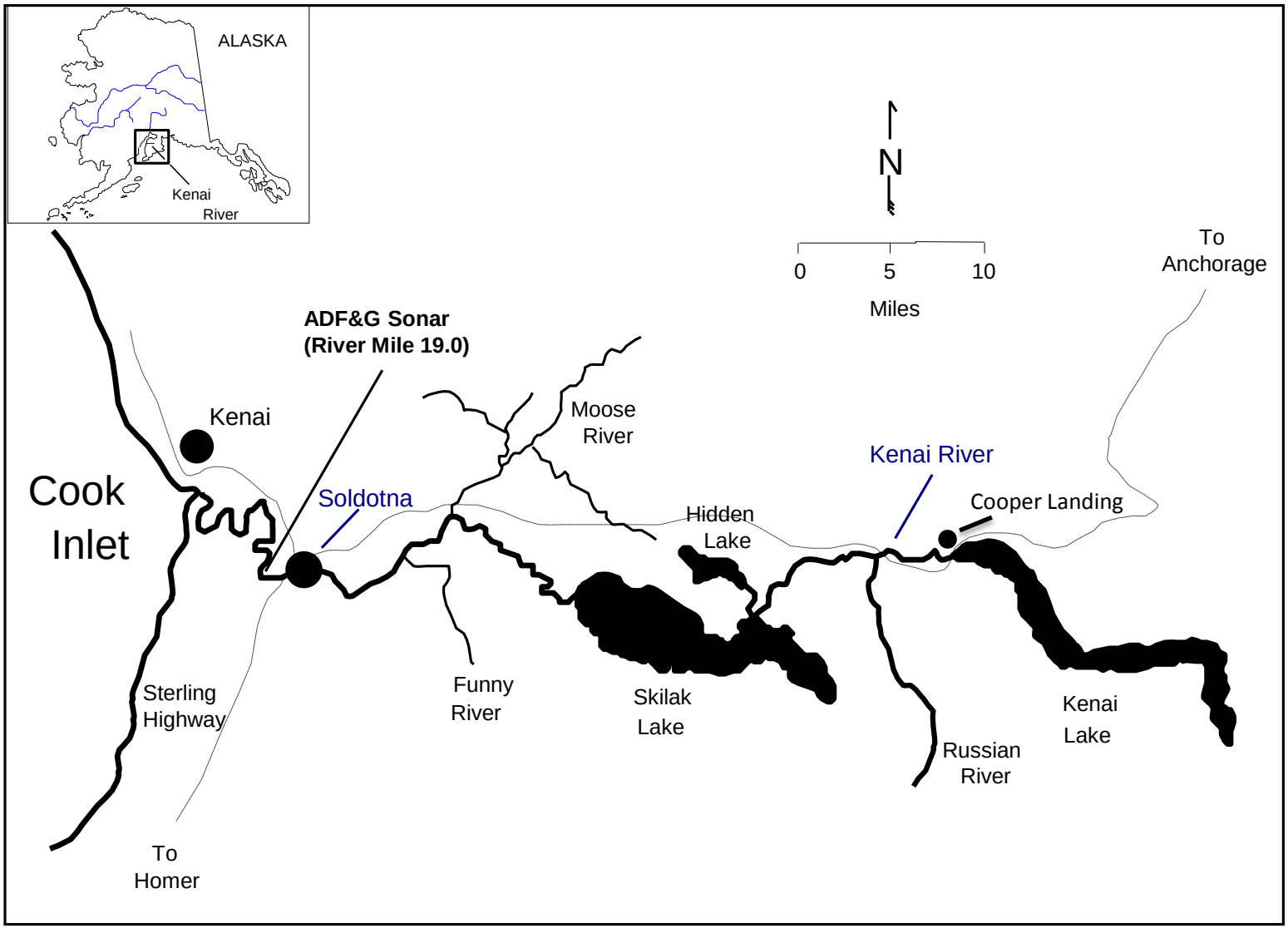

Figure 7.–Map of the Kenai River drainage showing the sockeye salmon sonar at RM 19.

Note: The late-run sockeye salmon fishery occurs from Cook Inlet to Kenai Lake.

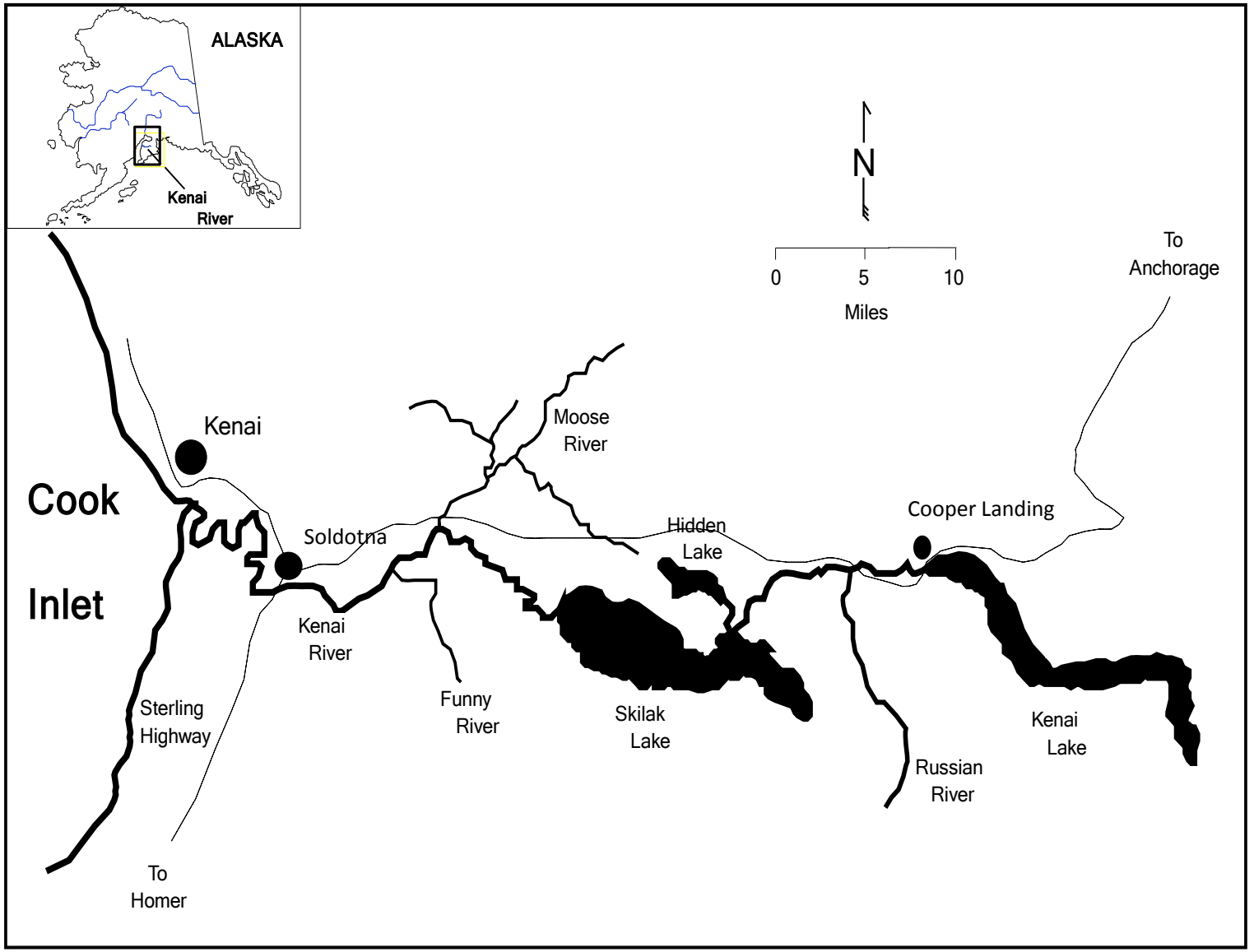

Figure 8.–Map of the Kenai River drainage.

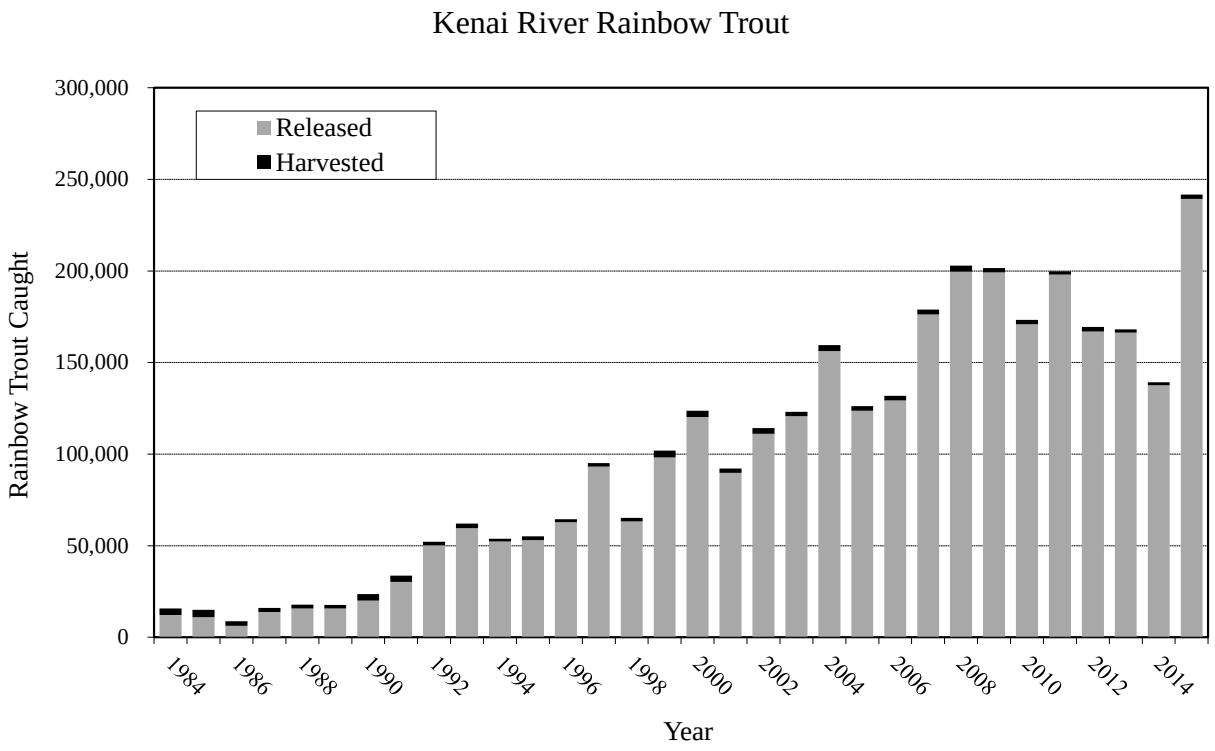

Figure 9.–Total numbers of rainbow trout caught (including those harvested and released) for the Kenai River sport fishery, 1984–2015.

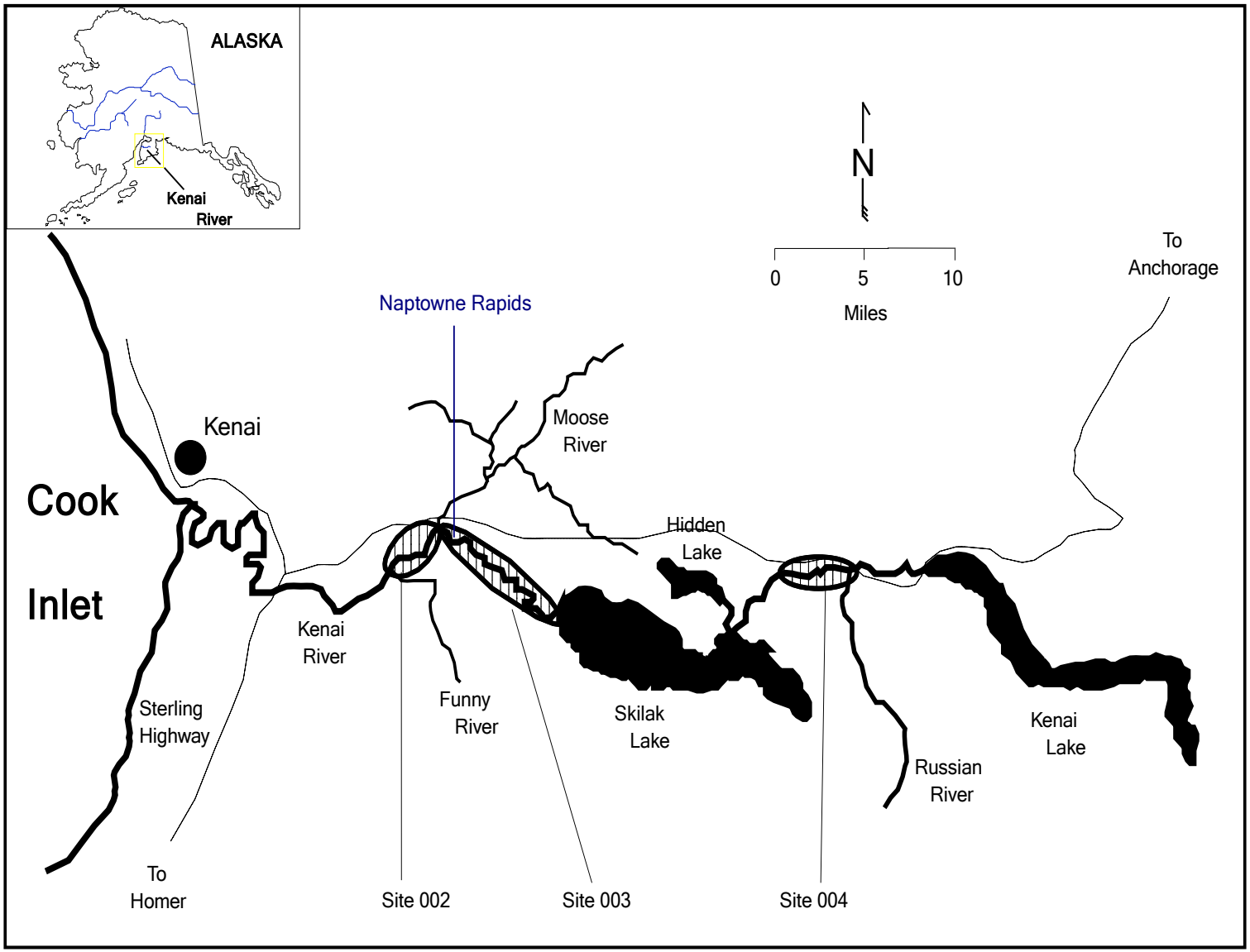

Figure 10.–Map of rainbow trout study areas in the Kenai River drainage.

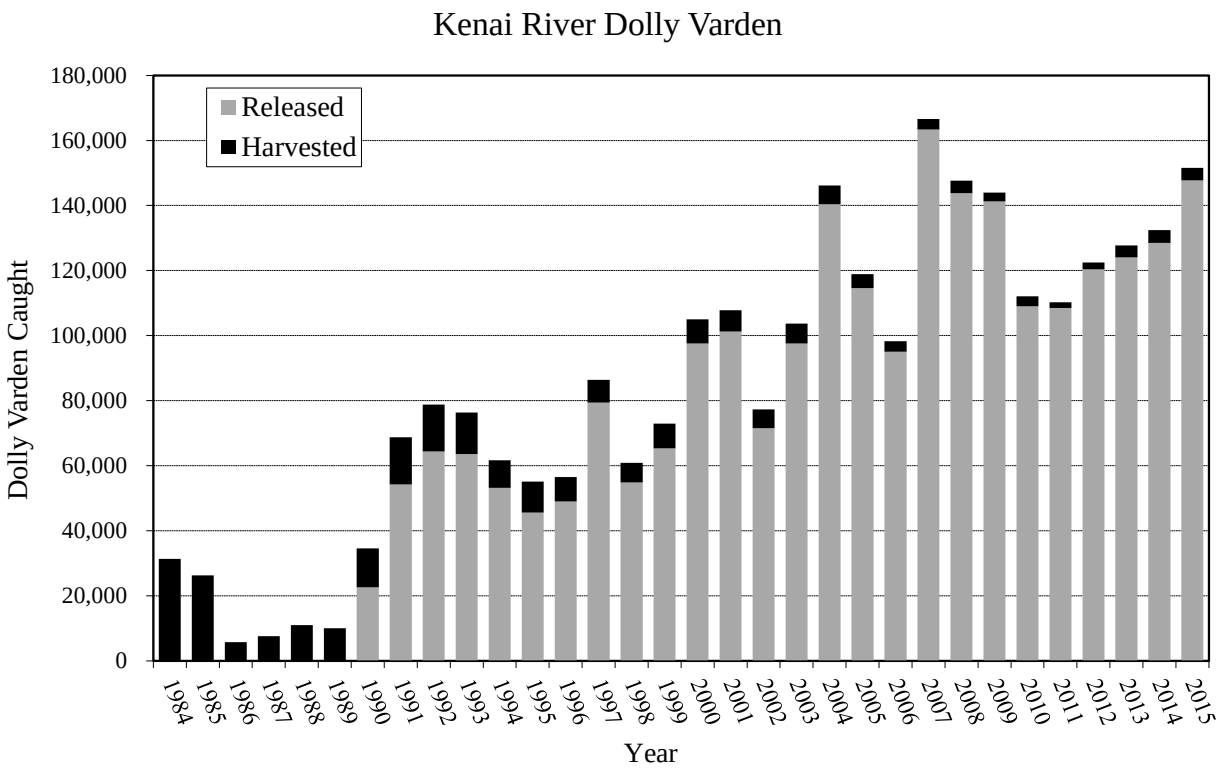

Figure 11.–Total number of Dolly Varden caught (including those harvested and released) for the Kenai River sport fishery, 1984–2015.

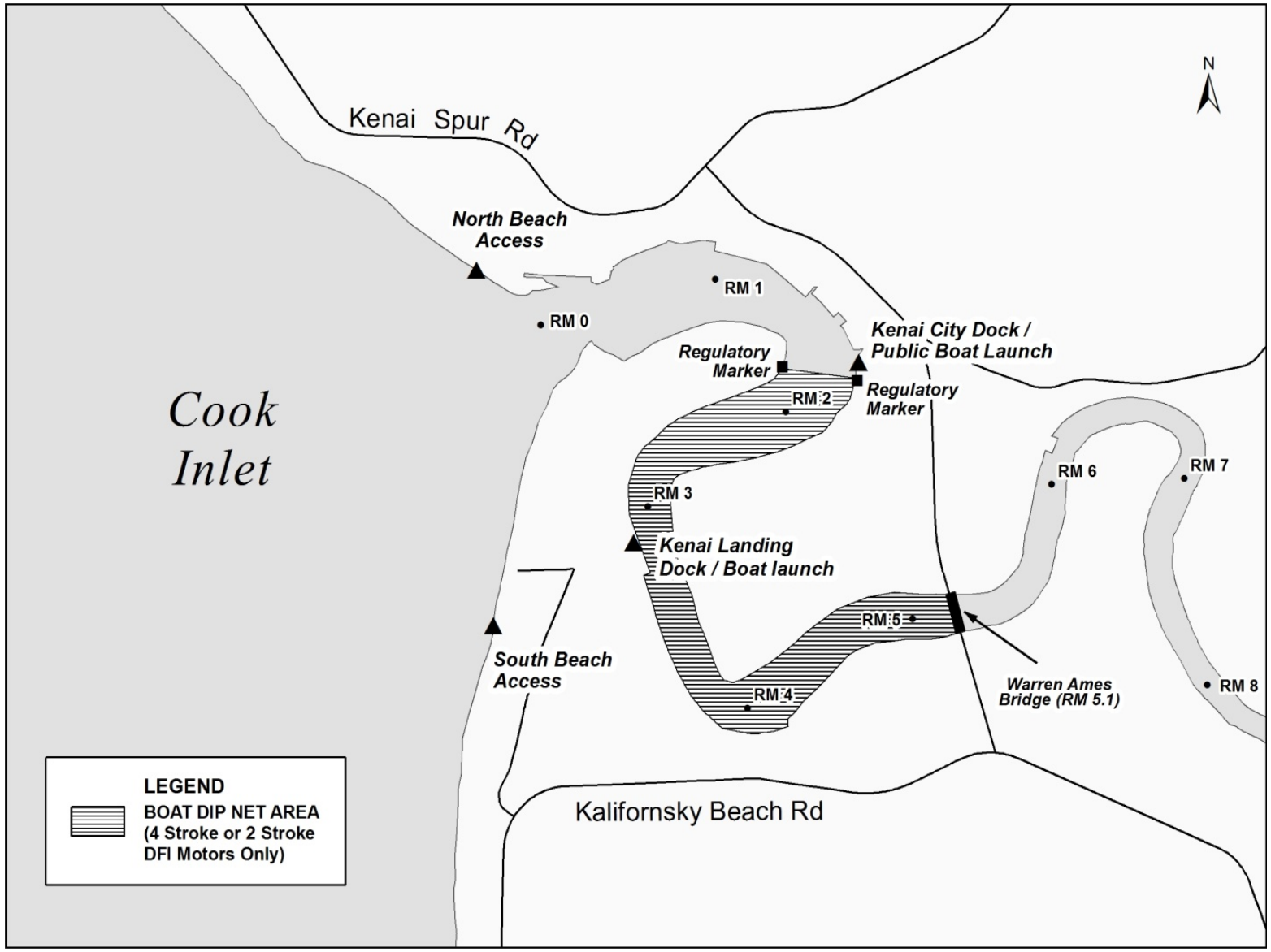

Figure 12.–Map of the Kenai River personal use fishery area open to dipnetting from a boat.

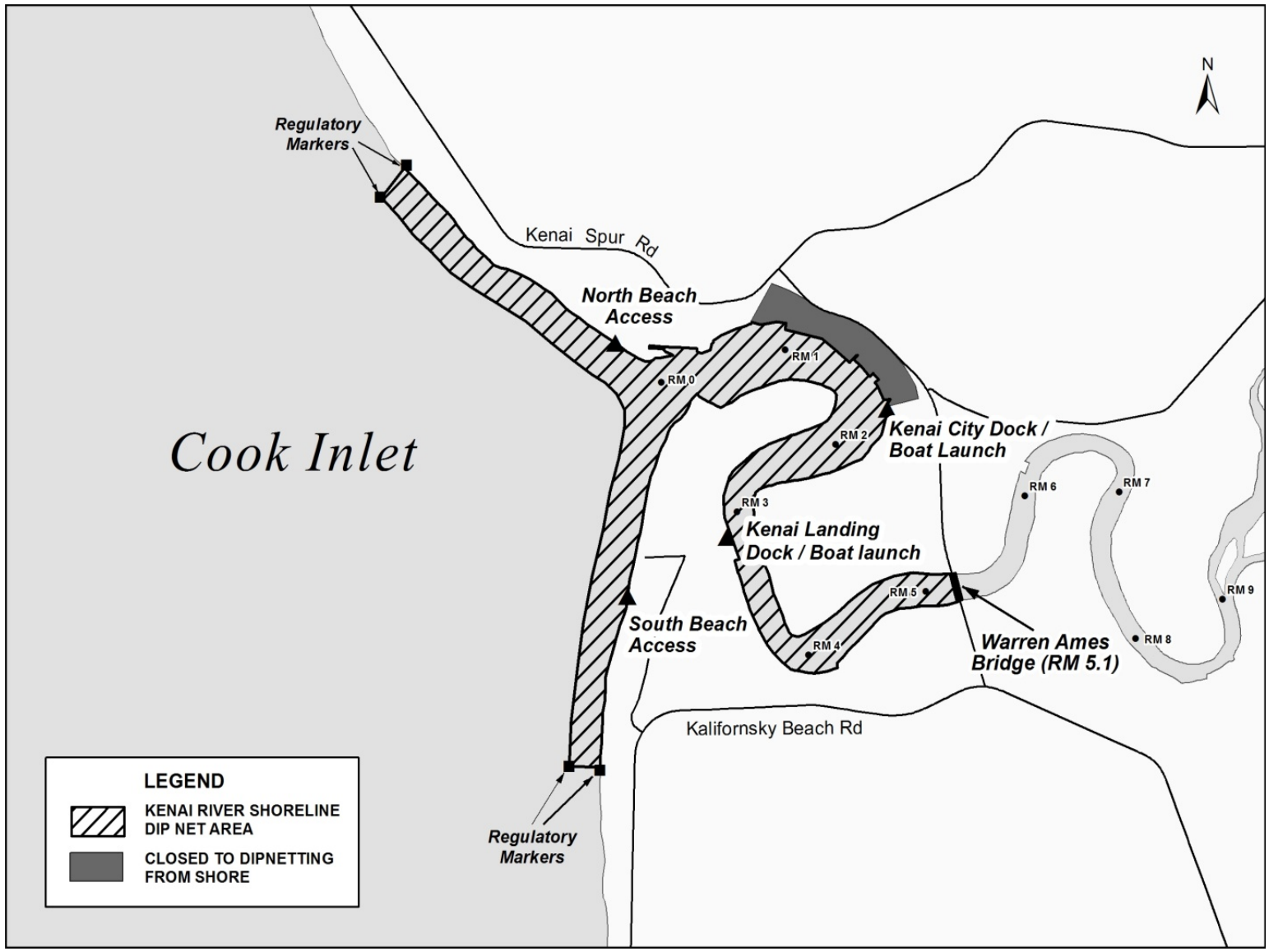

Figure 13.–Map of the Kenai River personal use dip net fishery and areas closed to dipnetting from shore.

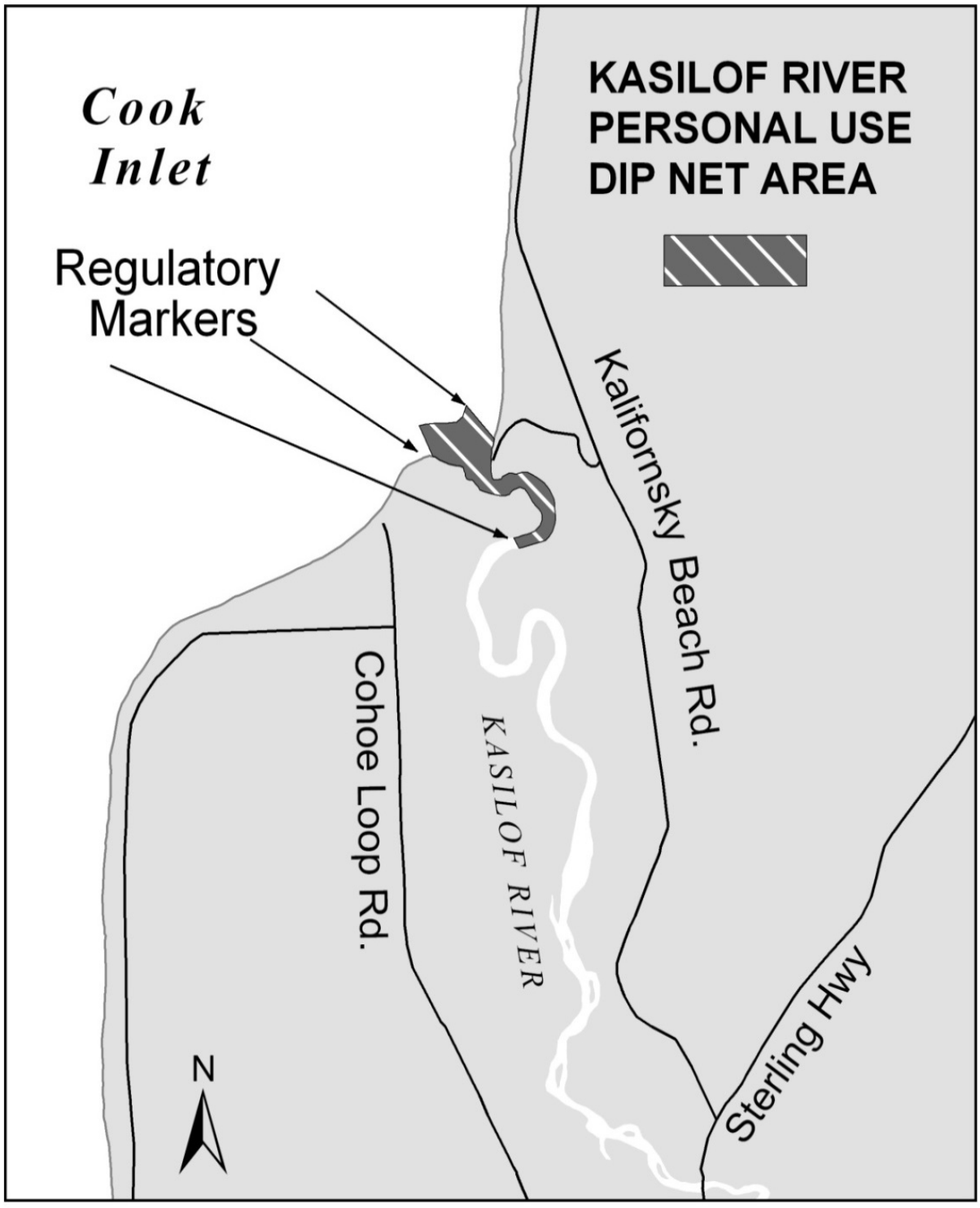

Figure 14.–Map of the Kasilof River personal use fishery area open to dipnetting from shore.

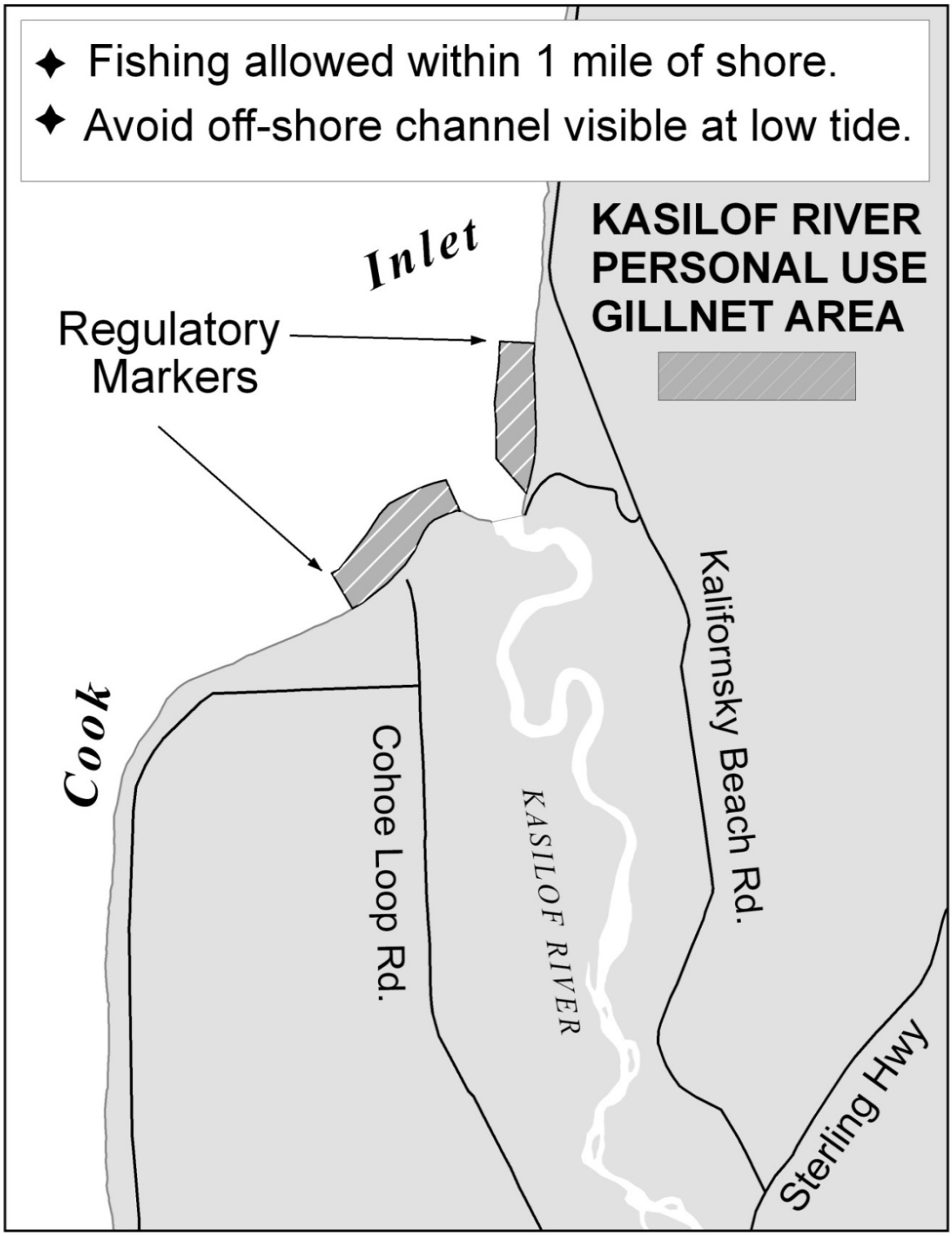

Figure 15.–Map of the Kasilof River personal use fishery area open to set gillnetting.

APPENDIX A: EMERGENCY ORDERS

Appendix A1.–Emergency orders (EOs) issued for Northern Kenai Peninsula Management Area waters in 2014.

Emergency order number	Effective date	Action and justification [a]
2-KS-1-04-14	May 1 12:01 AM	This emergency order closes the Kenai River to sport fishing for king salmon from the mouth upstream to the outlet of Skilak Lake and in the Moose River from its confluence with the northernmost edge of the Sterling Highway Bridge beginning at 12:01 a.m., Thursday, May 1, through 11:59 p.m., Monday, June 30, 2014. Sport fishing for king salmon will remain closed from 12:01 a.m., Tuesday, July 1, through 11:59 p.m., Thursday, July 31, 2014 in waters of the Kenai River drainage from an ADF&G marker located approximately 300 yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake and in the Moose River from its confluence with the Kenai River upstream to the northernmost edge of the Sterling Highway Bridge.
2-KS-1-05-14	May 1 12:01 AM	Prohibits the retention of naturally-produced king salmon and reduces the bag and possession limits of hatchery-produced king salmon 20 inches or greater in length to 1 fish in the Kasilof River beginning 12:01 a.m., Thursday, May 1, through 11:59 p.m., Monday, June 30, 2014. Naturally-produced king salmon may not be possessed or retained; naturally-produced king salmon caught may not be removed from the water and must be released immediately. Use of bait and multiple hooks was prohibited from the mouth of the Kasilof River upstream to the Sterling Highway Bridge.
2-RS-1-24-14	June 24 12:01 AM	Increases the bag and possession limits for salmon other than king salmon from 3/day, 6/possession to 6/day, 12/possession in that area of the Kenai River upstream from Skilak Lake to ADF&G markers located approximately 300 yards upstream of the public boat launch at Sportsman's Landing and the Russian River from its mouth upstream to an ADF&G marker located approximately 600 yards downstream from the Russian River Falls. Effective from 12:01 a.m., Tuesday, June 24 through 11:59 p.m., Monday, July 14, 2014.
2-RS-1-25-14	June 24 8:00 AM	Opens the Russian River Sanctuary Area to fishing for sockeye salmon. Effective 8:00 a.m., Tuesday, June 24 through Monday, July 14, 2014.
2-KS-1-26-14	July 1 12:01 AM	The Kenai River late-run king salmon fishery opens July 1. Harvest will be allowed under existing regulations in a portion of the Lower Kenai River from ADF&G Regulatory Markers located approximately 300 yards down-stream from the mouth of Slikok Creek. Use of bait and multiple hooks is prohibited in the Kenai River during the month of July.
2-KS-1-27-14	Jul 10 6:00 AM	King salmon may not be retained in the Kenai River personal use dip net fishery beginning 6:00 a.m., Thursday, July 10, through 11:59 p.m., Thurs-day, July 31, 2014. Any king salmon caught may not be removed from the water and must be released immediately.
2-KS-1-28-14	July 1 12:01 AM	This emergency order prohibits the use of bait and limits sport fishing gear to 1 unbaited, single-hook, artificial lure while sport fishing in the Kasilof River from its mouth upstream to the Sterling Highway Bridge beginning 12:01 a.m. Tuesday, July 1, through 11:59 p.m., Thursday, July 31, 2014.

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Emergency order number	Effective date	Action and justification [a]
2-RS-1-35-14	July 4 12:01 AM	Increases the Kasilof River bag and possession limit for sockeye salmon to 6/day, 12/possession effective 12:01 a.m., Friday, July 4 through 11:59 p.m., Thursday, August 7. Any king salmon, Dolly Varden, or rainbow/steelhead trout caught while dipnetting must be released immediately.
2-RS-1-36-14	July 4 12:01 AM	This emergency order extends the area that salmon may be harvested in the personal use dip net fishery on the Kasilof River from ADF&G markers located on the Cook Inlet beaches outside the terminus of the river upstream to the Sterling Highway Bridge from the shore and from ADF&G markers located on the Cook Inlet beaches outside the terminus of the river upstream to ADF&G markers located at approximately river mile 3 for dipnetting from a boat. In addition, the bag and possession limit for sockeye salmon is increased to 6/day 12/possession effective 12:01 a.m., Friday, July 4, 2014, through 11:59 p.m., Thursday, August 7. Any king salmon, Dolly Varden, or rainbow/steelhead trout caught while dipnetting must be released immediately.
2-KS-1-40-14	July 19 12:01 AM	This emergency order restricts Kenai River king salmon fishing to catch and release with barbless hooks only from the mouth of the Kenai River upstream to ADF&G regulatory markers located approximately 300 yards downstream from the mouth of Slikok Creek. King salmon may not be possessed or retained, may not be removed from the water, and must be released immediately. The king salmon closure upstream from ADF&G regulatory markers located approximately 300 yards downstream from the mouth of Slikok Creek remains in effect. Fishing with barbed single hooks for other species such as sockeye salmon, rainbow trout, and Dolly Varden is still permitted in this area. Bait and scent are still prohibited on the entire Kenai River.
2-KS-1-42-14	July 26 12:01 AM	This emergency order closes the Kenai River to king salmon fishing in an effort to conserve late-run king salmon escapement. Effective 12:01 a.m., Saturday, July 26, 2014.
2-KS-1-43-14	July 26 12:01 AM	This emergency order closes sport fishing for king salmon in Cook Inlet marine waters north of Bluff Point beginning 12:01 a.m., Saturday, July 26, 2014, through 11:59 p.m., Thursday, July 31, 2014. King salmon may not be retained or possessed, may not be removed from the water, and must be released immediately.
2-KS-1-44-14	July 26 12:01 AM	This emergency order restricts the Kasilof River to catch and release fishing for king salmon, effective 12:01 a.m., Saturday, July 26, through 11:59 p.m., Thursday, July 31, 2014.
2-KS-1-44-14	July 26 12:01 AM	Prohibits the retention of Arctic char/Dolly Varden in Stormy Lake. Sport fishing through the ice is permitted using 2 closely attended lines; only 1 hook or artificial lure may be used on each line. Effective 12:01 a.m. Friday, November 14, 2014 through 11:59 p.m. Thursday, April 30, 2015.

Source: R. N. Begich, Sport Fish Area Management Biologist, ADF&G, Soldotna, personal communication.

[a] Actions and justifications are given in their regulatory language and style. “King” salmon is the same as Chinook salmon in this report.

Appendix A2.–Emergency orders (EOs) issued for Northern Kenai Peninsula Management Area waters in 2015.

Emergency order number	Effective date	Action and justification [a]
2-KS-1-05-15	May 1 12:01 AM	This emergency order closes the Kenai River to sport fishing for king salmon from the mouth upstream to the outlet of Skilak Lake beginning at 12:01 a.m., Friday, May 1, through 11:59 p.m., Tuesday, June 30, 2015. Sport fishing for king salmon will remain closed from 12:01 a.m., Wednesday, July 1, through 11:59 p.m., Friday, July 31, 2015 in waters of the Kenai River drainage from an ADF&G marker located approximately 300 yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake.
2-KS-1-06-15	May 1 12:01 AM	Prohibits the retention of naturally-produced king salmon on Sunday through Friday each week, reduces the bag and possession limit of hatchery-produced king salmon 20 inches or greater in length to 1 fish, and limits sport fishing gear to 1 unbaited, single-hook artificial lure while sport fishing in the Kasilof River beginning 12:01 a.m., Friday, May 1 through 11:59 p.m., Tuesday, June 30, 2015. Naturally-produced king salmon (adipose fin intact) caught on Sunday through Friday each week may not be possessed or retained, may not be removed from the water and must be released immediately.
2-RS-1-28-15	June 23 12:01 AM	Increases the bag and possession limits for salmon, other than king salmon, from 3/day, 6/possession to 6/day, 12/possession in that area of the Kenai River upstream from Skilak Lake to ADF&G markers located approximately 300yards upstream of the public boat launch at Sportsman's Landing and the Russian River from its mouth upstream to an ADF&G marker located approximately 600yards downstream from the Russian River Falls. Effective from 12:01 a.m., Tuesday, June 23 through 11:59 p.m., Tuesday, July 14, 2015.
2-RS-1-29-15	June 23 8:00 AM	This emergency order opens the Russian River Sanctuary Area to fishing for sockeye salmon. Effective 8:00 a.m., Tuesday, June 23, 2015.
2-KS-1-35-15	July 1 12:01 AM	The use of bait will be prohibited in the Kenai River from its mouth upstream to an ADF&G marker at the outlet of Skilak Lake. Effective 12:01 a.m., Wednesday, July 1 through 11:59 p.m., Friday, July 31, 2015.
2-KS-1-36-15	July 1 12:01 AM	Retention of king salmon in the Kenai River personal use dip net fishery will be prohibited in 2015. Any king salmon caught incidentally may not be removed from the water and must be released immediately unharmed.
2-KS-1-37-15	July 1 12:01 AM	The use of bait and multiple hooks is prohibited in the Kasilof River from its mouth upstream to the Sterling Highway bridge, effective 12:01 a.m., Wednesday, July 1 through 11:59 p.m., Friday, July 31, 2015. Anglers may use only 1 unbaited, single-hook, artificial lure.
2-RS-1-39-15	July 1 12:01 AM	Increases the bag and possession limit for salmon 16 inches or longer, other than king salmon, from 3/day 3/possession to 6/day 12/possession in all portions of the Kasilof River open to salmon fishing. No more than 2 salmon per day may be coho salmon. Effective 12:01 a.m., Wednesday, July 1 through 11:59 p.m., Friday, August 7, 2015.

-continued-

Emergency order number	Effective date	Action and justification [a]
2-RS-1-40-15	July 1 12:01 AM	Extends the personal use salmon dipnet fishing area on the Kasilof River. Salmon may be harvested from shore from ADF&G markers located on the Cook Inlet beaches outside the terminus of the river upstream to the Sterling Highway Bridge Salmon may be harvested from a boat from ADF&G markers located outside the terminus of the river upstream to ADF&G markers located at approximately river mile 3. Effective 12:01 a.m., Wednesday, July 1 through 11:59 p.m., Friday, August 7, 2015.
2-RS-1-50-15	July 29 12:01 AM	Increases the bag and possession limit for salmon 16 inches or longer, other than king salmon, from 3/day 3/possession to 6/day 12/possession in the Kenai River from its mouth upstream to an ADF&G marker located at the outlet of Skilak Lake. No more than 2 per day and in possession may be coho salmon. Effective 12:01 a.m., Wednesday, July 29, 2015.
2-RS-1-51-15	July 28 11:00 PM	Salmon may be harvested 24 hours per day in the personal use dip net fishery at the mouth of the Kenai River. Effective 11:00 p.m., Tuesday, July 28 through 11:59 p.m., Friday, July 31, 2015.
2-KS-1-46-15	July 25 12:01 AM	Allows the use of bait in the Kenai River sport fishery from its mouth upstream to ADF&G markers located at the outlet of Skilak Lake. Effective 12:01 a.m., Saturday, July 25 through 11:59 p.m., Friday, July 31, 2015.
2-KS-1-47-15	July 25 6:00 AM	Allows retention of king salmon in the Kenai River personal use dip net fishery. Effective 6:00 a.m., Saturday, July 25, 2015.
2-KS-1-48-15	July 25 6:00 AM	Allows the use of bait and multiple hooks while sport fishing in waters of the Kasilof River downstream of the Sterling Highway Bridge. Effective 12:01 a.m., Saturday, July 25 through 11:59 p.m., Friday, July 31, 2015.
2-DV-1-58-15	Nov 7 12:01 AM	Prohibits the retention of Arctic char/Dolly Varden in Stormy Lake. Sport fishing through the ice is permitted using 2 closely attended lines; only 1 hook or artificial lure may be used on each line. Effective 12:01 a.m. Saturday, November 7, 2015 through 11:59 p.m. Saturday, December 31, 2016.
2-NP-4-59-15	Dec 22 12:01 AM	Reduces the number of lines that may be used to fish through the ice and prohibits the retention of any species of fish in East Mackey Lake, West Mackey Lake, Union Lake, and Derks Lake. Sport fishing through the ice is permitted using two closely attended lines. Anglers may still use up to 5 lines while sport fishing through the ice for northern pike in Sevena Lake, and the unnamed lakes on Tote Road. Effective 12:01 a.m., Tuesday, December 22 through 11:59 p.m., Saturday, December 31, 2016.

Source: R. N. Begich, Sport Fish Area Management Biologist, ADF&G, Soldotna, personal communication.

[a] Actions and justifications are given in their regulatory language and style. “King” salmon is the same as Chinook salmon in this report.

Appendix A3.–Emergency orders (EOs) issued for Northern Kenai Peninsula Management Area waters in 2016.

Emergency order number	Effective date	Action and justification
2-KS-1-03-16	May 1 12:01 AM	This emergency order closes the Kenai River to sport fishing for king salmon from the mouth upstream to the outlet of Skilak Lake beginning at 12:01 a.m. Sunday, May 1 through 11:59 p.m. Thursday, June 30, 2016. Sport fishing for king salmon will remain closed from 12:01 a.m. Friday, July 1 through 11:59 p.m. Sunday, July 31, 2016 in waters of the Kenai River drainage from an ADF&G marker located approximately 300yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake.
2-KS-1-04-16	May 1 12:01 AM	This emergency order prohibits the retention of naturally-produced king salmon except Tuesdays and Saturdays, and limits sport fishing gear to 1 unbaited, single hook artificial lure while sport fishing in the Kasilof River beginning 12:01 a.m. Sunday, May 1 through 11:59 p.m. Thursday, June 30, 2016. Naturally-produced (adipose fin intact) king salmon may not be possessed or retained on Sundays, Mondays, Wednesdays, Thursdays, and Fridays; naturally-produced king salmon caught on those days may not be removed from the water and must be released immediately.
2-KS-1-15-16	June 4 12:01 AM	This emergency order supersedes Emergency Order 2-2KS-1-03-16. This order prohibits the retention of king salmon while sport fishing in the Kenai River from its mouth upstream to an ADF&G regulatory marker located at the outlet of Skilak Lake. Retention of king salmon is also prohibited in waters of the Kenai River drainage from an ADF&G regulatory marker located approximately 300yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake. Only 1 unbaited, barbless, single-hook, artificial lure may be used. King salmon may not be retained or possessed, may not be removed from the water, and must be released immediately. The use of bait is also prohibited in the waters of the Kenai River drainage from an ADF&G marker located approximately 300yards downstream from the mouth of Slikok Creek upstream to an ADF&G marker located at the outlet of Skilak Lake. These provisions are effective beginning 12:01 a.m. Saturday, June 4 through 11:59 p.m. Sunday, July 31, 2016.
2-KS-1-19-16	June 18 12:01 AM	This emergency order supersedes Emergency Order 2-KS-1-15-16. This order allows the harvest of king salmon while sport fishing in the Kenai River from its mouth upstream to an ADF&G regulatory marker located approximately 300yards downstream from the mouth of Slikok Creek. In addition, retention of king salmon is prohibited from an ADF&G regulatory marker located approximately 300yards downstream from the mouth of Slikok Creek upstream to the outlet of Skilak Lake. When fishing for king salmon in waters where retention is prohibited, only 1 unbaited, barbless, single-hook, artificial lure may be used. King salmon may not be retained or possessed, may not be removed from the water, and must be released immediately. These provisions are effective beginning 12:01 a.m. Saturday, June 18 through 11:59 p.m. Thursday, June 30, 2016.

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Emergency order number	Effective date	Action and justification
2-KS-1-20-16	June 18 12:01 AM	This emergency order rescinds Emergency Order 2-KS-1-104-16 which prohibited the retention of naturally-produced king salmon except Tuesdays and Saturdays, and limited sport fishing gear to 1 unbaited, single-hook, artificial lure while sport fishing in the Kasilof River.
2-KS-1-24-16	July 1 12:01 AM	This emergency order prohibits the use of bait while sport fishing in the Kenai River from its mouth upstream to an ADF&G marker located at the outlet of Skilak Lake beginning 12:01 a.m. Friday, July 1 through 11:59 p.m. Sunday, July 31, 2016.
2-KS-1-28-16	July 1 12:01 AM	This emergency order supersedes Emergency Order 2-KS-1-24-16 which prohibited the use of bait while sport fishing in the Kenai River from its mouth upstream to an ADF&G regulatory marker located at the outlet of Skilak Lake. This emergency order maintains the bait restriction based on concerns for achieving the low end of the escapement goal for king salmon and is effective beginning 12:01 a.m. Friday, July 1 through 11:59 p.m. Sunday, July 31, 2016.
2-KS-1-33-16	July 9 12:01 AM	This emergency order rescinds Emergency Order 2-KS-1-28-16 and restores the use of bait in the Kenai River sport fishery from its mouth upstream to ADF&G markers located approximately 300 yards downstream from the mouth of Slikok Creek effective 12:01 a.m. Saturday, July 9, 2016.
2-RS-1-35-16	July 22 11:00 PM	The Kenai River personal use dip net fishery will be open 24 hours per day, beginning at 11:00 p.m. Friday, July 22, through 11:59 p.m. Sunday, July 31, 2016.
2-RS-1-36-16	July 22 12:01 AM	Increases the bag and possession limit for salmon 16 inches or longer, other than king and coho salmon, from 3/day, 6/possession to 6/day, 12/possession, in the Kenai River from its mouth upstream to an ADF&G regulatory marker located at the outlet of Skilak Lake beginning 12:01 a.m. Friday, July 22. No more than 2 salmon 16 inches or longer per day and in possession may be coho salmon.

Source: R. N. Begich, Sport Fish Area Management Biologist, ADF&G, Soldotna, personal communication; J. A. Pawluk, Sport Fish Acting Area Management Biologist, ADF&G, Soldotna, personal communication.

[a] Actions and justifications are given in their regulatory language and style. “King” salmon is the same as Chinook salmon in this report.

APPENDIX B: RUSSIAN RIVER SOCKEYE SALMON AGE, SEX, AND LENGTH DATA

Appendix B1.–Estimated age and sex composition and length-at-age of early-run sockeye salmon at the Russian River weir, 2014.

		Age (freshwater.ocean years)					
Sex	Parameter	1.2	1.3	1.4	2.2	2.3	Total
Female							
	Sample size	0	64	3	20	50	137
	Percent	0.0	26.6	1.2	8.3	20.7	57
	SE (percent)	0.0	2.9	0.7	1.8	2.6	8
	Escapement	0	6,787	306	2,118	5,282	25,515
	SE (escapement)	0	727	184	454	668	2,034
	Mean length (mm)	0	574	595	532	582	572
	SE	0.0	2.9	5.0	5.2	2.9	2.4
Male							
	Sample size	2	41	3	17	41	104
	Percent	0.8	17.0	1.2	7.1	17.0	43
	SE (percent)	0.6	2.4	0.7	1.7	2.4	8
	Escapement	155	3,291	232	1,375	3,291	19,361
	SE (escapement)	114	470	139	319	470	1,514
	Mean length (mm)	563	584	603	532	593	579
	SE	17.5	3.2	8.8	7.8	3.2	3.0
Combined							
	Sample size	2	105	6	37	91	241
	Percent	0.8	43.6	2.5	15.4	37.8	100
	SE (percent)	0.6	3.2	1.0	2.3	3.1	n/a
	Escapement	359	19,585	1,123	6,918	16,980	44,920
	SE (escapement)	265	1,437	454	1,047	1,406	n/a
	Mean length (mm)	563	578	599	532	587	575
	SE	17.5	2.2	4.9	4.5	2.2	1.9

Source: Sandee Simons, Fishery Technician III, Crew leader, Russian River Sockeye Project, unpublished data, 2014.

Appendix B2.–Estimated age and sex composition and length-at-age of late-run sockeye salmon at the Russian River weir, 2014.

		Age (freshwater.ocean years)							
Sex	Parameter	1.1	1.2	1.3	2.1	2.2	2.3	3.1	Total
Female									
	Sample size	0	2	9	2	62	13	1	89
	Percent	0.0	1.0	4.4	1.0	30.1	6.3	0.5	43.2
	SE (percent)	0.0	0.7	1.4	0.7	3.2	1.7	0.5	3.5
	Escapement	0	226	994	226	6,798	1,423	113	22,584
	SE (escapement)	0	154	323	154	723	384	111	781
	Mean length (mm)	0	510	571	423	513	561	415	522
	SE	0.0	0.0	9.7	2.5	2.2	7.1		4.0
Male									
	Sample size	1	0	3	55	34	22	2	117
	Percent	0.5	0.0	1.5	26.7	16.5	10.7	1.0	56.8
	SE (percent)	0.5	0.0	0.8	3.1	2.6	2.2	0.7	3.5
	Escapement	148	0	445	7,928	4,899	3,177	297	29,693
	SE (escapement)	145	0	249	918	769	641	202	1,027
	Mean length (mm)	395	0	597	410	499	576	430	472
	SE	0.0	0.0	19.2	2.3	4.9	4.8	10.0	6.6
Combined									
	Sample size	1	2	12	57	96	35	3	206
	Percent	0.5	1.0	5.8	27.7	46.6	17.0	1.5	100.0
	SE (percent)	0.5	0.7	1.6	3.1	3.5	2.6	0.8	n/a
	Escapement	261	523	3,032	14,481	24,361	8,887	784	52,277
	SE (escapement)	256	355	857	1,631	1,824	1,338	439	n/a
	Mean length (mm)	395	510	578	411	508	570	425	494
	SE	0.0	0.0	8.9	2.2	2.3	4.1	7.6	4.4

Source: Sandee Simons, Fishery Technician III, Crew leader, Russian River Sockeye Project, unpublished data, 2014.

Appendix B3.–Estimated age and sex composition and length-at-age of early-run sockeye salmon at the Russian River weir, 2015.

		Age (freshwater.ocean years)					
Sex	Parameter	1.2	1.3	2.1	2.2	2.3	Total
Female							
	Sample size	2	20	1	37	95	155
	Percent	0.8	7.6	0.4	14.0	36.0	59
	SE (percent)	0.5	1.6	0.4	2.1	3.0	3
	Escapement	236	2,244	118	4,135	10,632	29,533
	SE (escapement)	157	481	112	632	874	898
	Mean length (mm)	515	571	510	538	567	560
	SE	25.0	3.6	0.0	3.1	1.5	1.7
Male							
	Sample size	3	13	0	19	74	109
	Percent	1.1	4.9	0.0	7.2	28.0	41
	SE (percent)	0.7	1.3	0.0	1.6	2.8	3
	Escapement	228	1,014		1,490	5,794	20,693
	SE (escapement)	135	275		329	573	629
	Mean length (mm)	522	572		549	576	569
	SE	10.9	6.1	0.0	2.7	1.7	1.9
Combined							
	Sample size	5	33	1	56	169	264
	Percent	1.9	12.5	0.4	21.2	64.0	100
	SE (percent)	0.8	2.0	0.4	2.5	3.0	n/a
	Escapement	954	6,278		10,648	32,145	50,226
	SE (escapement)	422	1,025		1,266	1,487	n/a
	Mean length (mm)	519	571	510	542	571	564
	SE	10.1	3.2	0.0	2.4	1.2	1.3

Source: Sandee Simons, Fishery Technician III, Crew leader, Russian River Sockeye Project, unpublished data, 2015.

Appendix B4.–Estimated age and sex composition and length-at-age of late-run sockeye salmon at the Russian River weir, 2015.

		Age (freshwater.ocean years)					
Sex	Parameter	1.2	1.3	2.1	2.2	2.3	Total
Female							
	Sample size	1	6	0	54	38	99
	Percent	0.5	3.2	0.0	29.2	20.5	53.5
	SE (percent)	0.5	1.3	0.0	3.4	3.0	3.7
	Escapement	124	791	0	7,221	5,070	24,729
	SE (escapement)	134	324	0	828	737	910
	Mean length (mm)	500	559	0	524	554	537
	SE		3.5	0.0	2.2	3.3	2.4
Male							
	Sample size	1	5	21	23	36	86
	Percent	0.5	2.7	11.4	12.4	19.5	46.5
	SE (percent)	0.5	1.2	2.3	2.4	2.9	3.7
	Escapement	107	580	2,450	2,665	4,191	21,494
	SE (escapement)	116	258	503	522	628	791
	Mean length (mm)	460	578	414	515	567	515
	SE		18.7	4.9	4.9	3.0	7.2
Combined							
	Sample size	2	11	21	77	74	185
	Percent	1.1	5.9	11.4	41.6	40.0	100.0
	SE (percent)	0.8	1.7	2.3	3.6	3.6	n/a
	Escapement	508	2,727	5,269	19,229	18,489	46,223
	SE (escapement)	351	804	1,082	1,678	1,669	n/a
	Mean length (mm)	480	568	414	521	561	527
	SE	20.0	8.7	4.9	2.2	2.4	3.7

Source: Sandee Simons, Fishery Technician III, Crew leader, Russian River Sockeye Project, unpublished data, 2015.

Appendix B5.–Estimated age and sex composition and length-at-age of early-run sockeye salmon at the Russian River weir, 2016.

		Age (freshwater.ocean years)					
Sex	Parameter	1.2	1.3	2.1	2.2	2.3	Total
Female							
	Sample size	1	20	0	19	68	108
	Percent	0.5	9.9	0.0	9.4	33.5	53.3
	SE (percent)	0.5	2.1	0.0	2.1	3.3	3.5
	Escapement	103	2,044	0	1,941	6,917	20,648
	SE (escapement)	101	434	0	423	686	725
	Mean length (mm)	545	575	0	537	574	567
	SE		3.2	0.0	4.0	1.9	2.0
Male							
	Sample size	3	15	0	10	67	95
	Percent	1.5	7.4	0.0	4.9	33.0	46.8
	SE (percent)	0.9	1.8	0.0	1.5	3.3	3.5
	Escapement	272	1,342	0	888	5,983	18,130
	SE (escapement)	154	334	0	276	600	636
	Mean length (mm)	537	578	0	532	575	569
	SE	8.3	4.1	0.0	8.4	2.1	2.4
Combined							
	Sample size	4	35	0	29	135	203
	Percent	2.0	17.2	0.0	14.3	66.5	100
	SE (percent)	1.0	2.7	0.0	2.5	3.3	n/a
	Escapement	775	6,663	0	5,540	25,761	38,739
	SE (escapement)	380	1,030	0	953	1,286	n/a
	Mean length (mm)	539	576	0	536	574	568
	SE	6.3	2.5	0.0	3.9	1.4	1.5

Source: Sandee Simons, Fishery Technician III, Crew leader, Russian River Sockeye Project, unpublished data, 2016.

Appendix B6.–Estimated age and sex composition and length-at-age of late-run sockeye salmon at the Russian River weir, 2016.

		Age (freshwater.ocean years)								
Sex	Parameter	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	Total
Female										
	Sample size	0	10	4	1	57	12	0	1	85
	Percent	0.0	6.4	2.6	0.6	36.5	7.7	0.0	0.6	54.5
	SE (percent)	0.0	2.0	1.3	0.6	3.9	2.1	0.0	0.6	4.0
	Escapement	0	1,320	536	124	7,527	1,588	0	124	20,621
	SE (escapement)	0	406	262	132	798	441	0	132	825
	Mean length (mm)	0	528	568	445	526	567	0	515	533
	SE	0.0	5.0	9.2		2.3	4.7	0.0		2.7
Male										
	Sample size	1	8	3	9	41	7	1	1	71
	Percent	0.6	5.1	1.9	5.8	26.3	4.5	0.6	0.6	45.5
	SE (percent)	0.6	1.8	1.1	1.9	3.5	1.7	0.6	0.6	4.0
	Escapement	103	878	327	999	4,528	775	103	103	17,216
	SE (escapement)	110	305	189	322	609	286	110	110	689
	Mean length (mm)	410	506	583	433	522	574	430	520	514
	SE		9.9	10.1	7.6	3.3	8.1			5.5
Combined										
	Sample size	1	18	7	10	98	19	1	2	156
	Percent	0.6	11.5	4.5	6.4	62.8	12.2	0.6	1.3	100.0
	SE (percent)	0.6	2.6	1.7	2.0	3.9	2.6	0.6	0.9	n/a
	Escapement	227	4,351	1,703	2,422	23,762	4,616	227	492	37,837
	SE (escapement)	242	972	628	745	1,468	995	242	341	n/a
	Mean length (mm)	410	518	574	435	525	569	430	518	524
	SE		5.7	7.0	6.9	1.9	4.2		2.5	3.0

Source: Sandee Simons, Fishery Technician III, Crew leader, Russian River Sockeye Project, unpublished data, 2016.

APPENDIX C: HISTORY OF REGULATORY CHANGES FOR THE KENAI RIVER RAINBOW TROUT SPORT FISHERY

Appendix C1.–History of regulations adopted by the Alaska Board of Fisheries for the Kenai River rainbow trout sport fishery.

Year	Extent	Type of regulatory change	Detail
1959–1964	Areawide	Season	Spring closure from April 1 to about May 26.
		Bag limit	Combined trout/char/grayling/salmon under 16 inches: 10/day, only 2 over 20 inches.
1965–1977	Kenai River	Season	Changes to no closed season.
1978	Areawide	Daily bag limit	Combined trout/char/grayling/salmon under 16 inches: 10/day, only 1 over 20 inches.
1979	Areawide	Annual bag limit	Harvest record required for rainbow/steelhead trout over 20 inches, only 2/year.
1980–1981	Areawide	Annual bag limit	Increased to 5 rainbow/steelhead trout over 20 inches.
	Kenai River	Gear restriction	In flowing waters upstream from the Moose River to Kenai Lake only single-hook, artificial lures allowed from January 1 to May 31.
1982–1983	Kenai River	Season	Spring closure from January 1 to June 14 (excludes Skilak Lake)
	Areawide	Bag limit	Changed to 5 rainbow trout with only 1 over 20 inches.
1984–1986	Kenai River	Season	Spring and fall closure from November 1 to June 14 (includes Skilak Lake).
	Kenai River	Bag limit	Changed to 3/day, only 1 over 20 inches.
	Areawide	Annual bag limit	Rainbow/steelhead trout over 20 inches—changed to 2/year.
	Kenai River	Gear restriction	In addition to spring single-hook, artificial lure restriction, only artificial lures may be used between Skilak and Kenai lakes from January 1 to December 31.
1987–1988	Kenai River	Season	Spring and fall closure from November 1 through June 14 (includes Skilak Lake).
	Kenai River	Bag limit	Reduced to 2/day; 1 daily over 20 inches.
	Areawide	Annual bag limit	Rainbow/steelhead trout over 20 inches—remained at 2/year.
	Kenai River	Gear restriction	Artificial lures only upstream from Skilak to Kenai Lake. Single hook restriction repealed. No bait permitted in Skilak Lake and in the Kenai River downstream to Moose River from November 1 through May 31.
1989–1990	Kenai River	Area and size	Between Skilak and Kenai lakes designated a trophy trout area. Only trout 20 inches or larger could be retained.
	Areawide	Bag limit	Susitna-West Cook Inlet annual limit remained at 2 trout over 20 inches.
	Kenai River	Gear restriction	Terminal tackle in upper Kenai River limited to single-hook artificial lures.
1991	Kenai River	Area and size	Trophy trout area extended to include half-mile radius of Skilak Lake inlet. Minimum length of trophy trout increased to 24 inches.

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Year	Extent	Type of regulatory change	Detail
1993	Kenai River	Area and size	The trophy trout area was closed to all fishing from April 15 through June 10. Length at which a trout in the trophy trout area could be retained increased to 30 inches.
	Kenai River	Bag limit	Bag and possession limits for trout in Skilak Lake and the Kenai River downstream from Skilak Lake were reduced to 1 fish.
1997	Kenai River	Area	Former trophy trout area becomes catch-and-release area. Area extended 1/4 mile into Kenai Lake. No retention of trout permitted in this area and no retention permitted in the flowing waters upstream of Kenai Lake.
	Kenai River	Season	Trout season in all waters of the Kenai River drainage is now June 15 through April 15.
	Killey River	Area	All flowing waters upstream of the Upper Killey River closed to all fishing from April 15 through June 14.
	Kenai Lake and tributary lakes	Bag limit	From June 15 through October 31 in all lakes tributary to Kenai Lake supporting wild trout, the bag and possession limits are 2 trout, only 1 of which may be 20 inches or greater.
	Areawide	Bag limit	From November 1 through April 14 the bag and possession limits in lakes supporting wild trout are 5; only 1 may be 20 inches or greater. The bag and possession limits were not changed in stocked lakes.
1998	Kenai River	Gear restriction	The use and placement of beads was regulated in all flowing waters of the Kenai River drainage. Beads must be either fixed to the line or hook, or be free moving on the line or leader. A bead not attached to the hook was defined as an attractor, not a fly.
	Slikok Creek	Season	In Slikok Creek a tributary of the lower Kenai River, the fishing season for rainbow trout was established as August 16 through April 14.
2002	Kenai River	Bag limit	Established a maximum size limit of less than 18 inches in all waters of the Kenai River from the mouth of the Moose River upstream to Skilak Lake with a limit of 1 daily/1 in possession. Allowed the use of beads fixed on the line within 2 inches of fly, lure, or hook throughout the drainage and clarified the single-hook regulation to mean one single hook.
2005	Kenai River	Bag limit	Rescinded the catch-and-release only regulation for rainbow trout in the upper Kenai River area by establishing a bag limit for rainbow trout of 1 day/1 in possession under a maximum size limit of less than 16 inches in flowing waters of the Kenai River drainage above Skilak Lake (upper river) and established a bag limit of rainbow trout 1 daily/1 in possession under a maximum size limit of less than 18 inches in all waters of the Kenai River downstream of and including Skilak Lake.
	Kenai River	Season	The spring spawning seasonal closure was aligned throughout the drainage, designated from May 2 through June 10.
	Moose River	Bag limit	Reduced the bag limit in the Moose River drainage lakes and ponds from 5 day/5 in possession to 2 day/2 in possession and in flowing waters of the Moose River drainage from 2 day/2 in possession to 1 day/1 in possession under a maximum size limit of less than 18 inches.
2008	Kenai River	Area	Skilak Lake outlet downstream to the Upper Killey River closed to all fishing from May 2 through June 10.