Fishery Management Report No. 13-51

2010-2012 Annual Management Report and 2013 Recreational Fisheries Overview for Northern Kenai Peninsula: Fisheries under Consideration by the Alaska Board of Fisheries, 2014

by

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December 2013

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

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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 Department of Fish and Game	ADF&G
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. 13-51

2010-2012 ANNUAL MANAGEMENT REPORT AND 2013 RECREATIONAL FISHERIES OVERVIEW FOR NORTHERN KENAI PENINSULA: FISHERIES UNDER CONSIDERATION BY THE ALASKA BOARD OF FISHERIES, 2014

by

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Division of Sport Fish, Research and Technical Services
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ABSTRACT

This report provides information on fisheries in the Northern Kenai Peninsula Management Area. An overview of information for the 2010-2013 recreational fisheries is included and provides updated fishery data with inseason assessment data from 2013 for fisheries under consideration by the Alaska Board of Fisheries in January 2014. Summary information is provided for estimates of effort, catch, and harvest through 2012. The following recreational 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, and areawide coho salmon *O. kisutch*, 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 northern pike *Esox lucius*. The educational fisheries, guided sport fisheries, various habitat concerns as well as Kenai and Kasilof rivers sockeye salmon personal use fisheries are also discussed.

Key words: Northern Kenai Peninsula Management Area, 2010–2012 annual management report, 2013 season overview, Kenai River, Kasilof River, Russian River, Chinook salmon, sockeye salmon, coho salmon, rainbow trout, Dolly Varden, northern pike, personal use dip net fisheries, Alaska Board of Fisheries.

MANAGEMENT OVERVIEW

This report provides information on the following fisheries under consideration by the Alaska Board of Fisheries (BOF) in February 2014:

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

An overview of the area, sport and personal use fisheries from 2010-2012, as well as a season summary of the 2013 Northern Kenai Peninsula Management Area recreational 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 Kasilof River (Figure 1). Marine waters of NKPMA are all waters from the latitude of East Forelands south to the latitude of 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's 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 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 germane to NKPMA fisheries are:

- *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*), and
- *Kenai River Coho Salmon Management Plan* (5 AAC 57.170).

FISHERIES RESOURCES

The NKPMA offers diverse fishing opportunities for recreational anglers. Anglers can target four species of Pacific salmon (Chinook *Oncorhynchus tshawytscha*, sockeye *O. nerka*, coho *O. kisutch*, and pink *O. gorbuscha*). Fisheries for these species occur primarily in freshwater and, to a lesser degree, in the salt waters of Cook Inlet. Anglers can also target fish stocked by the Division of Sport Fish (SF) into various landlocked lakes; salmon, rainbow trout *O. mykiss*, Arctic char *Salvelinus alpinus*, and Arctic grayling *Thymallus arcticus*. Popular fisheries for resident stocks of rainbow trout, Dolly Varden *Salvelinus malma*, and lake trout *S. namaycush* also occur. Fisheries target resident stocks of Arctic grayling and 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.

Marine sport fisheries offer limited opportunities. Adjacent to the mouths of the Kenai and Kasilof rivers and the waters of Cook Inlet within the management area, small numbers of anglers target halibut *Hippoglossus stenolepis*, razor clams *Siliqua patula*, and several species of hardshell clams.

Two runs of wild Kenai River Chinook salmon combine to support the largest recreational 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 comprised of wild Chinook salmon also provides sport fishing opportunity at the Kasilof River. Chinook salmon have also been stocked into one roadside landlocked lake to provide additional fishing opportunity, primarily during winter months.

The Russian River supports an early and late sockeye salmon run. These wild stocks maintain the second largest recreational sockeye salmon 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 recreational sport fishery for sockeye salmon has grown into the largest recreational 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 returns to Kenai River support the largest recreational freshwater coho salmon 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 recreational 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* returns 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 recreational freshwater fishery for rainbow trout in Alaska. To provide alternative fishing opportunities, several landlocked lakes are also stocked with rainbow trout.

Steelhead currently provide recreational fishing opportunity in the Kasilof River. Steelhead production is thought to originate from two primary sources. A stocked return of this species was developed in the 1980s using wild stocks indigenous to Crooked Creek. The stocking program was discontinued in 1996 due to excessive straying of hatchery trout into the Kenai River system. Since 1995, steelhead production in Crooked Creek has resulted from natural production. Tributaries of Tustumena Lake (Nikolai and Shantalilik creeks) also maintain wild production. 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 recreational angling opportunity at roadside as well as more remote locations.

Lake trout are found primarily in four 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. Alaska Department of Fish and Game statewide angler survey (SWHS; e. g., Jennings et al. 2011b) estimates indicate Crescent Lake supports modest participation and harvest. To provide additional fishing opportunity for this species, two roadside landlocked lakes (Arc and Scout lakes) were stocked with Arctic grayling in 2010.

RECENT RECREATIONAL ANGLER EFFORT

This section provides generalized participation trends in the NKPMA. Summarized data depicting angler effort and harvest for the sport fisheries in the NPKMA are shown for the years 1977 through 2012 in Tables 1-5. SWHS data for the 2013 season will be available in mid-2014.

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

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 recreational angler effort in the NKPMA are based on estimates produced from the SWHS (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003;. Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, In prep, Romberg et al. In prep).

From 2008 through 2011, the NKPMA accounted for an average of about 22% of the total statewide recreational fishing effort (Table 1). In 2012, participation was estimated to be 457,936 angler-days in NKPMA waters. Angler participation between 2006 and 2007 increased from 462,749 to 539,283 angler-days and has since declined from 484,148 angler-days in 2008 to 457,936 angler-days in 2012 (Table 1; Figure 2).

The Kenai River accounts for the largest recreational fishery in the NKPMA. From 2008 to 2012, fisheries on this river accounted for 73% to 82% of the area's total recreational angling effort, or 337,217 to 374,732 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 with salmon, rainbow trout, and Dolly Varden being the most abundant species harvested (Tables 2–3).

Other fresh waters of the Kenai Peninsula support major recreational fisheries (Tables 1 and 4–5) as well. Of these, Russian River supports the largest fishery, 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. Also of significance are 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 4–5). Overall, total recreational angling effort in other recreational fisheries declined from 2008 to 2012 (Table 1 and 4).

Personal use salmon fisheries at the mouths of the Kenai and Kasilof rivers continue to be popular with the public. From 2010 to 2012, personal use fishing effort averaged 31,845 and 6,898 days fished in the Kenai and Kasilof rivers personal use dip net fisheries, respectively

(Table 6). Effort in the Kasilof River personal use gillnet fishery declined from 1,855 days fished in 2010 to 1,082 days fished in 2012 (Table 6). The harvest of salmon in the Kenai River dip net fishery and Kasilof River gillnet fisheries declined while Kasilof River dip net salmon harvest increased from 2012 to 2013. 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 2010 through 2013:

1. Annual stock assessment of both early- and late-run Kenai River Chinook salmon. This program has three study components. Sonar estimates abundance of Chinook salmon entering the lower river during both runs. Age, gender and size composition of the Chinook salmon stocks are determined by sampling the early- and late-run fish entering the lower river at the sonar site with drift gillnets. A creel survey estimates 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. DIDSON development. In 2002 deployment and testing the use of dual-frequency identification sonar (DIDSON) in the Kenai River to assess Chinook salmon began as a research project. The findings of this research over the next several years indicated the DIDSON has several advantages over the split-beam sonar. Importantly, it was used in 2010 through 2012 to estimate Chinook salmon passage. In 2013 it was deployed at both river mile 8.6 and upstream at river mile 13.7. The river mile 8.6 site was the main source of information to assess run strength. DIDSON research to transition upstream to river mile 13.7 is ongoing.

3. Kenai River Chinook salmon tagging project. This research project was conducted from 2010 through 2013 with early–run Chinook salmon and during 2012 and 2013 with late–run Chinook salmon. The main objective is to estimate abundance of Chinook salmon independent of the sonar. This will provide important information to compare sonar estimates of abundance to those estimates from the tagging project to fortify the transition of the sonar program to DIDSON at river mile 13.7. Important information about run-timing, spawning distribution as well as age and size composition is also being documented.

4. Assessment of early- and late-run Russian River sockeye salmon. A weir is used to determine the early- and late-run spawning escapement. Scale samples to determine age and size composition of the sockeye salmon stocks are collected at the weir. Statewide Harvest Survey (SWHS) statistics together with weir data allow runs to be reconstructed to the extent that the data provided by this program can be used to develop 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) for the early–run stock and sustainable escapement goal (SEG) for late–run fish. 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. This program now has two main elements since the creel survey was discontinued after the 2010 season. A weir located at the department's Crooked Creek facility is used to estimate the naturally- and hatchery-produced compositions of the escapement as well as to estimate age, gender and size composition of the Chinook salmon stocks. Lastly, the facility allows the department 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 also used to construct brood tables necessary to assess spawner-recruit relationships to evaluate the escapement goal for early-run Crooked Creek Chinook salmon.
6. Invasive northern pike distribution and eradication planning. Projects have been undertaken annually since 2002 to identify the distribution, to reduce abundance and to restore lakes by eradicating northern pike in NKPMA. In addition, multi-agency planning and public scoping efforts were completed and initiated to address large scale control and eradication of northern pike from selected NKPMA drainages. In 2012 northern pike were eradicated from Stormy Lake. Presently, an eradication plan is being composed for the Soldotna Creek drainage. 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 RECREATIONAL FISHERIES

2014 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING KENAI RIVER CHINOOK SALMON SPORT FISHERY ISSUES

The following proposals published in "The Alaska Board of Fisheries 2013/2014 *Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013 a–f) will likely have some impact on the sport fisheries targeting Chinook salmon in the Kenai River:

> Proposal Numbers: 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 240, 241, 242, 243.

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, 1988–1992a-b, 1993–1994; Hammarstrom and Larson 1982-1984, 1986; Hammarstrom et al. 1985 , Schwager-King 1995; King 1996–1997; Marsh 1999, 2000; McKinley and Fleischman 2010; Reimer et al. 2002; Reimer 2003, 2004a-b, 2007; Eskelin 2007, 2009-2010; Perschbacher 2012a-d; Jeffrey Perschbacher Division of Sport Fish Biologist, Soldotna, personal communication). The 2013 SWHS survey results will not be available until the fall of 2014. Chinook salmon catch and harvest data provided for the 2013 season contained in this document were estimated inseason and are *considered preliminary* until the SWHS results are available.

Chinook salmon return to Kenai River in two distinct runs, early and late. The early run usually has "fishable" numbers by mid-May and it 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 two primary tributaries, the Killey and Funny Rivers. Late-run fish primarily spawn in the mainstem Kenai River.

The recreational 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 recreational fishery every year. Because of the high level of participation in relation to the total number of Chinook salmon in the return, the fishery is strictly regulated. Chinook salmon fishing is limited to a 50-mile area downstream from Skilak Lake (Figure 3). The season is January 1 through July 31. By regulation, the early-run Kenai River Chinook salmon fishery ends on June 30. The daily bag and possession limit is one 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 two 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 two fish. During 2008, the BOF, modified the annual limit for Chinook salmon less than 28 inches but greater than 20 inches and also adjusted the protected slot limit by changing it from 44 to 55 inches to 46 to 55 inches.

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 four-stroke or two-stroke direct fuel injection (DFI) outboard motors. In addition, during the month of July, all outboard motors operating on the Kenai River must be four-stroke or two-stroke DFI. This regulation expired after the 2012 season and, beginning in 2013 all outboard motors operating on the Kenai River must be four-stroke or two-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 the present, 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.

Estimation uncertainty, due to the problem of differentiating between the various salmon species migrating together into 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 the 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, the 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, the 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 daily Chinook passage rate 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 Board of Fisheries meeting the department revised the escapement goal from a biological escapement goals (BEG) to sustainable escapement goals (SEG) because of the uncertainty in the evaluation of escapement and lack of stock specific information in the commercial harvest. At this same meeting, the department reported that it had decided to discontinue 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. Since the TS-based estimates were known to be biased high and the source of the bias identified was the imprecision in estimates of fish length that the split bean technology provided, use of the TS-based estimate 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 king 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 king salmon escapements. Minimum inseason management objective values were set for DIDSON net apportioned estimates, 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 sight was selected near RM 13.7 and DIDSON was operated during the 2013 Chinook salmon run 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.

Inseason assessment information from the 2012 run resulted in restrictive actions to all fisheries harvesting Kenai River Chinook salmon. The early-run Chinook salmon sport fishery closed on June 22. The late-run Chinook salmon sport fishery closed on July 19 triggering closure of the set gillnet fishery in the upper subdistrict (ESSN) through July 31 as prescribed in *Kenai River Late-run King Salmon Management Plan* (5 AAC 21.359). Restrictive EO actions were implemented for both commercial and inriver sport fisheries during early August to reduce mortality of Kenai River Chinook salmon needed for escapement. 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*. The department also submitted an ACR to replace the late-run Chinook salmon SEG (17,800-35,700) 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 while sonar, independent mark-recapture, and alternative sonar site research is ongoing.

While the primary management objective of the management plan is to ensure adequate escapement of late-run king salmon, inseason restrictions of fisheries over the 2011–2012 seasons in response to the decline in Chinook salmon abundance caused economic and social hardships to stakeholders. Because of the concerns about Chinook salmon conservation and allocative nature of regulatory ACRs, the BOF assembled a Cook Inlet Chinook salmon task force during the winter of 2012–2013 to generate recommendations for changes to the regulations within the *Kenai River Late-run King Salmon Management Plan*. The task force was comprised of a 9 member public panel and 2 BOF members. Recommendations achieved by consensus from the public panel were to be forwarded to the full BOF for deliberation during the statewide finfish meeting in March, 2013. The public panel comprised of 4 commercial representatives (3 ESSN, 1 drift gillnet) 2 commercial sport guides (1 freshwater, 1 saltwater) 2 public sport anglers and 1 personal use representative, along with department staff and 2 BOF members. The panel held three open public meetings to discuss regulatory changes. By March, no consensus was reached on proposed regulation changes to the management plan. However, the BOF replaced the SEG contained in the management plan with the transitional DIDSON-based SEG of 15,000-30,000 fish recommended by the department (Fleischman and McKinley 2013).

For early-run stocks, the department recommended a transitional DIDSON-based SEG of 3,800–8,500 fish based on the analysis for the early-run stocks conducted by McKinley and Fleischman (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 (2008–2012) average Kenai River Chinook salmon sport fish harvest from both runs combined was 8,925 fish. Harvests and inriver abundance of Kenai River Chinook salmon have been in decline since 2006 (Tables 3, 7 and 8).

Recent Board of Fisheries Actions

At the regularly scheduled 2011 Board of Fisheries meeting two regulations were adopted affecting the Kenai River Chinook salmon fisheries. The first created a drift-only fishing area during July 1-July 31, which prohibits sport fishing from a vessel that is making upstream movement relative to the water, with the aid of a motor, in an approximate 1-mile section of the lower Kenai River near Eagle Rock. The other regulation change redefined motorized vessel for that portion of the Kenai River downstream of the Sterling Highway bridge crossing in Soldotna for drift-boat-only during all Mondays in May, June and July. Under this regulation a boat may have onboard a single motor no greater than 10 hp that may only be used downstream of Cunningham Park at RM 6.5 after fishing has ceased for the day to exit the drift-boat-only fishery.

KENAI RIVER EARLY-RUN CHINOOK SALMON

Fishery Management Objectives

In 1988, the Board of Fisheries 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* (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 assure achievement of the escapement objective.

The fishery begins without the use of bait and is limited to the use of only one 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 shall establish, by emergency order (EO), a period of time and 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 early-run 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. Achievement of this escapement objective requires information on the number of early-run Chinook salmon entering the river; the ability to project the total number of Chinook salmon in the inriver run, and an estimate of the harvest and final spawning escapement.

In 2010, the TS-based Chinook salmon passage estimate from split-beam sonar supplemented with indices of abundance were used to assess run strength. During 2011, ELSD-based sonar passage estimates and indices of abundance were used to assess run strength. In 2012 indices of abundance supplemented with estimates from DIDSON at RM 8.5 were used to assess run strength. Finally, in 2013 the number of Chinook salmon entering the river transitioned to DIDSON in the lower, mainstem Kenai River at river mile (RM) 8.5 and was supplemented with four indices of run strength: DIDSON-based estimates of fish greater than about 30 inches in total length, a net apportioned sonar estimate, as well as creel and netting CPUE estimates. The sonar is usually operational on May 16 and the early-run Chinook salmon run is assessed daily with these various estimates through June 30. The early-run Kenai River Chinook salmon fishery ends by regulation on June 30. Estimates from the netting and sport indices are available daily. The sonar and net-apportioned sonar estimates are not available on a daily basis 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 upon the projected inriver return 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 two 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 the department'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.

2010 Fishery Performance

The 2010 preseason forecast for the inriver run of early-run Chinook salmon was approximately 10,400 fish. The cumulative TS-based sonar passage estimate for the early run was 13,248 fish through June 30. During the developing stages of the run, low numbers of Chinook salmon were detected by the TS-based sonar as well as for all other run strength estimates using sonar and CPUE. The projected inseason run strength using a mean run time model and resulting projected escapement indicated run strength would not be sufficient to support harvest and achieve the OEG (5,300–9,000). An EO was issued on June 3 that closed the Kenai River to Chinook salmon fishing on June 5 (EO 2-KS-1-12-10; Appendix A1). Run strength increased during mid-June. This increase was unexpected because it occurred later than increases historically observed for this stock. Due to this increase, the closure was rescinded to allow catch-and-release fishing on June 12 (EO 2-KS-1-16; Appendix A1). By June 14, the fishery was further liberalized by EO to allow retention of Chinook salmon and on June 18, use of bait was allowed from the mouth of the river upstream to a point approximately 100 yards downstream of the confluence of the Moose and Kenai rivers (EOs 2-KS-1-19-10 and 2-KS-1-21-10; Appendix A1). The resulting estimated harvest including catch-and-release mortality for the entire river was approximately 1,337 fish (Table 7). The estimated escapement from TS-based sonar was approximately 11,824 early-run Chinook salmon. This estimate was refined based on the analysis conducted by McKinley and Fleischman (2013), and the final spawning escapement was estimated to be 6,403 fish (Table 7).

The 2010 season was the eighth year of the slot limit regulation for early-run Kenai River Chinook salmon. From 2003 through 2007, the slot limit was 44 to 55 inches total length; the slot limit was 46 to 55 inches total length from 2008 to 2010. The 2010 age composition results from the Chinook salmon netting program indicated that ocean-age-5 fish comprised less than 1% of the run, while ocean-age-2 fish accounted for 25% of the run (Perschbacher 2012c). From 2008 through 2010, ocean-age-5 fish comprised an average of 2.3% of the run and ocean-age-2 fish accounted for 18% (McKinley and Fleischman 2013). It is not known why the relative abundance of ocean-age-5 fish has declined. Since 2003, regulations stipulate all retained trophy Chinook salmon (greater than 55 inches total length) must be sealed by ADF&G within three days of harvest. Only one trophy Chinook salmon (caught in 2005) was sealed during the early-run Chinook salmon fishing seasons between 2003 and 2010.

2011 Fishery Performance

The 2011 preseason forecast of the inriver early-run Chinook salmon run was approximately 10,500 fish, which was well below the long-term average of 16,500 fish (forecasts for 2011–2013 are from T. McKinley, Sport Fish Biologist, ADF&G, Soldotna, personal communication). The cumulative ELSD-based sonar passage estimate for the early run was 10,559 fish and net apportioned sonar estimate was 4,037 fish through June 30. The sport and net CPUE's were well below the most recent ten year average. In combination, all data indicated an inriver run of Chinook salmon that was below average. ADF&G issued an EO on Monday, June 27 prohibiting the use of bait and retention of Chinook salmon 20 inches or greater in length but less than 55 inches in length while sport fishing in waters of the Kenai River drainage from an ADF&G regulatory 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 northern-most edge of the Sterling Highway Bridge, beginning 12:01 am, Wednesday, June 29 through 11:59 pm, Thursday, July 14 (EO 2-KS-1-17-11; Appendix A2). The emergency order protected the majority of early-run Chinook salmon between river mile 18.7 and 50 (Slikok Creek to Skilak Lake, about 63% of the area open to king salmon fishing). After subtracting an estimated harvest (including catch-and-release mortality) of approximately 800 fish for the entire river from the ELSD-based sonar passage estimate, the inseason estimate of escapement was about 9,700 Kenai River early-run Chinook salmon for the 2011 season. Values from the Chinook salmon indices of abundance did not maintain a consistent relationship with ELSD-based sonar indicating the split beam sonar estimate was biased high and the actual number of king salmon passing the sonar station was low. This information was supported by the third lowest net apportioned sonar estimate, net CPUE and sport CPUE measured since 2002. Based on the analysis of McKinley and Fleischman (2013), the final spawning escapement was estimated to be 8,466 fish (Table 7).

2012 Fishery Performance

The 2012 preseason forecast of the inriver early run of Chinook salmon was for a run that was similar to 2011 with a slight increase in run strength, but still below average. The minimum inseason management objectives for each of the various indices were not achieved and the cumulative DIDSON passage estimate for the early-run was 3,400 fish through June 30. Evaluation of the daily Chinook salmon indices of abundance and the DIDSON passage estimates indicated the 2012 early-run was well below average and smaller than both the 2010 and 2011 early-runs. Consequently, ADF&G issued EO 2-KS-1-11-12 restricting the early-run fishery to catch and release trophy fishing effective June 15 (Appendix A3). Upon completion of over 50% of the historic mean run-timing for all indices, the EO 2-KS-1-17-12 to close the early-run sport fishery was issued on Tuesday, June 19 effective Friday, June 22 (Appendix A3). Along with the closure of the fishery through June 30, this EO also closed the king salmon sport fishery upstream of the ADF&G marker located approximately 300 yards downstream of Slikok Creek from July 1 through July 14. Cumulative values for the various management indices were the lowest on record. The final DIDSON passage estimate of early-run Chinook salmon passage was also lower than the 2010 and 2011 final DIDSON passage estimates of early-run Chinook salmon. After accounting for inriver sport fishing mortality, the final estimated early-run escapement was 5,061 fish (Table 7).

2013 Fishery Performance

The preseason forecast for early-run Chinook salmon was for a total run of approximately 5,300 fish. Because the low forecast indicated the early-run could sustain little harvest without jeopardizing achievement of the OEG, the department issued EO 2-KS-1-11-13 on May 9 restricting the early-run fishery to catch and release trophy fishing effective May 16 (Appendix A4). As the run progressed into June the DIDSON Chinook salmon passage estimates and all management indices of abundance indicated a low run. Therefore an EO (2-KS-1-22-13) effective June 20, closed the early-run Chinook salmon fishery through June 30 and also closed the Chinook salmon sport fishery upstream of the ADF&G marker located approximately 300 yards downstream of Slikok Creek from July 1 through July 14 (Appendix A4). Through June 30 the inseason DIDSON estimate of Chinook salmon passage was 2,038 fish and cumulative values for management indices were the lowest on record. The resulting *preliminary inseason* estimated harvest was zero and catch-and-release mortality for the entire river was approximately 5 fish (Table 7). The *preliminary inseason* estimated escapement was approximately 2,033 early-run Chinook salmon (Table 7). This estimate might be refined in the future.

Preliminary inseason 2013 age composition results from the Chinook salmon netting program indicate that ocean-age-5 fish comprised about 2% of the run, while ocean-age-2 fish accounted for about 19% of the run (Jeffrey Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication). Age composition information compiled from inseason netting program data for the early-run from 2010 through 2013 shows ocean-age-5 fish comprised an average of approximately 1.8% of the run and ocean-age-2 fish accounted for 20.4% (Jeffrey Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication).

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. 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 these stocks have been the subject of intense allocation debates among recreational 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.

During the spring of 1999, the BOF amended both of these plans. The most significant change was the revision of the biological escapement goal (BEG) and the management actions associated with it. Under the previous *Kenai River King Salmon Management Plan*, the BEG was established as an optimum goal of 22,300 Chinook salmon with management directives centered around projected escapement levels of less than 15,500 fish, 15,500 to 19,000 fish, and greater than 22,300 fish. Under the revised management plan, the BEG was established as a range of 17,800 to 35,700 Chinook salmon. Management directives were also established to link inseason regulatory actions with abundance of sockeye salmon. In 2011 the BEG was redefined

as an SEG because of the measurement error associated with split-beam TS based sonar passage estimates of the number of king salmon entering the river. The TS-base sonar estimates were in part used originally to formulate the escapement goals when the management plan was adopted in 1989. The current management objective, as outlined in the plan, is to achieve adequate escapement defined as a sustainable escapement goal from 15,000 to 30,000 Chinook salmon.

Inseason Management Approach

Achieving adequate escapement of late-run Chinook salmon requires an estimate of the number of late-run Chinook salmon entering the river, an estimate of the harvest, the ability to project the total inriver run, and an estimate of the total harvest and the spawning escapement.

Late-run sonar estimates begin when the late-run fishery opens by regulation (July l) and conclude on approximately August 10. The passage of late-run Chinook salmon into the river is estimated daily by sonar at RM 8.5. In 2010, the TS-based Chinook salmon passage estimate from split-beam sonar was used to assess the spawning escapement supplemented with indices of abundance. During 2011, ELSD-based sonar passage estimates and indices of abundance were used to assess run strength. In 2012 indices of abundance were used to assess run strength supplemented with estimates from DIDSON at RM 8.5. Finally, in 2013, the number of Chinook salmon entering the river transitioned to DIDSON and was supplemented with five indices of run strength. Estimates of run strength available to management staff on a daily basis include the DIDSON-based estimates of fish greater than about 30 inches in total length, DIDSON-based net apportioned, 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 escapement are also used. Such techniques include estimates based on historical exploitation rates in the recreational fishery and historical exploitation rates in the commercial set gillnet fishery.

The lower river sport fishery is the predominant source of inriver sport harvest. This harvest is estimated by an onsite creel survey in the lower Kenai River below the Sterling Highway Bridge. Harvest above the Soldotna Bridge 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 return. Harvest estimates are usually generated weekly. Daily estimates are 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). During most years, the run strength and a spawning escapement estimate can be projected with reasonable accuracy by approximately mid-July.

Historically, the recreational fishery for late-run Chinook salmon in the Kenai River is one of the largest and, 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.

2010 Fishery Performance

During 2010, the pre-season forecasted run size was approximately 34,000 Chinook salmon, well below the 1986–2009 average of approximately 42,000 fish. Evaluation of the daily Chinook salmon passage estimates indicated the sonar passage estimates were high in value, while all other sources of abundance data were low in value. Because the TS-based sonar passage estimates of Chinook salmon were positively biased by an unknown amount, the total inriver run was smaller than indicated by the TS-based sonar. The discrepancy between the TS-based sonar Chinook salmon passage estimates and performance of the sport fishery and test netting program were evident, as catch rates were low. The harvest estimate for the ESSN fishery was 4,567 Kenai River Chinook salmon and this harvest was below the most recent 10-year average (2000–2009) harvest of 7,775 Chinook salmon (Table 8).

During the season the inriver run estimated by TS-based sonar was 48,343 fish. The estimated late-run sport harvest (including catch-and-release mortality) of approximately 7,471 fish, of which about 7,062 were harvested above the sonar, provided a TS-based sonar spawning escapement of 41,281 Chinook salmon. Based on the analysis from Fleischman and McKinley (2013), the final spawning escapement was estimated to be 16,224 fish (Table 8). This estimate was less than the lower bound of the SEG (17,800-35,700) contained within the management plan in 2010.

Results from the test net catches at the sonar site and from the creel survey indicated the age structure of Chinook salmon changed as the run progressed. During approximately the first 12 days of July, the run was comprised of low numbers of larger older fish (ocean-age-4 and 5), thereafter the numbers of larger older fish increased. Overall, estimates indicated that the late-run Chinook salmon age composition was 19.0% ocean-age-2 fish, 31.5% ocean-age-3 fish, 37.3% ocean-age-4 fish, and 5.4% ocean-age-5 fish (Fleischman and McKinley 2013). No Chinook salmon were brought to ADF&G for sealing during the 2010 late-run fishery.

2011 Fishery Performance

The pre-season forecast was for an inriver run of approximately 36,000 late-run Kenai River Chinook salmon. This forecasted run strength was well below the 1986–2010 average inriver run of approximately 42,000 fish (forecasts for 2011–2013 are from T. McKinley, Sport Fish Biologist, ADF&G, Soldotna, personal communication). In combination, all inseason data indicated an inriver run of king salmon that was below average. ADF&G issued an EO on Wednesday, July 13 extending the EO prohibiting the use of bait and retention of king salmon 20 inches or greater in length but less than 55 inches in length, while sport fishing in waters of the Kenai River drainage from an ADF&G regulatory 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 northern-most edge of the Sterling Highway Bridge, beginning 12:01 am., Wednesday, July 15 through 11:59 pm, Sunday, July 31 (EO 2-KS-1-20-11; Appendix A2). This EO reduced harvest of late-run stocks that had passed Slikok Creek and provided additional conservation of the early-run stocks still transiting between Slikok Creek and Skilak Lake. Additional measures were implemented to conserve late-run stocks by issuance of EO 2-KS-1-23-11 on Friday, July 22 which prohibited the retention of king salmon in the Kenai River personal use dip net fishery effective 12:01 a.m.

Sunday, July 24. Furthermore, use of bait was prohibited in the Kenai River, from its mouth upstream to ADF&G makers located approximately 300 yards downstream of Slikok Creek beginning 12:01 a.m., Monday, July 25 (EO 2-KS-1-24-11; Appendix A2). The final ELSD-based sonar estimate for 2011 was 35,584 Chinook salmon. After subtracting an estimated harvest (including catch-and-release mortality) of approximately 7,373 fish upstream of the sonar from the ELSD-based sonar passage estimate, the estimate of escapement was approximately 28,211 fish for the 2011 season. However, values from the indices of abundance did not maintain a consistent relationship with ELSD-based sonar or with estimates from DIDSON. This indicated the ELSD-based estimate was biased high and the actual inriver run of Chinook salmon king salmon passing the sonar station was low and was supported by the third lowest net apportioned sonar estimate, second lowest net CPUE, and fifth lowest sport CPUE measured since 2002. In addition, the final inseason DIDSON estimate was 21,036 fish. Based on the analysis by Fleischman and McKinley (2013) the final spawning escapement estimate was 19,717 fish (Table 8).

The commercial fisheries in the Central District of the Upper Cook Inlet Management Area harvested an estimated 5,952 Kenai River Chinook salmon and of this commercial harvest, about 5,596 were harvested in the eastside setnet (ESSN) fishery (Table 8). The 2011 ESSN harvest was below the 10-year (2001-2010) average harvest of 7,979 Chinook salmon (Table 8). This low harvest was likely due to the below-average Chinook salmon abundance.

A few late-run Chinook salmon were brought to ADF&G personnel by sport anglers to be sealed as required for Chinook salmon 55 inches or greater in total length. However, none of these fish were actually 55 inches or greater in total length and did not meet the sealing requirement. Results from inseason assessment projects indicated the run was comprised of 27.2% ocean-age-2 fish, 19.9% ocean-age-3, 47.7% ocean-age-4, and 2.5% ocean-age-5 (Fleischman and McKinley 2013).

2012 Fishery Performance

The 2012 preseason forecast of the inriver late run of Chinook salmon was for a run that was similar to 2011 with a slight increase in run strength however still below average. The department issued EO 2-KS-1-18-12 (Appendix A3) on June 19, 2012 prohibiting use of bait and scent in the Kenai River late-run Chinook salmon fishery downstream of Slikok Creek effective at the start the late-run fishery on July 1 (the Kenai River waters normally open to Chinook salmon fishing upstream of Slikok Creek were restricted for early-run stocks through July 14). EO 2-KS-1-35-12 issued on July 6 prohibited retention of Chinook salmon in the Kenai River personal use dip net fishery that occurs annually from July 10-July 31 (Appendix A3). These EOs were issued because of below average Chinook salmon early runs throughout Cook Inlet. Numerous EOs were issued to restrict and/or close early-run Chinook salmon fishing throughout the state, including Kenai River early-run as previously mentioned. Furthermore, historical Kenai River Chinook salmon annual run-strength data indicates of early- and late-runs of Kenai River Chinook salmon are correlated. In other words, if early-run stocks are of low run strength, the late-run also tends to be low and vice versa.

The 2012 run was the lowest of all years on record as measured by abundance indices and harvests. The 2012 fishery experienced a very low harvest rate without bait; however, catch rates in the sport fishery and the netting program were both well below anticipated and

acceptable management objective levels due to low Chinook salmon abundance. DIDSON estimates during July indicated that the total number of Chinook salmon in the 2012 late-run was smaller than the both the 2010 and 2011 late-runs. Consequently, the department issued EO 2-KS-42-12 to close the Kenai River to sport fishing for Chinook salmon on July 19 (Appendix A3). Provisions of the *Kenai River Late-Run King Salmon Management Plan* (5 AAC 21.359) also dictated the marine sport fishery in Cook Inlet north of Bluff Point, the commercial set gillnet fishery in the Upper Subdistrict of the Central District (ESSN), and the commercial drift gillnet fishery within one and one-half miles of the Kenai Peninsula shoreline also be closed through July 31. This was the first time since the plan was enacted that these provisions of the plan were implemented. The department also issued EO 2-KS-1-48-12 effective August 2 that restricted the Kenai River sport fishery to the use of a single-hook artificial lure only downstream of the Sterling Highway Bridge in Soldotna (Appendix A3). This bait prohibition was designed to lessen the incidental catch of Chinook salmon during the beginning of the coho salmon fishery when bait and multiple hooks are allowed by regulation. An increase in the daily passage rates of Chinook salmon into the Kenai River during August was detected by the remaining non-fishery indices of abundance (inriver netting CPUE, net apportioned sonar estimate and DIDSON). Therefore, this EO originally planned to expire on August 16 was rescinded on August 9 by EO 2-KS-1-52-12 (Appendix A3). In combination, the DIDSON estimate with other indices (netting CPUE, net apportioned sonar) showed that approximately thirty-six percent of the late-run entered the river during August. Through August 15, the inseason DIDSON estimate was 21,914 fish. The estimated sonar count minus sport harvest (including catch-and-release mortality) of 196 fish resulted in a DIDSON-based escapement estimate of 21,718 fish. The ESSN fishery was closed by EO for most of the season resulting in a low harvest of 484 Kenai River Chinook salmon, while the drift gillnet fishery reported a harvest of 115 Kenai River Chinook salmon (Table 8). Based on Fleischman and McKinley (2013) the final spawning escapement was estimated to be 27,714 fish.

The age composition estimates indicated the run was comprised of 11.8% ocean-age-2, 35.9% ocean-age-3 and 46.1% ocean-age-4 fish, while ocean-age-5 fish accounted for 4.2% of the run (Fleischman and McKinley 2013). No Chinook salmon were brought to ADF&G for sealing.

2013 Fishery Performance

During 2013, the pre-season forecasted run size was approximately 29,000 Chinook salmon, well below the 1986–2012 average of approximately 58,000 fish. Because low production persisted in several Cook Inlet Chinook salmon stocks during 2013 (including early-run Kenai River stocks), and the relation between early-run Chinook salmon abundance and late-run abundance, it was thought the late-run would also experience low run strength in 2013. Consequently, a preseason EO (2-KS-1-24-13) issued June 25 prohibited the use of bait during July (Appendix A4). This EO was implemented to delay or avoid further inseason restrictions to the in-river sport fishery as well as other fisheries harvesting late-run Kenai River Chinook salmon and to ensure adequate escapement. In addition to preseason restrictive actions in the sport fishery an EO (2-KS-1-34-13) was issued July 8 that prohibited the retention of Chinook salmon in the Kenai River personal use dip net fishery that occurs from July 10 through July 31 each year (Appendix A4). Further measures by EO 2-KS-1-36-13 extended the Chinook salmon sport fishing closure in waters of the Kenai River from an ADF&G regulatory marker located 300 yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake from July 15 through July 31. By July 23 the projected escapement had declined below the SEG and

an EO (2-KS-1-43-13) was issued restricting the remainder of the river open to sport fishing for Chinook salmon to catch and release trophy fishing effective July 25 (Appendix A4). Low passage rates as well as record low values for all indices of abundance prompted issuance of EO 2-KS-1-43-13 closing the Kenai River to sport fishing for Chinook salmon effective July 28 (Appendix A4). Similar to the 2012 season, the department prohibited the use of bait and multiple hooks in the Kenai River sport fishery downstream of the Sterling Highway Bridge in Soldotna from August 1-15 (EO 2-KS-1- 46-13; Appendix A4).

The DIDSON operated through August 15 and resulted in a *preliminary inseason* DIDSON estimate of 17,015 Chinook salmon. Above the sonar, the inseason estimate of sport fishing harvest (including catch-and-release mortality) was approximately 1,620 fish resulting in a *preliminary inseason* DIDSON based escapement estimate of 15,395 fish (Table 8). The ESSN fishery closed by EO concurrently with the inriver sport fishery on July 28 and did not reopen. Through July 28 a total of 2,256 Kenai River Chinook salmon were harvested in this set gillnet fishery (Table 8).

The inriver netting program operated through August 17 and resulted in preliminary age composition estimates of 28.2% ocean-age-2 fish, 23.5% ocean-age-3 fish, 43.0% ocean-age-4 fish, and 3.4% ocean-age-5 fish. Male Chinook salmon comprised about 66.4% of the fish captured in the netting program during 2013 (Jeff Perschbacher, ADF&G Sport Fish Biologist, Soldotna, personal communication). Total run estimates of age, sex, and length composition for 2013 will not be available until ESSN harvest scales are read.

CURRENT ISSUES

Accurately estimating the total return, escapement and harvestable surplus available to the various fisheries is the major issue for both the early-and late-runs. 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 goals. Inherent limitations of the assessment techniques being developed during the transition to DIDSON that is now used to make the inseason projections to implement management strategies is widely viewed by some of the public to be subjective. A decline in Chinook salmon total returns following 2007 has exacerbated numerous biological issues that have, to some extent, been present in the fisheries for several years. These issues include adequate protections for spawning fish as well as for unique, larger-sized 4-ocean and 5-ocean fish, habitat impacts of a robust inriver fishery and increase in the numbers of small younger Chinook salmon in annual runs. The social issues that persisted through the development of the fisheries remain and are 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 & MANAGEMENT

As the transition of the Kenai River Chinook salmon assessment program from DIDSON at RM 8.6 upstream to RM 13.7 remains ongoing, research and management activities will continue to be interrelated. Research is required for both inseason management and postseason analysis of assessment information to evaluate management strategies as they relate to development of

escapement goals at the new RM 13.7 DIDSON site. The current sonar research will continue until sufficient information is present to develop an escapement goal for each run that can be evaluated by the sonar at the RM 13.7. Once RM 13.7-based escapement goals become established, strategies to achieve goals can be developed and the subjectivity often associated with the management of the fisheries will be reduced. The continuation of these research and management programs is essential to improve the assessment program and transition to the RM 13.7 site. During 2014 the department will continue to look at all indicators of run strength; however, DIDSON at RM 8.6 will remain the primary tool to determine abundance and to implement strategies outlined in management plans to achieve the escapement goals established for each run.

KASILOF RIVER CHINOOK SALMON RECREATIONAL FISHERY

2014 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING KASILOF RIVER CHINOOK SALMON SPORT FISHERY ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) will likely have some impact on the sport fisheries targeting Chinook salmon in the Kasilof River:

Proposal Numbers: 249, 250, 251.

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 were stocked annually into Crooked Creek. From 1994–1999 the number of smolt released averaged 192,476 (Table 12). Because of concerns of hatchery stock introgression and straying of stocked fish, the department reduced the stocking levels to a target of about 105,000. Doing so resulted in stocking an average 99,331 smolt annually over the next 5-year period from 2000-2004. The numbers stocked from 2005–2009 increased to an average of 113,265 smolt (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 2012; Cope 2011). 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 recreational 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 which 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 and to a lesser extent by 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; Cope 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 Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting a regulation previously adopted in 2002 that restricted guides to only one trip per day (guides may have only one 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 return is managed to ensure that a sustainable escapement goal (SEG) of 650 to 1,700 naturally-produced Chinook salmon reach the spawning grounds above Crooked Creek weir and to harvest hatchery-produced Chinook salmon. Objectives for this fishery achieved through the enhancement program are to generate 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 last objective is to hold a sufficient number of naturally-produced Chinook salmon at the

facility to collect 150,000 eggs so that approximately 105,000 Chinook salmon smolt may be released into Crooked Creek annually.

Inseason Management Approach

Currently by regulation, the bag and possession limit is two fish per day, of which only one may a naturally-produced fish. Hatchery-produced fish are allowed to be harvested seven days each week and naturally-produced fish are allowed to be harvested three days per week (e.g., 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. Since 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 indicates the highest catch rates are typically observed prior to June 10. Currently, the Chinook salmon harvest is estimated post-season. Similarly, run strength estimates, harvest estimates and data regarding the inseason performance of the fishery (catch, harvest, effort) are not available inseason since the creel survey was discontinued.

2010 Fishery Performance

To minimize the effects of conservation actions for Kenai River Chinook salmon, the ADF&G issued an EO effective June 5 prohibiting the retention of naturally-produced Chinook salmon (EO 2-KS-1-13-10; Appendix A1). This emergency order was rescinded on June 14 (EO KS-1-20-10; Appendix A1). During 2010, the SEG of 650 to 1,700 naturally-produced Chinook salmon was achieved with an escapement of 1,088 naturally-produced fish passing through the weir at Crooked Creek (Table 9). An additional 260 hatchery-produced fish raised the total escapement to 1,348 Chinook salmon (Table 9). The estimate of effort and harvest from the onsite creel survey was 52,973 angler-hours and a Chinook salmon harvest of 273 naturally-produced and 1,060 hatchery-produced fish (Tables 9 and 11). Approximately 106,000 Chinook salmon smolt were released back into Crooked Creek during 2010 (Table 12).

2011 Fishery Performance

The primary management objective, ensuring an SEG of 650 to 1,700 naturally-produced Chinook salmon reach the spawning grounds, was met in 2011. A total of 654 naturally-produced Chinook salmon and 128 hatchery-produced Chinook salmon passed upstream of the weir to spawn (Table 9) for a total spawning escapement of 782 fish. The estimated harvest of Chinook salmon was 933 fish (Table 9). The objective to stock approximately 105,000 Chinook salmon smolt into Crooked Creek annually was not met in 2011; rather, approximately 64,578 were stocked (Table 12). This was due to low abundance of the 2009 run as the both escapement goal was barely achieved, and the broodstock goal was not achieved. Due to relatively low Chinook salmon abundance in 2011 as well, the department was not able to collect a sufficient number of naturally produced Chinook salmon broodstock at the weir to achieve the stocking objective of 105,000 smolt for 2012. The 2011 total return was estimated at 2,987 Chinook salmon (Table 9).

2012 Fishery Performance

The 2012 Chinook salmon early-run to Kasilof River, similar to early-run stocks throughout Cook Inlet, was below average. To minimize the effects of conservation actions for Kenai River

Chinook salmon, EO 2-KS-1-12-12 effective June 15 prohibited the retention of naturally-produced Chinook salmon at the Kasilof River (Appendix A3). Further restrictions were implemented at Kasilof River on June 22 (EO 2-KS-1-19-12; Appendix A3) prohibiting the use of bait and multiple hooks. The first management objective, ensuring an SEG of 650 to 1,700 naturally-produced king salmon was not achieved as a total of 631 fish were counted through the weir at Crooked Creek (Table 9). In addition, 100 hatchery-produced Chinook salmon reached the spawning grounds for a total escapement of 731 Chinook salmon (Table 9). The harvest estimated from the SWHS by guided and unguided anglers was 872 (Table 9). The total run was estimated to be 1,668 Chinook salmon (Table 9). To support the early-run fishery, 52,759 smolt were released into Crooked Creek (Table 12). Because the SEG for naturally-produced Chinook salmon was not achieved, no surplus escapement was available to provide broodstock and eggs for stocking of hatchery raised smolt back to Crooked Creek in 2013 (Tables 9 and 12).

2013 Fishery Performance

As in 2012, the SEG for naturally-produced king salmon in Crooked Creek of 650–1,700 was not achieved in 2013. In addition, in 2013, no Chinook salmon smolt were stocked into Crooked Creek due to low abundance of naturally-produced Chinook salmon in 2012 even with restrictions to the inriver sport fishery mentioned above. In order to provide the best chance to achieve the SEG of naturally-produced Chinook salmon in Crooked Creek and to meet 2013 stocking goals the department issued a preseason EO (2-KS-1-07-13) on April 18 effective May 1 through June 30 prohibiting the retention of naturally-produced Chinook salmon (Appendix A4). To minimize effects of conservations actions for the Kenai River Chinook salmon sport fishery, EO 2-KS-1-21-13 was effective concurrent to the closure of the Kenai River on June 20 (Appendix A4). This EO prohibited the use of bait and multiple hooks in the Kasilof River early-run Chinook salmon fishery through June 30. The season ending count of naturally-produced Chinook salmon at the Crooked Creek weir was 1,102 fish. In addition, sufficient broodstock were collected for hatchery smolt stocking programs in 2014 (Table 9).

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. Also, 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 1,018 Chinook salmon (Table 10). Using genetic analysis from the ESSN commercial fishery during 2010 and 2011 described in Fleischman and McKinley (2013), and applying the average of those two years towards the ESSN harvests since 1996, the average harvest of late-run Kasilof River Chinook salmon has been estimated at 2,929 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 limit is one fish and the annual limit for Chinook salmon in Cook Inlet is five fish.

2010-2013 Fishery Performance

There has 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 post-season (Reimer and Fleishman 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 2012, EO 2-KS-1-38-12 restricted the late-run fishery to catch and release on July 10 (Appendix A3). The fishery was eventually closed on July 19 with issuance of EO 2-KS-1-43-12 (Appendix A3). Harvests estimated by the SWHS were 1,660 Chinook salmon in 2011 and 55 Chinook salmon in 2012 (Table 10). No management actions were taken during the 2013 season.

There have been changes in the commercial fisheries targeting sockeye salmon bound for the Kasilof River in recent years due to large numbers of sockeye salmon passage at the ADF&G sonar station at the Kasilof River in excess of escapement needs. These commercial fishery changes included the implementation of terminal commercial fishing periods at the mouth of the Kasilof River annually from 2005 through 2008. These terminal commercial fishing periods are designed to reduce the numbers of sockeye salmon entering the Kasilof River when it is determined the sockeye salmon escapement will be achieved; 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. During 2009 through 2012, the terminal fishery was not operated. During 2013 the terminal harvest area was extensively used to reduce numbers of sockeye salmon entering the river while the remainder of the Kasilof section ESSN fishery was closed to conserve Kenai River Chinook salmon. The estimated Chinook salmon sport harvest from the Kasilof River of 2,164 fish during 2009 was nearly double all previous Chinook salmon harvests estimated for this sport fishery and has declined in years thereafter likely due in part to low Chinook salmon abundance and inseason restrictions (Table 10).

Occasionally, anglers bring in harvested Kasilof River late-run Chinook salmon, over 50 pounds in total weight, to ADF&G 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 2013 one “Trophy Fish” certificate was issued to an angler for a late-run Chinook salmon harvested in the Kasilof River.

CURRENT ISSUES

Low abundance of Chinook salmon in the Kasilof River returns has persisted since 2009. At current levels of abundance it is likely the sustainable escapement goal for naturally produced Chinook salmon and broodstock objectives in the early-run will not be achieved under existing regulations.

The Crooked Creek facility was originally constructed in 1974 and is now used to assess the spawning escapement and to support the stocking program. The facility is an old hatchery that has several deficiencies. The deficiencies are caused by structural deterioration of the facility. In addition, flow through the facility is obtained by run of the river diversions from Crooked Creek. Flows are conveyed through the facility and returned to the creek by gravity flows. Over the past three decades changes to the channel morphology have altered flow characteristics of Crooked Creek. Extensive repair and upgrade to correct the deficiencies is an ongoing project. These repairs are necessary so that the department can continue to use the facility to collect broodstock, count and sample adult Chinook salmon as well as to hold smolt for imprinting and release.

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 three privately owned landings to retrieve drift boats were available for public use in the lower river. Due to the landings locations relative to the lay-out of the fishery and established fishing patterns, one landing received primary use while the other two received only infrequent use by drift boat anglers. Currently one of the infrequently used landings now serves as the primary drift boat retrieval landing. Because of this situation and popularity of the drift boat fishery, land acquisition and 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 two locations in the lower river. Since the evaluations described boat landings constructed 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. It is not understood how the culvert barrier impacts Chinook salmon production in the 52.6 square mile Crooked Creek watershed.

Reduced stocking levels the past 10 years 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 restored to those levels prior to 2000.

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 river 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 gill net operators during July, is a contentious social issue. This fishery is opened infrequently under certain circumstances to reduce the escapement of sockeye salmon to the Kasilof River. While doing so, Chinook salmon harvest also occurs. It is assumed all Chinook salmon caught in the KRSHA are of Kasilof River origin.

RECOMMENDED RESEARCH AND MANAGEMENT

Research will focus on long-term quantitative stock assessment of naturally-produced Crooked Creek Chinook salmon to supply information to refine the existing escapement goal. This includes estimating the numbers of fish in the annual runs by utilizing harvests 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 escapement goal of naturally-produced fish. Beginning in 2000 the number of Chinook salmon smolt stocked into Crooked Creek was reduced from approximately 210,000 to 105,000. Since 2000 stocking levels have remained relatively stable (Table 12). It is not known if the natural production of Chinook salmon in Crooked Creek can compensate for the reduction in stocking levels. Since 2007 the total runs of naturally-produced Chinook salmon were lower than previous years 2004-2007 (Table 9). 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.

Management efforts are focused on ensuring the fishery is managed to achieve the established escapement goal for Crooked Creek 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 the restoration and infrastructure improvements to Crooked Creek and the 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 to restore and maintain the connectivity of Crooked Creek as important water to 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 the 2014 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 conservations concerns for this stock because 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 RECREATIONAL FISHERIES

2014 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING RUSSIAN RIVER SOCKEYE SALMON SPORT FISHERY ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) will likely have some impact on the sport fisheries targeting sockeye salmon in the Russian River and Russian River sanctuary:

Proposal Numbers: 245.

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 returns of sockeye salmon to upper Cook Inlet (UCI) and provides one of the largest freshwater recreational 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 recreational fisheries for the other species.

Sockeye salmon return to the Russian River during two 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 recreational 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 two 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, recreational, 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 recreational 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 (2003–2012) average harvest of early and late-run sockeye salmon is approximately 34,375 and 21,200 fish, respectively (Table 13). The Federal subsistence fishery prosecuted on both runs supports an annual harvest of approximately 1,000 fish with the majority of this harvest taken from the early run (Table 13).

Angler effort estimates from the SWHS over the most recent 10-year period (2003–2012) have averaged 54,384 angler-days per year (Table 13). Although these estimates include effort directed toward other species such as 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, effort has remained relatively stable with annual effort expended in 2010 through 2012 being lower when compared to effort estimated historically. Because this area is popular for various forms of outdoor recreation, the two 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, the 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 Kenai and Russian rivers. The 4.4-acre property, formerly the site of the privately owned Sportsman's Lodge, was purchased. 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 recreational fishery have become more restrictive to ensure sustainability of the stock. 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. Information collected about the same time through the tagging and release of snagged sockeye salmon indicated nearly all fish hooked, landed tagged and released that were hooked elsewhere than the mouth survived to pass through the Russian River weir. In 1967, 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 3/8 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 recreational 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 Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting, no regulation changes were made to the Russian River sockeye salmon sport fisheries.

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 (Table 13).

The *Russian River Sockeye Salmon Management Plan* recognizes that commercial users as well as mainstem Kenai and Russian River recreational 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 recreational users. In the event that conservation measures are required to achieve the minimum escapement goal, ADF&G may restrict Kenai River drainage recreational 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, given their 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 2006-2008 (Eskelin et al. 2013). 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 recreational 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 three 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 historic mid-point 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). 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 an indicator 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 which include 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 recreational fishery opens June 11 and closes August 20 by regulation. Sockeye salmon run strength at Russian River was low for 3 consecutive years 2010-12. Therefore the early-run recreational fishery was not liberalized inseason during these years as had often been the case in past years. During the late-run fishery, the fishery was closed in 2010 but no further inseason actions were taken even though inriver recreational (sport and personal use) sockeye salmon fisheries were liberalized downstream of Skilak Lake. 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 power line crossing. Since 2009 the bag limit increase has been applied downstream to Jim's Landing to increase exploitation on a large run (Begich and Pawluk 2010). Historically, the bag and possession limit has been increased from 3 fish to 4 or 6 fish.

2010 EARLY-RUN FISHERY PERFORMANCE

Following installation of the weir on June 9, initial stream surveys of the Russian River and sanctuary area at the start of the sport fishery on June 11 indicated few sockeye were present. Stream survey observations were corroborated by reports of low catch rates in the sport fishery and relatively low numbers of sockeye salmon counted through the weir each day through mid-June. The numbers of anglers fishing the area was observed to be lower than in previous years and catch rates were also low due to low sockeye salmon abundance as relatively low numbers of sockeye salmon passed through the fishery and weir during the first week of the fishery (Table 14). No management actions were taken for the 2010 early-run sockeye salmon sport fishery. The lower bound of the SEG (14,000–37,000) was achieved on June 30 and the final escapement was 27,074 sockeye salmon (Table 13). After accounting for harvest, the estimated total run was approximately 51,100 fish and was below the recent 10-year average (2000-2009) of 93,148 fish (Table 13).

2011 EARLY-RUN FISHERY PERFORMANCE

The first day of weir operations was on June 7, 2011. No management actions were taken for the 2011 early-run sockeye salmon sport fishery. The lower bound of the BEG (22,000–42,000) was achieved on July 1 and the final escapement was 29,129 sockeye salmon (Tables 13 and 14a). The estimated early-run Russian River sockeye salmon sport harvest was 22,697 and the 2011 total early-run was approximately 52,468 (Table 13). Abundance was lower than the most recent 10-year average (2001-2010) of 91,123 fish (Table 13).

2012 EARLY-RUN FISHERY PERFORMANCE

The weir was installed on June 7 at Lower Russian Lake. Fish passage was low for the first several days of the fishery as large numbers of 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 2012. During the early-run there was very high discharge, so to facilitate fish passage the fish pass was opened on June 13 and remained open until July 12. The lower bound of the BEG (22,000-42,000) was not achieved until July 5 and the final escapement count at the weir was 24,115 sockeye salmon through July 14 (Tables 13 and 14a). The estimated harvest was 15,231 fish (Table 13). The 2012 total run was approximately 40,213 and was less than half of the most recent 10-year (2002-2011) average total run of about 85,004 sockeye salmon (Table 13). The department produced a preseason forecast of the total abundance of 2012 early-run Russian sockeye salmon. A below average total run of approximately 52,000 fish was forecasted. After accounting for an average exploitation rate of 0.47 the preseason escapement projection based on the forecast was approximately 27,000 sockeye salmon and compared closely to the escapement of 24,115 fish.

2013 EARLY-RUN FISHERY PERFORMANCE

At the time of weir installation on June 6, sockeye salmon were present in the Russian River. However, the initial counts of sockeye salmon passage at the weir from June 7 through June 11 were low due in part to high discharge in the Russian River falls that impedes upstream fish passage (Table 14). A stream survey of the Russian River downstream of the falls and sanctuary area on June 12, one day after the start of the sport fishery on June 11, indicated sockeye salmon

abundance was relatively high. As a result of high discharge and the presence of a high number of sockeye salmon below the falls, the fish pass was opened on June 12 and remained open until June 23. Consequently, when it was projected the lower bound of the BEG (22,000) would be attained, EO 2-RS-1-20-13 was issued effective June 19 to open the sanctuary area to sport fishing (Appendix A4). This EO was followed by a second EO (2-RS-1-23-13) effective June 22 that increased the bag and possession limits for sockeye salmon from three per day, three in possession to six per day, twelve in possession in that area of the Kenai River upstream from Skilak Lake to ADF&G regulatory 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 (Appendix A4). This EO was issued because it was projected the BEG would be exceeded. The final escapement of sockeye salmon through the Russian River weir was 35,776 fish (Table 13). The early-run of sockeye to Russian River displayed earlier run-timing than the historical average. The 2013 estimates of fishing effort and harvest will be available when the SWHS is published in mid-2014. 2013 marked the second year the department attempted to produce a preseason forecast for the total number of early-run sockeye salmon in the run and escapement. An above average total run was forecasted of about 80,000 fish with an escapement of approximately 43,000 fish, assuming a historical average harvest rate.

2010 LATE-RUN FISHERY PERFORMANCE

During the 2010 season, the late-run Russian River Area sockeye salmon sport fishery was closed on August 12 by EO on August 10 (EO 2-RS-1-43-10; Appendix A1). The EO closed the sockeye salmon sport fishery in the Kenai and Russian rivers fly-fishing-only waters downstream to the power line below the Russian River Ferry Crossing because ADF&G was not able to project that the SEG of 30,000 to 110,000 sockeye salmon would be achieved. An increase in the passage rate of sockeye salmon occurred August 20. The lower bound of the SEG (30,000–110,000) was obtained on August 25 and the escapement was 38,848 sockeye salmon through September 7 (Tables 13 and 14b). The 2010 late-run Russian River sockeye salmon sport fishery was characterized by low sockeye abundance and low angler success rates. The 2010 harvest was 9,333 fish and was the lowest harvest of late-run Russian River sockeye salmon since 1975 (Table 13). A foot survey was conducted on August 23 and resulted in an estimate of 16,656 spawning sockeye salmon below the Russian River weir downstream to the mouth of the Russian River.

2011 LATE-RUN FISHERY PERFORMANCE

No management actions were taken for the 2011 late-run Russian River sockeye salmon sport fishery. Sockeye salmon were enumerated at the Russian River weir from July 15 through September 6. The 2011 late-run sockeye salmon escapement through the Russian River weir was 41,529 fish and was within the SEG range of 30,000 to 110,000 fish (Table 13). This was below the previous 10-year (2001–2010) average escapement of 77,207 fish. The lower goal range of 30,000 fish was achieved on August 22, 2011 (Table 14). This was later than typically observed and sport fishing catch rates were low in the Russian River. 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 2011 harvest was 14,412 fish and was the second lowest harvest of late-run Russian River sockeye salmon since 1997 (Table 13). 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 35,415 fish. This was the second highest 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 56,252 fish (Table 13).

2012 LATE-RUN FISHERY PERFORMANCE

No management actions were taken for the 2012 late-run Russian River sockeye salmon sport fishery. The weir was removed on September 5 after a total escapement of 54,911 late-run sockeye salmon had been counted (Table 13). The escapement through the weir was within the SEG (30,000–110,000) and was lower than the previous 10-year (2002-2011) average escapement of 73,863 fish. Fishery observations indicated that catch rates were low through July; however, catches improved during the first week of August and the mid-point of the run occurred just 6 days prior to the regulatory closure of the fishery on August 14 (Table 14). The resulting sport harvest of 15,074 fish was the third lowest harvest estimated for the late-run fishery since 1997 (Table 13). The local run of late-run sockeye salmon was 70,446 fish (Table 13). The estimated number of late-run sockeye salmon spawning in the Russian River downstream of the weir during a foot survey conducted on August 27 was 25,471 fish.

2013 LATE-RUN FISHERY PERFORMANCE

During the 2013 season, no management actions were taken in the late-run Russian River Area sockeye salmon sport fishery. During the final week of July several daily counts of sockeye salmon at the Russian River exceeded 1,000 fish indicating an above average run was in progress. Thereafter, the daily escapement counts as well escapement projections declined and remained relatively stable through the remainder of August. The SEG (30,000 to 110,000) was achieved on August 27, a full seven days after the Russian River sockeye salmon sport fishery closed by regulation. Similar to the 2013 Russian River early-run, the late-run also displayed early run-timing as the mid-point of the run occurred very early on August 2 (Table 14). The weir was operated through September 3 providing a final escapement count of 31,573 late-run sockeye salmon. This was the lowest escapement of late-run sockeye salmon since 1977 (Table 13). The fishery experienced moderate catch rates during late July and early August; however, overall the sport fishery was characterized by low sockeye salmon abundance and low catch rates. The estimated number of late-run sockeye salmon spawning in the Russian River downstream of the weir during a foot survey conducted on August 22 was 18,972 fish. The 2013 estimates of fishing effort, harvest, and estimate of the total run to the area will be available when the SWHS is published in mid-2014.

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 and infrastructures (trails, boardwalks, stairways) to support anglers that are positioned in the Russian-Kenai river uplands or riparian areas has 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 has 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. This is a new issue and it is a concern for anglers as the majority of sockeye 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 research or 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–B8).

KENAI RIVER LATE-RUN SOCKEYE SALMON RECREATIONAL FISHERIES

2014 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 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) that would have any level of impact on the sport fisheries targeting late-run sockeye salmon in the Kenai River:

Proposal Numbers: 168, 169, 170, 171, 244, 247.

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 23,584 sockeye salmon from 1977 through 1981 (Mills 1979-1980, 1981a-b, 1982).

Between 1981 and 1989, the average harvest increased (Table 15). This dramatic increase 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 16). Kenai River late run sockeye salmon sport fish harvests from 1981 to 2012 have ranged from 15,702 to 455,454 and averaged 194,409 fish, while the estimated sockeye salmon runs to the sonar have exceeded a million fish on several occasions (Tables 15 and 16).

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

- Large numbers of sockeye salmon must be present to provide acceptable harvest rates.
- The fishery is short in duration, usually within July 14 to August 5 depending on run timing, and is approximately 15-20 days.
- 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.
- 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 multi-species fishery in July and August when the late-run sockeye salmon recreational 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 Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting no regulation changes were made to the Kenai River late–run sockeye salmon sport fishery.

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 inriver sport harvest above the sockeye sonar located at river mile (RM) 19.

The plan directs ADF&G to do three things:

1. Meet the optimum escapement goal,
2. Achieve inriver goals as established by the board 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 three levels of projected run strength. Ranges of projected run strength and corresponding inriver (sonar) goals are outlined in the plan as follows:

Projected Run Strength	Inriver (Sonar) Goal
1. less than 2.3 million fish	900,000-1,100,000 sockeye salmon
2. 2.3-4.6 million fish	1,000,000-1,200,000 sockeye salmon
3. greater than 4.6 million fish	1,100,000-1,350,000 sockeye salmon

The 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 the 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 recreational 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 the department completed the transition from Bendix sonar technology to DIDSON technology as the method to assess late-run Kenai River sockeye salmon run. The goals adopted by the BOF (described above) reflected the adjustment in the estimated number of sockeye salmon passing the RM 19 sonar station in 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 recreational fishery as management, similar to years prior to 2011,

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 recreational harvest of sockeye salmon inseason, provided that 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 recreational harvests. If the inriver goal (sonar estimate) is achieved, the recreational fishery can be prosecuted without restriction. This management strategy for the Kenai River recreational sockeye salmon 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.

2010 FISHERY PERFORMANCE

The 2010 preseason forecast for Kenai River late-run sockeye salmon was for a run of approximately 1.7 million fish (Shields 2010). This forecasted run size was below the long-term average run size of just over 3.0 million sockeye salmon. On July 23, the inseason run size was estimated to be greater than 2 million fish. Due to the strength of the 2010 Kenai River sockeye salmon run, an EO was issued on July 23 to increase the bag and possession limit to 6 fish effective July 24 (EO 2-RS-1-39-10; Appendix A1).

The final estimated total run was approximately 3.3 million Kenai River sockeye salmon run (Shields 2010). The estimated number of sockeye salmon to pass the sonar counter was 970,662 fish (Table 15). When sport harvest estimates above the sonar were subtracted from the sonar estimate, the estimated escapement of Kenai River late–run Kenai River sockeye salmon was 713,443 fish and was within the OEG range (500,000-1,000,000; Shields 2010).

2011 FISHERY PERFORMANCE

The 2011 preseason forecast for Kenai River late-run sockeye salmon was for a run of 3.9 million fish. This forecasted run size was 9% greater than the 20-year average run of 3.6 million. In season, the preliminary run size was estimated to be greater than forecasted and greater than 4.6 million fish. The actual run lagged behind the historic average during the first two weeks of July as only about 91,000 sockeye salmon were estimated to have passed the mile 19 sonar station through July 16. However, from July 17 through July 31 an estimated 1,325,563 sockeye salmon passed the sonar station. Over the 15-day period from July 17-31 daily passage estimates of sockeye salmon exceeded 50,000 fish eleven days, exceeded 100,000 fish five days and exceeded 200,000 fish one day. The large influx of sockeye salmon provided excellent sockeye salmon harvest opportunity throughout the Kenai River downstream of Skilak Lake. The Kenai River sport fishery was liberalized by increasing the sockeye salmon bag limit from three to six fish effective July 21 with issuance of EO 2-RS-1-21-11 on July 20 except in the Russian River and the Kenai River “fly-fishing-only waters” at the confluence of the Russian River, (Appendix A2). The possession limit was not increased and remained 6 sockeye salmon. The remainder of the run to pass the sonar in August was similar to the beginning of the run as the estimated number of sockeye salmon to pass the mile 19 sonar station daily ranged only from approximately 6,000 to 22,000 fish. Consequently, catch and harvest rates in the late-run sockeye salmon recreational fishery declined sharply.

The final estimate for the 2011 sockeye salmon total run was 2.2 million fish greater than the forecast, and was approximately 6.1 million fish (Shields 2012). The number of sockeye salmon

estimated to pass by the sonar was 1,599,217 (Table 16). After accounting for the sport harvest of 314,731 sockeye salmon above the sonar, the estimated spawning escapement was 1,275,369 sockeye salmon and was within the OEG range (700,000-1,400,000; Table 16).

2012 FISHERY PERFORMANCE

The 2012 preseason forecast for Kenai River late-run sockeye salmon was for a run of approximately 4.0 million fish (Shields 2013a). ADF&G used inseason assessment data to project that the 2012 Kenai River sockeye salmon run was greater than 4.6 million fish. Based on this projection, the department issued EO 2-RS-1-45-12 to increase the sockeye salmon bag and possession limit to 6 per day and 12 in possession, effective July 21 downstream of Skilak Lake (Appendix A3). At that time approximately 597,000 sockeye salmon had passed the sonar. The minimum inriver run goal of 1,100,000 fish in the Kenai River was achieved on July 27, and by August 1 the cumulative passage estimate had exceeded 1,300,000 sockeye salmon. The final sockeye salmon passage estimate past the sonar was 1,581,555 fish (Table 16). After accounting for removal by harvest above the sonar, the final estimated escapement was 1,197,518 fish, which was within the OEG range (700,000-1,400,000). The final estimated total run abundance of Kenai River late-run sockeye salmon was approximately 4.7 million fish, which was greater than the preseason forecasted run strength.

2013 FISHERY PERFORMANCE

The 2013 preseason forecast for Kenai River late-run sockeye salmon was for a run of approximately 4.4 million fish which was about 13% greater than the long-term average (Shields and Dupuis 2013b). By July 19 the department determined the Kenai River late-run of sockeye salmon was greater than 2.3 million fish and the OEG would be achieved. Therefore EO 2-RS-1-41-13 was issued to increase the sockeye salmon bag and possession limit to 6 per day and 12 in possession effective July 20, in the Kenai River downstream of Skilak Lake (Appendix A4). From July 14 through July 21 over 900,000 sockeye salmon were estimated to have passed the departments sonar at river mile 19 of the Kenai River. This early run-timing provided excellent sport fishing however daily passage estimates at the sonar declined thereafter and did not exceed 31,000 for the remainder of the season when the river mile 19 sonar operations closed on August 7. The final total cumulative sockeye salmon sonar passage estimate was 1,359,893 fish (Table 16). The spawning escapement will be published when sport harvest estimates of sockeye salmon in the Kenai River become available in 2014 however, the final escapement will be within the OEG range. The *preliminary* estimated total run abundance of Kenai River sockeye salmon was slightly less than forecasted and was approximately 3.6 million fish.

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, which requires the department to project inseason the total return of late-run sockeye salmon to the Kenai River is an issue with the public. The responsibility of developing the inseason projection falls upon

Commercial Fisheries Division 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 ranges of projected run strength, corresponding inriver (sonar) run goals, and the SEG and OEG are misunderstood by the public.

Large numbers of anglers concentrated in confined shoreline fishing areas during this brief but intense 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 Board of Fisheries. 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 & MANAGEMENT

We recommend a continuing 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: "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 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 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 the department remain active in securing management right to additional land parcels within the Kenai River corridor for riparian habitat conservation.

NORTHERN KENAI PENINSULA AREA COHO SALMON RECREATIONAL FISHERIES

2014 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING KENAI RIVER COHO SALMON SPORT FISHERY ISSUES

The following proposal published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) will likely have some impact on the sport fisheries targeting coho salmon in the Kenai River:

Proposal Number: 248.

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 two runs of coho salmon migrate into Kenai River. However, creel surveys conducted from 1991 to 1993 and in 1998 indicate that two distinct runs are not readily discernable from harvest rate data (Clark et al. *Unpublished*). Furthermore, recoveries of returning adult coho salmon, marked as smolt, in the Kenai River indicate that time of entry and time of spawning are independent of time of marking as smolt (Clark et al. *Unpublished*). As a result, coho salmon in the Kenai River are managed with harvest information and smolt abundance as a single stock.

Coho salmon typically begin entering Kenai River in late July and continue through mid-September, and at much reduced levels into late-November. Elsewhere in 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, 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. Recreational 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*. 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:

- The end date of the season was extended for coho salmon fishing within the Kenai River drainage from September 30 to October 31.
- Bait was allowed throughout the entire season downstream of the Upper Killey River.
- The August 1–3 coho salmon fishing closure downstream of Skilak Lake was repealed, allowing a continuous season from July 1 through October 31.
- The regulation prohibiting fishing after a person takes a bag limit of 2 coho salmon below Upper Killey River was reduced to below the Soldotna Bridge, allowing a person to continue to fish upstream of the Soldotna Bridge.

- Fishing from a guide 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 limit 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:

- A bag and possession limit increase from 2 coho salmon to 3 coho salmon within Kenai River beginning September 1, except within the Russian River and Kenai/Russian Rivers fly-fishing only waters area.
- 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:

- 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.
- A person may not remove a coho salmon 16 inches or greater from the water before releasing it.
- 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 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) (Carlon and Hasbrouck 1996-1998; Massengill and Carlon 2004a-b, 2007a-b; Massengill 2008; Massengill and Evans 2007; Begich and Pawluk 2010; Robert Massengill ADF&G Sport Fish Biologist, Soldotna, personal communication). The majority of the total harvest of Kenai River stocks occurs in the recreational fisheries of the Kenai River (Table 17).

Kenai River coho salmon are also harvested in personal use and subsistence fisheries. In 1981 and 1983-1993, there was a fall personal use or subsistence set gillnet fishery for coho salmon on the eastside beaches that were open to commercial setnetting. This fishery was open in September, and therefore harvested late-running coho salmon. In 1985 and 1991 through 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 the 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 recreational fishery through the early 1990s, fisheries managers became increasingly concerned that the current harvest levels could not be sustained.

The SF began a stock assessment program in 1992 which focused upon the estimation of annual smolt production as an indicator of future abundance (Carlon 2000, 2003; Carlon and Hasbrouck 1997-1998). 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, the 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 1999-2004. In addition, this inriver estimate in combination with the sport harvest data from the SWHS enabled ADF&G to estimate total returns, 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 returns 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 17). Sport harvests then decreased from 1994 to 1999. Kenai River coho salmon sport harvests averaged 40,776 fish prior to the 2 fish a day bag limit started in 2000, and has since averaged 48,589 fish (Table 17).

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 Six Mile and Resurrection creeks has remained stable, with some variation (Table 18). Harvests for the most recent 10-year average (2003–2012) are slightly greater in Kenai River tributaries, Kasilof River drainage and other drainages than harvests prior to the bag limit reduction in 2000 (Table 18).

Recent Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting regulations were adopted affecting coho salmon sport fisheries in the NKPMA. One new regulation affecting all freshwaters of Cook

Inlet adopted by the board prohibited the removal of coho salmon from the water prior to release; a coho salmon removed from the water counts toward the bag limit of the person hooking it and must be retained. In the Kenai River drainage from the Russian River ferry crossing near the confluence of the Russian and Kenai rivers, downstream to the power line, the daily bag and possession limit for coho salmon was reduced from two to one fish per day. In the Kasilof River drainage downstream of the Sterling Highway Bridge, the board extended the amount of time anglers are allowed to use bait during coho salmon season from August 31 to September 15.

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*. 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, department objectives are for NKPMA coho salmon are:

- To provide 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 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 was 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. The capture rates from this project indicated the Kenai River coho salmon run size as estimated by the index as being low, medium or high in magnitude. Currently, inseason fishery performance is assessed through information provided by anglers.

The SWHS is currently used to assess coho salmon fishery performance postseason (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, In prep; Romberg et al. In prep). 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.

2010–2013 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 2012 coho salmon fishery was below average while the 2010 and 2013 fisheries were above average. The estimated harvest in the Kenai River declined each year from 52,912 in 2010 to 36,407 in 2012 (Table 17). Harvest during 2012 was below the long term (1981–2010) average harvest of 43,793 coho salmon. The most recent 10-year (2003–2012) average harvest is 47,371 fish. Harvests in the Swanson River drainage showed a similar pattern of lower recent harvests: less than the long term average in 2011 (1,348) and the 2012 estimated harvest of 283 coho salmon was the lowest harvest estimated since 1985 (Table 18). Coho salmon harvest estimates in other NKMPA drainages were also lower than the long-term average harvests estimated for those systems. Reports from anglers during the 2013 coho salmon fishery indicated the fishery improved over 2011 and 2012 with relatively stable and good coho salmon catches reported from early August until September. ADF&G expects that the 2013 harvests of coho salmon from these fisheries will be near or above the recent 10-year average for each system.

Reports from anglers during the 2010 Kenai River coho salmon sport fishery indicated the fishery started out very slow but improved. Poor to fair coho salmon catches were reported in early August, though catch rates improved in late-August. Reports indicated that good fishing waned later in the run during September. Coho salmon were caught throughout the drainage and the run timing appeared to be normal with bright fish present throughout the run.

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 2011 and 2012 seasons indicated a decline in harvest and matched inseason fishery reports. The SWHS estimates declined from 52,912 in 2010 to 36,407 for the 2012 season indicating less than average coho salmon run strength. For both 2011 and 2012 run abundance likely approximated average or was less than average with the 2012 run generally considered to be of lowest run-strength over several recent years. The estimated harvest was

approximately 44,132 fish and 36,407 fish in 2011 and 2012, respectively (Table 17). Reports from anglers during the 2011 Kenai River coho salmon sport fishery indicated the fishery was good for an approximate 10 to 12 day period during mid-August, thereafter fair to poor catches were reported until mid-September. In September the reports of good fishing success increased markedly from throughout the river for a short duration. During 2012 reports during August indicated below average catch rates. A high water event began in mid-September and persisted into October. Flood conditions prompted the Department of Natural Resources, Division of Parks and Outdoor Recreation to close the entire Kenai River to all boating from 1:00 p.m., September 24 to 27, 2012. The river remained closed to boating downstream of the Upper Killey River through October 3, 2012 before reopening on October 4, 2012. High water prior to and following this closure is likely to have significantly impacted sport fishing effort in the Kenai River from about mid-September through early October hence, impacted the catch and harvest of Kenai River coho salmon during 2012.

Reports from 2013 indicated that fishing was generally much better than recent years with good to excellent fishing reported from early-August to September and mid-September well into the fall. These reports indicated run strength was likely well above average. The above average run-strength was also reflected in department catches of coho salmon in the lower Kenai River Chinook salmon netting program were high in early August and remained unusually high through the end of the project on August 15. Coho salmon were caught throughout the drainage and the run timing appeared to be earlier than normal with bright fish present throughout the run. Therefore above average harvest estimates are anticipated for the Kenai River in 2013.

CURRENT ISSUES

Historically, fishery performance, measured by catch and harvest, was thought to be proportional to abundance managed under a 3 fish bag limit. The fishery is presently managed under a 2 fish bag limit except 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 comprise 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 abundances. The lack of information to estimate total returns, escapements and a harvestable surplus is a concern for the public who desire a 3 fish bag limit.

RECOMMENDED RESEARCH & MANAGEMENT

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

NORTHERN KENAI PENINSULA MANAGEMENT AREA PINK SALMON RECREATIONAL FISHERIES

2014 Proposals to the Alaska Board of Fisheries Concerning Pink Salmon Sport Fishery Issues

There are no proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) pertaining to NKPMA pink salmon.

Background and Historical Perspective

Runs of pink salmon occur each year however 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 returns. The majority of the pink salmon harvest occurs in the Kenai River (Table 19).

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 limit in the Kenai River was increased to six 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 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 management plan adopted by the Board of Fisheries. Department objectives for this fishery are:

- To provide 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 spawning escapement does not decline below levels necessary to ensure 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 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, In prep; Romberg et al. In prep). Results from this survey are typically available during the year following the season.

2010–2013 FISHERY PERFORMANCE

Inseason run strength information were gauged by reports from department staff, volunteered by guides and by individual anglers. Final harvest estimates provided by the SWHS indicate the

recent Kenai River even year catch and harvest estimates from 2010-2012 was comparable to historic catch and harvest levels (Table 19).

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 RECREATIONAL FISHERIES

KENAI RIVER RAINBOW TROUT RECREATIONAL FISHERY

2014 Proposals to the Alaska Board of Fisheries Concerning Kenai River Rainbow Trout Sport Fishery Issues

The following proposals published in "The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues" (ADF&G 2013a–f) will likely have some impact on the sport fisheries targeting rainbow trout in the Kenai River:

Proposal Numbers: 246, 252, 253, 254.

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 two to three decades. Catches have ranged from 8,720 to 202,875 fish since 1984 and are more stable in recent years (Table 20, Figure 9).

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, implemented in the years outlined below:

1959–1964	Season: Areawide 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	Season: Kenai River changes to no closed season.
1978	Daily bag limit: (Areawide) Combined trout/char/grayling/salmon under 16 inches: 10/day, only 1 over 20 inches.
1979	Annual bag limit: (Areawide) Harvest record required for rainbow/steelhead trout over 20 inches - 2/year.

1980–1981	Annual bag limit: (Areawide) Increased to 5 rainbow/steelhead trout over 20 inches.
	Gear restriction: (Kenai River) 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	Season: (Kenai River) Spring closure from January 1 to June 14 (excludes Skilak Lake).
	Bag limit: (Areawide) Changed to 5 rainbow trout with only 1 over 20 inches.
1984–1986	Season: (Kenai River) Spring and fall closure from November 1 to June 14 (includes Skilak Lake).
	Bag limit: (Kenai River) Changed to 3/day, only 1 over 20 inches.
	Annual bag limit: (Areawide) Rainbow/steelhead trout over 20 inches—changed to 2/year.
	Gear restriction: (Kenai River) 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	Season: (Kenai River) Spring and fall closure from November 1 through June 14 (includes Skilak Lake).
	Bag limit: (Kenai River) Reduced to 2/day; 1 daily over 20 inches.
	Annual bag limit: (Areawide) Rainbow/steelhead trout over 20 inches—remained at 2/year.
	Gear restriction: (Kenai River) 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	Area between Skilak and Kenai lakes designated a trophy trout area. Only trout 20 inches or larger could be retained. Susitna-West Cook Inlet annual limit remained at 2 trout over 20 inches. Terminal tackle in upper Kenai River limited to single-hook artificial lures.
1991	Trophy trout area extended to include half-mile radius of Skilak Lake inlet. Minimum length of trophy trout increased to 24 inches.
1993	Length at which a trout in the trophy trout area could be retained increased to 30 inches. The bag and possession limits for trout in Skilak Lake and the Kenai River downstream from Skilak Lake were reduced to 1 fish. The trophy trout area was closed to <u>all</u> fishing from April 15 through June 10.
1997	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. Trout season in all waters of the Kenai River drainage is now June 15 through April 15. All flowing waters upstream of the Upper Killey River closed to all fishing from April 15

through June 14. 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.

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 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.

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 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 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. The spring spawning seasonal closure was aligned throughout the drainage, designated from May 2 through June 10. 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 The area from the Skilak Lake outlet downstream to the Upper Killey River closed to all fishing from May 2 through June 10.

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

In 1987, the study was expanded to include two 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 21). This study also concluded that these estimates were likely 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 21). 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 year 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 20). 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 20).

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, 300mm (12 inches) or more in length, was 5,106 fish in 2009 (Table 21). The 2001 data were reevaluated in 2009 using different assumptions resulting in an estimated population size of 6,365 fish (Table 21). The 2009 estimate is lower than the 2001 estimate of 6,364 fish but within the range of abundances estimate 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 show 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 over-summering areas that are relatively well defined. Specifically, radio-tagged 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 Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting no regulations were adopted affecting the Kenai River rainbow trout sport fisheries.

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:

- To provide the opportunity for angler participation at a level that can be supported by the fisheries resource and associated habitat.
- To 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. 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.

2010–2013 Fishery Performance

Sport harvest and catch for the Kenai River rainbow trout fishery is determined by the SWHS (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, In prep; Romberg et al. In prep). Total catches of Kenai River rainbow trout increased steadily since the mid-1980s and remain high with some variation (Table 20; Figure 9). The most recent 10-year (2003-2012) average catch and harvest, as determined from the SWHS, is 166,660 and 2,560 fish respectively (Table 20). The most recent 10-year (2003–2012) average percent of rainbow trout retained of fish caught in the flowing waters of the Kenai River is only about 2% (Table 20). ADF&G estimates that the 2013 total catch will be similar to the most recent average.

Retention of rainbow trout by anglers has increased slightly since the mid to late 1990s (Table 20). 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 20). Since 2008 the estimated harvests have been less than 400 fish and during 2012, the estimated harvest of rainbow trout in this section between the lakes was 386 fish, while catch in this section remains high (Table 20). For the entire river, as numbers of retained rainbow trout increased, the overall percentage of retention has declined due to more anglers participating in the fishery. The percentage of the total number of rainbow trout caught in the Kenai River in 2012 that were retained is 1.5% (Table 20). This is similar to the recent percentages estimated for fish retention. ADF&G predicts that this trend will continue and the 2013 catch and harvest data will be similar to 2012 data. Overall, the SWHS information shows that the Kenai River rainbow trout fishery is as popular as it has ever been as a catch-and-release recreational fishery. Information about the rainbow trout stock in combination with catch and harvest information indicates the stock remains robust.

During 2012 anglers reported fair to good rainbow trout fishing in the upper Kenai River in June and July. From late August to early October three separate high water events caused by seasonal rain events and glacial dam outbursts, generated unfavorable rainbow trout fishing conditions (turbid and high water levels) that dampened both fishing success and angler effort. In 2012 above average inriver abundance of late-run sockeye salmon generated anticipation for a good late-season rainbow trout fishery in the fall; however, high water conditions caused by persistent rain beginning in mid-September resulted in flood conditions throughout the Kenai River drainage. Flooding prompted the Department of Natural Resources, Division of Parks and Outdoor Recreation to close the entire Kenai River to all boating from 1:00 p.m., September 24 to 27, 2012. The river remained closed to boating downstream of the Upper Killey River through October 3, 2012 before reopening on October 4, 2012. The water prior to and following this closure had a significant impact on the 2012 rainbow trout fishing effort. By the time flood waters receded to average fall season levels unseasonably cold overnight air temperatures effectually ended the late fall rainbow trout fishery for many anglers.

Reports from anglers participating in the 2013 fishery and ADF&G staff observations suggest that the rainbow trout and Dolly Varden fishing was considered average. During mid-to late-August when the sockeye salmon typically start spawning anglers reported the sockeye salmon spawning season was well underway. Consequently, aggregations of spawning sockeye salmon were more dispersed than previous years which may be partly explained by earlier sockeye salmon run-timing in 2013. High water events during late-August as well as during mid-

September reduced angler participation 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. Fishing during the spawning period in areas of the Kenai River that are not closed to all fishing still occurs. Rainbow trout are captured either incidentally while targeting other species such as Dolly Varden, or are specifically targeted (illegally) under the guise of fishing for other species. There continues to be a desire by anglers for additional catch and release fishing opportunity during the spring spawning season.

RECOMMENDED RESEARCH & 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. Management staff also recommends closure to all fishing in areas of the Kenai River where it is known that directed fishing occurs on aggregations of rainbow trout during the spawning period.

KENAI RIVER DOLLY VARDEN RECREATIONAL FISHERY

2014 Proposals to the Alaska Board of Fisheries Concerning Kenai River Dolly Varden/Arctic Char Sport Fishery Issues

There are no proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) pertaining to the Kenai River Dolly Varden/Arctic char sport fishery.

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 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, In prep; Romberg et al. In prep). 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 limit was 10 Dolly Varden of any size. Beginning in 1984, this limit was 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 limit for the remainder of the drainage was 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 three 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 outmigrate from both of these lakes in April and May. Harvest estimates presented in Table 22 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, radio transmitters were placed in Dolly Varden in the Kenai River, selected tributaries, and Skilak and Kenai lakes. The radio-telemetry 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 was 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 limit of Dolly Varden. In the Kenai River drainage upstream of the Upper Killey River, the protected slot limit was removed and the bag limit was 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 limit remained 1 fish; however, the maximum 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 limit was reduced to 1 fish less than 18 inches and the season was open the entire year.

Recent Board of Fisheries Actions

During the 2011 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.

Department objectives for this fishery are:

- To provide the 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 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.

2010–2013 Fishery Performance

There is no creel survey or monitoring program to assess this population inseason. Harvest estimates are derived postseason from the SWHS (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, In prep; Romberg In prep). 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 22). The significant decline for 1986 and 1987 harvests is attributed to more restrictive bag limits (5 fish a day to 2 fish a day in 1993; 2 fish a day to 1 fish a day in 2005) and 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 (Figure 11). Since 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 (2003–2012) Dolly Varden harvest from the Kenai River is 3,620 fish (Table 22). The 2012 SWHS estimate of total catch of Dolly Varden in the Kenai River is 122,514 fish and is the fifth largest catch total since 1990 (Table 22; Figure 11). The 2012 percentage of Dolly Varden retained (1.8%) is less than the percentage of the most recent 10-year average (2003–2012) of 2.9% (Table 22). The trend of anglers retaining low percentages of Dolly Varden caught in the Kenai River sport fisheries is expected to continue. ADF&G projects that the 2013 season's sport fishing catch and harvest should be similar to the 2012 season.

CURRENT ISSUES

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

RECOMMENDED RESEARCH & MANAGEMENT

As interest and participation in the Kenai River fisheries for rainbow trout 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 RECREATIONAL FISHERIES

2014 Proposals to the Alaska Board of Fisheries Concerning NKPMA Resident Species Sport Fishery Issues

The following proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) will likely have some impact on the sport fisheries targeting other resident species in the NKPMA:

Proposal Number: 255, 256, 257.

Background and Historical Perspective

Department lake survey data from 362 lakes within the NKPMA document that 212 lakes support natural populations of game fish and an additional 27 lakes are stocked by the department. Game fish present in area lakes include; rainbow trout, Dolly Varden, Arctic char, Arctic grayling, lake trout, landlocked salmon and burbot. 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, department investigations for these fisheries is limited to research on stocked lakes summarized by Pawluk and Berkhahn (2012) and unstocked lakes by Tobin and Palmer (1997). Overall, research information on area lakes is confined to basic lake survey information conducted by the department 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 23 and 24). Estimates of participation and catch of both species at these locations increased through the early 1990s with some variation however, remained relatively consistent. Over the recent years the estimated total fishing effort and catches of rainbow trout and Dolly Varden have declined. The present catch levels have remained commensurate with historic catches at similar levels of sport fishing effort.

Steelhead occur naturally in the Kasilof River. In the early 1980s steelhead spawning in Crooked Creek, 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 2004–2009, 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 United States Fish and Wildlife Service conducted a steelhead telemetry study at the Kasilof River and documented seasonal distributions and run-timing patterns of Kasilof River steelhead (Gates and Palmer 2008; Gates 2009; Gates et. al. 2010). Significant findings documented the Nikolai Creek as well as a mainstem spawning component previously not known to be present as all Kasilof River steelhead were thought to originate 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 to occur in the Kenai River drainage. The main source for this information is from the adult coho salmon assessment projects conducted from 1998–2007. During these years fish wheels operated at approximately RM 28 and inriver netting conducted as part of a capture-recapture experiment upstream of RM 28 to approximately RM 36 in the middle river during October, 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 sized (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 as 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 opportunity 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 in popularity during the 1980s displaying moderate annual increases in participation and catch until the mid-1990s (Tables 23 and 24). The fishery remained relatively stable until about 2001. Over the past decade the estimated participation has displayed a declining trend while catch of resident species is commensurate with historic catch at similar levels of effort (Tables 23 and 24).

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 stocking of barren lakes on the road system that did not support game fish expanded to the present day stocking levels where rainbow trout were stocked into 27 lakes in the NKPMA. Select lakes are also stocked with Arctic grayling, Arctic Char as well as with landlocked coho and king 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 262,432 fish (Table 25). Catch and harvests have trended upwards since 2009 (Table 25).

Lake trout are indigenous to several NKPMA lakes and have been introduced to one 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. Department basic lake survey data as well as angler reports of lake trout catch provides documentation the transplant was successful. Recent SWHS information, observations by department staff as well as reports from anglers indicate that relatively little fishing effort is directed toward lake trout in the glacial lakes (Table 26). 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 26).

Hidden Lake supports the primary lake trout fishery in NKPMA. Staff observation 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 through the SWHS. Harvest in this fishery has been variable, but has declined over the past decade (Table 26). 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 26). 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 the department 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. 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 board of fisheries adopted a department proposal to reduce the bag and possession limit to one 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 26). 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 been declining since 2003 (Table 26).

Prior to statehood in 1952, Arctic grayling were introduced into Crescent Lake by the United States Fish and Wildlife Service. 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 27). Primary access is via two hiking trails, 6.4 mile Crescent Creek trail and 3.3 mile Carter Lake trail or

access is 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 and foot surveys to document time of spawning continued in 2011-2013 (Reimer *in prep*). Preliminary results indicate: 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 historic and recent basic life history information. Catch and harvest of Arctic grayling in other lakes is small. Historic 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, department efforts to collect size composition information about Bench Lake Arctic grayling were not successful.

Recent Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries adopted a regulation that reduced the bag and possession limit of burbot to 2 fish in all waters of the NKPMA.

Resident Species Management Objectives

These fisheries are not directly addressed in a management plan adopted by the BOF. Department objectives for these fisheries are

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

2010–2013 Fishery Performance

Harvest estimates derived from the SWHS (Mills 1979-1980, 1981a-b, 1982-1994; Howe et al. 1995, 1996, 2001 a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, In prep a-b) indicate that from 2010–2012 populations of resident species currently appear to be stable (Tables 23–27). Based on staff observations and reports from anglers, 2013 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 while 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 be continued to be stocked. Stocking was discontinued in Aurora, Cecille, and Quintin lakes due to very low or non-existent 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 non-existent. 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 & 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 department 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 RECREATIONAL FISHERY

2014 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING NORTHERN PIKE IN THE NORTHERN KENAI PENINSULA MANAGEMENT AREA SPORT FISHERY ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) will likely have some impact on the sport fisheries targeting northern pike in the Northern Kenai Peninsula Management Area:

Proposal Numbers: 258.

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 was the largest lake

containing northern pike and introduction here, based on SWHS information as well as reports from anglers, was thought to occur 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 28), 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 pike in the lakes (Afonasi, Imeri, Watson, Egumen, Peterson, Kelly, and Hikers lakes) of this drainage. Harvests of northern pike are too small to be estimated for specific lakes (Table 28).

Northern pike were also illegally introduced into three unnamed lakes about 6 miles south of Soldotna in the early to mid-1980s. These lakes are accessed via Tote Road and it is assumed local residents introduced the northern pike. These lakes are fortunately landlocked. Northern pike were also illegally introduced into Scout Lake near Sterling, Alaska. Scout Lake is a land-locked lake stocked by the department.

Two lakes, Hall and Tiny lakes near Soldotna, were verified to contain northern pike by ADF&G during 2010 that were not previous known to support them. Tiny Lake is an approximate 4 acre surface area land-locked lake adjacent to the Mackey’s Lake drainage and was reported to the department by the public to support northern pike. Tiny Lake was intensively gill-netted 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 while the nets retrieved the following break-up in the spring did not capture more northern pike. In total about 21,000 hours of netting was conducted at Tiny Lake. Hall Lake was the second lake reported by the public to the department to contain northern pike during the fall of 2010 and was netted in a similar fashion. The gillnet harvest of northern pike from this approximate 40 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. The best northern pike fishing is 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. Northern pike have been present in Stormy Lake for about three-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 259 fish annually (Table 28). Two of the Northern Kenai Peninsula's stocked lakes, Arc and Scout lakes as well as Stormy Lake which supported naturally occurring game fish, contained northern pike. These lakes were successfully treated with rotenone in 2008 (Arc Lake), 2009 (Scout Lake) and 2012 (Stormy Lake) to eradicate the northern pike. Restoration of the sport fisheries in Arc and Scout lakes by stocking has occurred. Department live trapping, 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).

Since the rotenone treatment during September of 2012 the restoration of Stormy Lake has been ongoing. In November of 2011 department staff 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 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, longnose sucker) over the treatment period and after the treatment until rotenone was no longer detectable hence, 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. It is anticipated that self-sustaining populations of these species will become established within a few years. EO-2-DV-1-52-13, effective November 21, prohibited retention of Arctic char/Dolly Varden in Stormy Lake during the 2013-2014 winter ice fishing season (Appendix A4). Because of all these removal efforts, the catch and harvest of northern pike in NKPMA estimated by the SWHS has declined sharply.

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 2010, *In prep a-b*). 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 four 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 indicated that the northern pike population has been reduced, temporarily, and that the size and age structure has been 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 of non-pike species increased. The bycatch included rainbow trout, Dolly Varden, juvenile coho salmon, and stickleback. During 2009, a northern pike radio telemetry 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 can be effectively planned.

Public scoping meetings to address removal of invasive northern pike were conducted to address the restoration of the Mackey's Lake drainage. A restoration plan for the Mackey's Lake drainage has been drafted. The plan includes rescue and restoration of native fishes as well as eradicating northern pike with several rotenone applications as each lake in the drainage will be treated with rotenone over a 3 to 4 year period. Educational messages about invasive northern pike through the department's web site, public service announcements and angler outreach program are ongoing and remain a high priority component of the department's information and education programs.

2010–2013 FISHERY PERFORMANCE

The recent SWHS and guide logbook report results detected the harvest of northern pike in the Kenai River during 2012 NKPMA (Table 28). Over the last 10 years northern pike harvest has decreased and is likely due to increased eradication efforts of northern pike in area lakes, particularly as a result of the rotenone treatments at Arc and Scout lake as well netting efforts at Soldotna (Sevena) Lake and to some extent the East and West Mackey lakes. 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 28). Due to the successful eradication of northern pike and the restoration of fisheries, especially at Stormy Lake, 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

Efforts to eradicate northern pike from the Soldotna Creek drainage using rotenone treatments beginning with the western branch of the drainage (Union Lake, West Mackey Lake, East Mackey Lake and Derks Lake) beginning in the fall of 2014 are being planned. Funding for this initial treatment phase has been secured. Multiple treatments will be required over different years in various sections of the drainage. If the initial treatment is conducted in 2014, northern pike could be eradicated with a final treatment in 2017 and the native fish assembly of the Soldotna Creek drainage could be restored by the year 2018.

NORTHERN KENAI PENINSULA MANAGEMENT AREA EDUCATIONAL FISHERIES

EDUCATIONAL FISHERIES

2014 Proposals to the Alaska Board of Fisheries Concerning Educational Fisheries Issues

There are no proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) pertaining to the educational fisheries in the NKPMA.

Fishery 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 the department and the Kenaitze Tribe, ordered the department 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 three 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 29–31). Each permit contains stipulations that are specific to gear, periods, seasons, location, quotas and harvest reporting. The Kenaitze Tribe is permitted to fish at Kenai, Kasilof and Swanson rivers. The Kasilof Regional Historical Association is permitted to fish at the 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 permit issued report harvests inseason on a schedule established by department 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. The department 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 Board of Fisheries.

2010–2013 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 29). Total salmon harvests averaged 5,875 fish from 2010–2013 (Table 29). During 2012 and 2013 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 both early–and late-run king salmon. From 2002–2011 the annual harvest of early–run king salmon averaged 57 fish while annual harvest of late-run Chinook salmon averaged 10 fish. Total harvests in both the Alaska Territorial Lodge and Kasilof Regional Historical Association educational fisheries are relatively minor (Tables 30 and 31). Fishing occurs sporadically during the season, and sockeye and coho salmon are the primary species harvested (Tables 30 and 31). No harvest quotas were exceeded in the NKPMA educational fisheries during 2010–2013.

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 king salmon is minor and likely has an insignificant effect on the performance of the inriver sport fishery during years when inriver fisheries are not restricted. Recent low runs of king salmon to 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 as there was some negative public reaction to this fishery from the commercial fishing sector during 2012–2013. 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 department concerns about king salmon mortality so that they will not be restricted and or closed during years when the inriver sport fisheries for king salmon are restricted.

RECOMMENDED RESEARCH & MANAGEMENT

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

NORTHERN KENAI PENINSULA MANAGMEMENT AREA GUIDED SPORT RECREATIONAL FISHERY

2014 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 2013/2014 Proposed Changes in the Cook Inlet, Kodiak, and Chignik Areas Finfish; and King and Tanner crab (Statewide Except Southeast/Yakutat) Regulations"* (ADF&G 2013a–f) will likely have some impact on the sport fisheries targeting guided anglers in the Northern Kenai Peninsula Management Area:

Proposal Numbers: 259, 260, 261, 262, 263, 264, 265, 266, 267, 268.

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 the guided sport fishing effort and harvests on both the Kenai and Kasilof rivers, for-the-most part, began in the 1980s and continued over the next two decades. Significant growth in the number of guides who offer sport fishing services on the Kenai River is well documented (Table 32). Increase in the participation of guided sport fishing prompted the BOF to adopt fishing regulations to provide opportunity for private (unguided) anglers when no guided anglers are present by: 1) restricting the area 2) limiting the hours each day and 3) prohibiting days of the week anglers may fish from a registered guide vessel. Information from department Chinook salmon creel surveys conducted on the both the Kenai and Kasilof rivers indicate catch and harvest rates are greater for guided than for unguided anglers. Therefore, at specific areas, times of the day, or day of the week, the numbers of guided anglers exceed 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 *(5 AAC 75.075: Sport Fishing Services and Sport Fishing Guide Services; License Requirement; Regulations of Activities)*. No licensing program, fees or daily fishing activity reporting were required from guides until two years after the Alaska Legislature established licensing requirements for sport fishing guide business owners and sport fishing guides in 2004. By 2006 guide logbooks required reporting of the guided anglers license numbers as well as harvest and release of the number of fish by species, 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 the department each year. Results of the logbook program are published annually by the department (Sigurdsson and Powers 2009–2013).

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 Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting the board repealed a longstanding regulation on the Kasilof River that prohibited a fishing guide, during May, June and July, from guiding only that client or group of clients initially guided by the fishing guide that day; consequently, different or additional clients are now allowed to be guided each 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 the 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 33). The total number of fishing guides operating on Kenai River has declined in recent years from 316 in 2010 to 284 in 2013 (Table 32).

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 34). Changes in guided fishing effort are also evident among years. For example, from 2006 to 2012 total guided effort each year has declined significantly in June and July and increased slightly during August while guided fishing effort in May, September and October has remained stable (Table 34). Decreases in June and July are likely the result of low Chinook salmon abundance over recent years from 2009 through 2012 (Table 34).

Annual changes in logbook catch and harvest of salmon by species are likely indicative of run strength. For instance, logbook data shows that guided anglers harvested 8,739 Chinook salmon from the Kenai River during 2006, while logbook data from 2012 indicates a harvest of 329 Chinook salmon by guided anglers (Table 33). Annual trends in participation are evident each year as the majority of guided sport fishing effort occurs during July followed by August (Table 34). Proportions of resident and nonresident guided anglers have remained relatively stable since 2006. Nonresident guided anglers comprise the vast majority of guided anglers fishing the Kenai River each year (Table 34). Similar trends in effort, fishing pattern and guided angler demographics are anticipated for the 2013 season.

CURRENT ISSUES

A decline in Chinook salmon total returns 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 Board of Fisheries process and include competition between guided and unguided anglers, restrictive guide regulations as well as numerous and complex sport fishing regulations.

RECOMMENDED RESEARCH & MANAGEMENT

Guided fishing effort, catch and harvest by species will continue to be monitored through the SWHS and guide logbook program. This information will allow the department 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 MANAGMEMENT AREA HABITAT

2014 PROPOSALS TO THE ALASKA BOARD OF FISHERIES CONCERNING HABITAT ISSUES

The following proposals published in "*The Alaska Board of Fisheries 2013/2014 Proposed Changes in the Cook Inlet, Kodiak, and Chignik Areas Finfish; and King and Tanner crab (Statewide Except Southeast/Yakutat) Regulations*" (ADF&G 2013a-f) will likely have some impact on the sport fisheries targeting habitat in the Northern Kenai Peninsula Management Area:

Proposal Numbers: 233, 234, 235, 236, 237, 238, 239.

BACKGROUND AND HISTORICAL PERSPECTIVE

Maintaining healthy riparian and aquatic habitat in the NKPMA is important for area fisheries resources. On the Kenai River various habitat types occur along the 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-b). The diversity of fish species decreases with distance inland as the highest diversity occurs in the lower river delta area.

Land ownership along the Kenai River is comprised of 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 land ownership status has not been updated since 1986.

The 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 *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 shore lands above mean ordinary high water of which several parcels are subject to a conservation easement to protect them from development in perpetuity. The 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 *5 AAC 57.180: Riparian Habitat Fishery Management Plan for the Kenai River Drainage* to compliment land protection efforts where it is legal to do so on public lands. Under this plan 24 parcels representing approximately 17.5 miles of publically owned riverfront shoreline are closed to all fishing within 10 feet of the shoreline from July 1 through August 15. Riparian habitat on these lands that is beneficial to fisheries resources remains intact and has not been lost. Additional riverbank closures are proposed by the 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 Untied 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 department's 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 Hansen 1999, 2001-2002; King and Clark 2004; King 2007). Findings from these projects identified sensitive riverfront uplands on conservation easement lands and other lands. This information was used to close them 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 non-governmental 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 including: 1) protective habitat regulations pursuant to the multi-agency permitting process which reviews instream and riverfront upland projects; 2) BOF adopted habitat closures, clean outboard motor regulations, 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). These projects were focused toward 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. More recently, from 2010 through 2013, a total of 315 projects were conducted on the Kenai River. In 2013, EO 2-RS-1-25-13 was issued, effective July 1 through August 15 to close approximately 475 feet of riverbank on the Kenai River to fishing from shore (Appendix A4). The conservation easement for this parcel of public land holds conservation easement protections for which ADF&G holds the management right to restrict sport fishing.

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 and borough lands in the Kenai River corridor.

RECOMMENDED RESEARCH & MANAGEMENT

We recommend that the department remain active in securing management right to additional land parcels within the Kenai River corridor for riparian habitat conservation.

NORTHERN KENAI PENINSULA MANAGEMENT AREA PERSONAL USE FISHERIES

2014 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 2013/2014 Proposed Changes in Pacific Cod, Chignik Finfish, Lower Cook Inlet Finfish, Kodiak Finfish, Upper Cook Inlet Finfish; and Statewide King and Tanner Crab; and Supplemental Issues*" (ADF&G 2013a–f) will likely have some impact on the personal use dip net fisheries targeting sockeye salmon in the Kenai and Kasilof rivers:

> Proposal Numbers: 172, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 318.

NKPMA PERSONAL USE FISHERIES

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/or 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, the Alaska Supreme Court's decision in the McDowell case 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 limit was 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.

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/Mat-Su/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, 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 35).

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/Mat-Su/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, one permit is issued for all four (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 a.m. to 11:00 p.m.). 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 35).

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, that was also effective for the 2008 season, is that fish may not be taken from a boat powered by a two-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 133 Chinook, 685 coho, 471 pink, and 36 chum salmon (calculated from Table 6).

New regulations were adopted by the BOF for the 2002 Kasilof River personal use dip net fishery which 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 (Brannian and Fox 1996). During 2002, participation in the dip net fishery was 4,020 days fished (Tables 6 and 35).

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 four 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 the CF and is discussed in the 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 the SF, inseason management authority of the gillnet fishery is the responsibility of the CF. The regulations governing the Kasilof River personal use gillnet and dip net fisheries have remained unchanged from 2002-2013.

Recent Board of Fisheries Actions

During the 2011 Alaska Board of Fisheries meeting the definition of personal use salmon in regulation was aligned with the definition in Alaska Statute. No other regulations affecting the NKPMA personal use fishing regulations were modified or adopted in 2011.

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 the CF and SF. The 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 the 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; or, if the projected run strength was 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 are considered non-compliant households. Participation and harvest by non-compliant households was estimated by calculating the mean participation (household days fished) and harvest by species for non-compliant permits that were returned. These were then expanded to include all non-respondents. Total estimates of participation and harvest by species for the fishery were obtained by summing the estimates for the non-compliant 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.

2010 Fishery Performance

The 2010 estimated harvest of sockeye salmon from the Kenai River personal use dip net fishery was 389,552 fish (Table 35). This is larger than the most recent 5-year (2005–2009) average of approximately 257,700 sockeye salmon, and was the largest harvest in the fishery on record (Table 35). The fishery was open for 22 consecutive days without disruption and fishing time was increased by emergency order to 24 hours a day for the final 8 days (July 24–31) (EO 2-RS-1-40-10; Appendix A1). Analysis indicated a total Kenai River sockeye salmon run of approximately 3.3 million fish (Shields 2010). Large daily estimates of sockeye passage at the sonar and near normal run timing provided excellent opportunities.

2011 Fishery Performance

In the 2011 Kenai river dip net fishery, the total harvest of sockeye salmon was approximately 537,765 fish (Tables 6 and 35). This sockeye salmon harvest was the largest on record (Table 6). A total of 1,243 Chinook; 4,745 coho; 3,914 pink; and 915 chum salmon were also harvested in the Kenai River personal use dip net fishery during 2011 (Table 6). The fishery was open for 22 consecutive days without disruption and fishing time was increased by emergency order to 24 hours a day for the final 12 days (July 20–31) (EO 2-RS-1-22-11; Appendix A2).

In season, the preliminary Kenai River sockeye salmon run size was estimated to be greater than the forecasted run of 3.9 million fish. As described above in the section on the Kenai River late-run sockeye salmon recreational fishery, actual numbers of sockeye salmon in the run lagged behind the historic average for most of the first week of the dip net fishery (July 10-15) however the run improved substantially. Beginning July 16 the large numbers of sockeye salmon present in the area of the Kenai River open to dip netting provided excellent sockeye salmon harvest opportunity to those participating in the personal use fishery. Due to low abundance of king salmon, a second EO (2-KS-1-23-11) was issued July 22 which prohibited retention of Chinook salmon in the personal use dip net fishery beginning July 24 (Appendix A2).

2012 Fishery Performance

During the 2012 dip net fishery, 526,992 sockeye; 40 Chinook; 4,008 coho; 3,770 pink; and 425 chum salmon were harvested for a total of 535,236 salmon (Table 6). This was the second highest sockeye salmon harvest estimated for the Kenai River personal use dip net fishery, and was well above the most recent 5-year (2007–2011) average of approximately 358,538 sockeye salmon. The estimated number of days fished increased from 32,818 days in 2011 to 34,374 days fished in 2012 (Tables 6 and 35). Two management actions were taken for the 2012 Kenai River personal use dip net fishery: the first issued prior to the start of the dip net fishery EO 2-KS-1-35-12 prohibited retention of king salmon for the entire July 10 through July 31 season (Appendix A3), and the second opened the fishery for 24 hours per day effective beginning Friday, July, 20 (EO 2-RS-1-46-12; Appendix A3). The final estimated total abundance of late-run Kenai River sockeye salmon was 4.7 million fish (Shields and Dupuis 2013a).

2013 Fishery Performance

The 2013 estimated harvest of sockeye salmon from the Kenai River personal use dip net fishery was 347,222 fish (Table 35). This was below the most recent 5-year average (2008-2012) harvest in this fishery of 405,682 fish (Table 35). The fishery was open for 22 consecutive days without disruption and fishing time was increased by emergency order for the final 10 days (July 22–31) (EO 2-RS-1-42-13; Appendix A4). The *preliminary results* indicate a total Kenai River sockeye salmon run of approximately 3.6 million fish. The final 2013 Kenai dip net harvest estimate was 354,727 salmon (Table 6). The retention of Chinook salmon was prohibited for the entire season (EO-2-KS-1-34-13; Appendix A4).

The most recent 5-year (2008–2012) average for participation in the personal use fishery was 28,495 days fished and participation in the 2013 Kenai River personal use dip net fishery was 33,193 days fished (Table 35). Reasons for the increased participation include, 1) the total sockeye salmon run strength was forecasted to be similar to the previous 2 years; 2) inseason management action allowed additional fishing time in the Kenai River personal use dip net fishery; and, 3) continuing growth in the interest and participation in personal use fishing.

Observations by ADF&G indicated that success varied from poor to excellent depending upon the daily influx of sockeye salmon into the Kenai River. Actions of the commercial fishing fleet and/or the natural run timing of the salmon entering the Kenai River determined a dipnetter's success on any particular day. During 2013, the total number of Kenai River sockeye salmon to pass ADF&G's sonar station at RM 19 from July 14-21 exceeded 900,000 fish or about 66% of the 1,354,554 sockeye salmon of the inriver run to reach the sonar. This early run-timing of sockeye salmon resulted in better personal use fishing success prior to July 20 rather than after July 20 which was typical during previous years. The cumulative total estimate of the inriver run of sockeye salmon to reach the sonar was less than the 2 previous years (Table 16). During the 22 days the 2013 Kenai River personal use dip net fishery was open, daily sockeye salmon passage estimates at the sonar ranged from approximately 4,000 to 246,000 fish per day and daily sockeye salmon passage estimates above 40,000 fish per day occurred on 6 days (Shields 2010 and Shields and Dupuis 2013b).

CURRENT ISSUES

From 2010–2013 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 as 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 rivermouth, 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 dip netting. The participation in boat-based dip netting 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 to Bridge Access Road) as well as at upriver 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. Local city and borough governments are active in planning to control congestion through the development of infrastructure (parking, rest rooms, traffic management), 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 & 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 the CF and the SF. The CF is responsible for operation of the Kasilof River sonar counter which enumerates sockeye salmon entering the river. The personal use gillnet and dip net fisheries open and close by regulation. Inseason management by the 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 dip netting. The shoreline-based dip netting area could be expanded to the Sterling Highway Bridge and the area opened to dip netting from boats could also be expanded upriver to river mile 3 below Trujillo's landing. Both liberalizations were enacted when the rate of sockeye salmon escapement was proceeding at a rate greater than that needed to ensure the BEG is met. In 2011 the BOF amended the *Kasilof River Salmon Management Plan* after the department completed the transition from Bendix sonar technology to DIDSON technology as the method to assess 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 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.

2010 Fishery Performance

The 2010 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 personal use gillnet fishery was 21,924 fish, while the dip net harvest was 70,774 fish (Tables 6 and 23). The dip net harvest was larger than the most recent 5-year (2005–2009) average of approximately 53,935 sockeye salmon, and was the second largest harvest in the fishery on record (Table 36). Harvest in the Kasilof River personal use fisheries was lower in 2010 than in 2009, however effort remained similar (Tables 6 and 36).

The 2010 Kasilof River sockeye salmon run resulted in an estimated escapement of 267,013 salmon past ADF&G's sonar station (Table 36). No inseason management actions were taken for the Kasilof River personal use dip net fishery during 2010. The final estimate for the 2010 Kasilof River sockeye inriver run was about 832,000 fish (Shields 2010).

2011 Fishery Performance

The 2011 sockeye salmon run to the Kasilof River resulted in an estimated escapement of 245,727 sockeye salmon (Table 36). Personal use harvest of sockeye salmon was 26,780 fish in the gillnet fishery and 49,766 fish in the dip net fishery (Table 6). The dip net harvest was below the most recent 5-year (2006–2010) average of approximately 59,459 sockeye salmon, but was still the fifth largest harvest in the fishery on record (Table 36). The estimated total run of Kasilof River sockeye salmon was about 860,000 fish (Shields 2012). No inseason management actions were taken for the Kasilof River personal use dip net fishery during 2011.

2012 Fishery Performance

The personal use harvest of sockeye salmon during 2012 was 89,057. The gillnet fishery harvested an estimated 15,638 sockeye salmon, while the dip net fishery harvest was 73,419 sockeye salmon (Table 6). The dip net harvest was well above the most recent 5-year (2007–2011) average of approximately 58,184 sockeye salmon, and was the largest harvest in the

fishery on record (Table 36). The estimated escapement was 374,523 sockeye salmon (Table 36). The total run abundance was estimated to be approximately 788,000 sockeye salmon (Shields and Dupuis 2013a). No inseason management actions were taken for the Kasilof River personal use dip net fishery during 2012.

2013 Fishery Performance

The 2013 Kasilof River personal use fisheries produced good opportunities to harvest sockeye salmon periodically throughout the season because the sockeye salmon run to Kasilof River was larger than forecasted. The preseason forecast was about 903,000 fish while the *preliminary results* indicated the total abundance of Kasilof River sockeye salmon was approximately 1.3 million fish (Shields and Dupuis 2013b). During commercial fishery closures, personal use dip net harvests may significantly increase and the inverse may also be experienced during commercial fishery openings.

An emergency order issued by the Division of Commercial Fisheries to conserve early-run Kenai River Chinook salmon closed the personal use set gillnet fishery effective June 20 thereby reducing the season by fifty percent (5 days). By regulation the fishery is open daily for a period of 10 days from June 15 through June 24, between the hours of 6:00 a.m. and 11:00 p.m. The estimated harvest of sockeye salmon in the personal use set gillnet fishery was 14,439 fish and was less than harvests estimated for recent years (Table 36).

Because of the large sockeye salmon run, opportunity in the dip net fishery was increased by EO 2-RS-1-38-13 which extended the area open to dip netting for shore-based participants from river mile 3 upstream to the Sterling Highway Bridge and for participants dip netting by boat from river mile 1 to river mile 3 (Appendix A4). The resulting harvest in the dip net fishery was 85,528 fish (Tables 6 and 36). This was well above the most recent 5-year (2008–2012) average of approximately 64,209 sockeye salmon, and was the largest harvest in the fishery on record (Table 36). Harvest in the Kasilof River personal use fisheries was higher in 2013 than in 2012, effort also increased due in part to an increase in effort during the dip net fishery (Tables 6 and 36). The 2013 Kasilof River sockeye salmon total inriver run past ADF&G's sonar station was an estimated 489,262 fish (Table 36).

CURRENT ISSUES

From 2010–2013 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 general 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.

RECOMMENDED RESEARCH AND MANAGEMENT

No research or revised management strategies are recommended.

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TABLES

Table 1.–Angler-days of effort expended by recreational anglers fishing Kenai Peninsula Management Area waters, 1977–2012.

	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	229,228	72	35,018	11	16,675	5	37,537	12	318,458	18	1,732,528
1984	270,422	71	55,861	15	25,697	7	31,584	8	383,564	21	1,866,837
1985	323,045	71	80,054	18	24,103	5	27,743	6	454,945	23	1,943,069
1986	335,051	68	70,729	14	36,115	7	49,883	10	491,778	24	2,071,412
1987	289,165	60	91,600	19	42,703	9	55,336	12	478,804	22	2,152,886
1988	374,630	69	76,180	14	43,965	8	51,651	9	546,426	24	2,311,291
1989	377,892	74	53,598	11	39,318	8	38,649	8	509,457	23	2,264,079
1990	342,711	68	68,861	14	40,437	8	51,114	10	503,123	21	2,453,284
1991	323,662	66	76,433	16	46,208	9	46,444	9	492,747	20	2,456,328
1992	332,573	65	67,443	13	49,774	10	58,537	12	508,327	20	2,540,374
1993	324,355	65	61,018	12	57,127	11	59,897	12	502,397	20	2,559,408
1994	340,904	65	65,996	13	50,821	10	62,757	12	520,478	19	2,719,911
1995	377,710	69	58,090	11	50,012	9	62,485	11	548,297	20	2,787,670
1996	265,986	69	50,122	13	33,585	9	36,574	9	386,267	19	2,006,528
1997	247,898	67	46,914	13	32,287	9	41,498	11	368,597	18	2,079,514
1998	216,650	66	47,942	15	26,487	8	38,771	12	329,850	18	1,856,976
1999	307,446	68	64,536	14	40,263	9	42,694	9	454,939	18	2,499,152
2000	358,569	68	69,864	13	46,654	9	50,196	10	525,283	20	2,627,805
2001	298,817	69	55,972	13	39,034	9	37,837	9	431,660	19	2,261,941
2002	312,815	68	68,263	15	35,198	8	44,099	10	460,375	20	2,259,091
2003	321,044	73	50,448	11	30,840	7	39,410	9	441,742	20	2,219,398
2004	376,313	75	60,784	12	29,889	6	36,265	7	503,251	20	2,473,961
2005	388,677	76	55,801	11	30,436	6	36,133	7	511,047	21	2,463,929
2006	329,122	71	70,804	15	26,323	6	36,500	8	462,749	20	2,297,961
2007	410,381	76	57,755	11	28,246	5	42,901	8	539,283	21	2,543,674
2008	360,344	74	55,444	11	29,939	6	38,421	8	484,148	21	2,315,601
2009	337,217	73	64,518	14	24,545	5	37,336	8	463,616	21	2,216,445
2010	347,938	79	39,873	9	19,481	4	32,067	7	439,359	22	2,000,167
2011	365,863	79	47,264	10	23,422	5	25,357	5	461,906	24	1,919,313
2012	374,732	82	41,152	9	22,099	5	19,953	4	457,936	24	1,885,768
Ave	303,014	69	60,887	15	33,226	7	42,317	10	435,752	21	2,115,789

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009-2011a-b, In Prep; Romberg et al. In prep.

Note: ND = 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/streams available from 1977–1982. Those years contain some Kasilof River totals and may contain some non-NKPMA data.

Table 2.–Angler-days of sport fishing effort for the Kenai River by section, 1977–2012.

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
Ave	152,448	79,137	43,917	42,451	5,725	303,014

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009-2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data collected.

[a] Prior to 2002, these data were listed under the "Other Streams" category, and only separated out in the detail SWHS data.

Table 3.–Kenai River sport fish harvest by species, 1977–2012.

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	1,199	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
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
Ave	15,499	175,563	43,597	10,023	183	5,123	11,538	341	94	15	607	262,580

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011, In Prep; Romberg et al. In prep. McKinley and Fleischman 2013; Fleischman and McKinley 2013.

Note: ND = no data collected.

[a] Includes Whitefish and those listed under the "Other" column.

[b] 1981-1992 totals revised to include fish originally excluded due to a size range of <16 or <20 inches.

Table 4.–Angler-days of sport fishing effort for other Northern Kenai Peninsula Area streams and drainages by fishery, 1977-2012.

Year	Stocked Lakes	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[a]	Total
1977[a]	ND	ND	ND[b]	7,462	ND[b]	8,183	ND[b]	ND	ND	ND	ND	ND	29,010	44,655
1978[a]	ND	ND	ND[b]	4,028	ND[b]	6,376	ND[b]	ND	ND	ND	ND	ND	28,303	38,707
1979[a]	ND	ND	ND[b]	5,974	ND[b]	5,769	ND[b]	ND	ND	ND	ND	ND	36,030	47,773
1980[a]	ND	ND	ND[b]	5,783	ND[b]	6,697	ND[b]	ND	ND	ND	ND	ND	33,772	46,252
1981[a]	ND	ND	ND[b]	4,761	ND[b]	5,235	ND[b]	ND	ND	ND	ND	ND	27,209	37,205
1982	ND	ND	ND[b]	6,278	ND[b]	6,329	ND[b]	ND	ND	ND	ND	ND	26,579	39,186
1983	3,018	691	2,124	6,761	ND	7,014	ND[b]	422	1,180	ND	540	253	15,534	37,537
1984	870	3,413	ND[b]	4,835	ND[b]	5,671	3,597	67	502	ND	770	351	11,508	31,584
1985	1,473	451	ND[b]	3,676	ND[b]	4,058	3,000	121	607	ND	243	1,734	12,380	27,743
1986	2,538	4,146	ND[b]	6,254	2,278[b]	9,831	3,608	413	2,722	1,483	1,147	291	15,172	49,883
1987	2,054	5,361	ND[b]	12,532	2,753[b]	7,353	4,980	4,129	580	2,717	960	1,576	10,341	55,336
1988	4,433	3,965	10,368	4,820	3,402	3,674	2,929	3,838	855	1,207	1,255	1,419	9,486	51,651
1989	2,068	4,893	5,484	1,152	1,668	2,189	3,570	2,810	377	1,152	1,052	923	11,311	38,649
1990	3,730	5,655	6,091	4,188	4,364	2,487	2,402	2,817	1,042	2,030	971	2,200	13,137	51,114
1991	3,423	5,354	5,830	4,426	1,234	2,586	2,830	4,120	1,064	679	1,223	1,596	12,079	46,444
1992	5,590	7,906	4,897	4,172	3,724	3,397	2,934	3,820	1,536	971	1,014	1,600	16,976	58,537
1993	5,480	9,152	5,690	5,030	2,264	2,818	2,332	3,289	2,586	1,693	1,713	1,055	16,795	59,897
1994	10,515	7,241	5,039	3,014	5,913	2,498	1,295	1,805	2,624	1,655	1,836	1,587	17,735	62,757
1995	8,204	5,179	4,637	4,443	4,521	2,228	2,262	2,957	3,240	2,044	1,874	1,332	19,564	62,485
1996[c]	5,380	3,018	3,907	2,305	3,884	2,564	1,184	1,780	878	1,723	756	910	8,285	36,574
1997[c]	6,053	3,401	3,496	2,575	2,048	2,253	2,310	2,346	1,734	1,224	957	1,699	11,402	41,498
1998[c]	5,876	3,166	3,422	1,576	6,101	1,671	1,515	1,645	520	1,370	1,145	985	9,779	38,771
1999	5,151	4,708	3,606	2,017	2,167	3,279	2,022	1,182	1,462	445	1,266	599	14,790	42,694
2000	7,969	2,423	5,839	1,804	5,751	2,929	1,742	2,072	1,033	1,207	1,504	1,368	14,555	50,196
2001	6,543	3,105	4,060	1,604	2,377	3,345	816	1,701	2,509	1,024	1,099	731	8,923	37,837
2002	7,641	4,245	4,249	1,412	3,456	1,396	2,296	1,668	2,502	2,001	1,457	871	10,905	44,099
2003	4,802	4,357	3,807	1,761	2,534	1,150	1,148	2,068	1,097	1,089	1,412	802	13,383	39,410
2004	4,978	6,589	2,878	1,902	3,116	762	580	2,460	497	1,297	1,104	972	9,130	36,265
2005	8,205	6,106	3,552	1,548	1,708	1,334	932	594	2,072	511	1,028	684	7,859	36,133
2006	6,488	5,582	3,533	1,975	4,550	1,136	794	1,152	619	1,127	790	455	8,299	36,500
2007	3,079	8,694	4,481	2,449	5,030	2,231	2,097	1,462	648	988	1,389	525	9,828	42,901
2008	2,822	7,105	5,006	1,543	5,584	2,221	1,341	1,692	728	641	959	750	8,029	38,421
2009	3,707	6,217	2,698	3,559	6,805	1,923	400	1,126	687	1,535	1,609	764	6,306	37,336
2010	5,510	4,859	2,303	2,393	3,287	900	1,385	1,085	955	1,361	758	348	6,923	32,067
2011	7,192	2,184	3,922	1,314	1,801	374	505	918	869	348	996	134	4,800	25,357
2012	5,867	1,238	700	835	2,511	397	930	538	1,179	655	896	0	4,265	20,011
Ave	5,022	4,680	4,293	3,671	3,512	3,452	1,991	1,870	1,297	1,266	1,124	950	14,455	42,318

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009-2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data collected

[a] No breakdown of "Other Lakes/Streams" available from 1977-1982. Those years contain Kasilof River totals and may contain some non-NKPMA data.

[b] No separate Swanson River or Swan Lakes Canoe Route data, only Swanson River Canoe Route data is listed in SWHS. Swanson River Canoe Route totals from "Canoe Route Systems" total in SWHS and includes Swanson River and Swan Lake Canoe Route data.

[c] SWHS data from revised estimates November 25, 2009.

Table 5.–Sport fish harvest for systems other than the Kenai River mainstem in the Northern Kenai Peninsula Management Area, 1977–2012.

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	377	105	17,703	18,272	2,664	1,455	294	429	79,931
1984	4,648	59,976	6,622	1,733	0	12,742	12,893	1,757	998	187	261	101,817
1985	3,608	70,502	4,247	783	0	13,369	6,483	1,995	1,248	52	222	102,509
1986	8,012	71,702	8,548	2,336	26	12,890	11,162	6,130	1,758	0	123	122,687
1987	5,623	182,839	12,052	1,449	72	7,659	6,917	3,077	850	0	257	220,795
1988	5,652	87,586	15,971	2,382	72	7,163	5,437	3,274	581	36	363	128,517
1989	4,121	73,945	20,344	892	431	5,408	6,559	1,661	982	49	128	114,520
1990	3,151	63,634	8,038	4,264	272	11,252	10,221	2,310	747	30	554	104,473
1991	5,734	107,006	12,684	807	66	9,129	8,663	2,946	1,419	86	1,130	149,670
1992	7,231	64,809	15,026	5,899	221	13,911	9,268	2,930	775	239	812	121,121
1993	9,829	59,570	16,390	1,612	148	12,010	12,717	3,378	1,268	216	2,832	119,970
1994	7,334	77,819	16,103	2,373	175	12,382	8,981	2,730	1,636	36	1,560	131,129
1995	6,699	42,315	11,749	2,897	220	11,929	7,010	2,709	1,863	219	872	88,482
1996[d]	6,139	62,099	17,058	4,033	188	7,878	4,167	2,341	948	85	134	105,070
1997[d]	6,761	56,115	11,980	1,681	244	14,133	6,456	2,352	1,187	21	316	101,246
1998[d]	4,857	73,246	14,730	8,180	321	10,979	3,488	2,298	872	114	212	119,297
1999	8,291	73,747	10,993	1,078	230	11,494	3,460	2,627	1,040	329	44	113,333
2000	9,943	79,370	14,137	4,581	619	14,972	4,491	1,743	1,154	153	274	131,437
2001	8,866	60,792	15,973	2,139	137	7,818	2,922	1,607	980	1,185	625	103,044
2002	5,302	93,363	22,066	6,151	150	13,441	3,002	1,726	982	368	195	146,746
2003	4,294	60,795	15,764	2,459	145	8,225	2,809	854	1,153	641	185	97,324
2004	4,424	66,084	17,352	4,193	209	5,360	4,066	1,719	874	2,263	135	106,679
2005	4,689	62,443	12,438	1,190	108	5,228	1,798	1,229	739	212	230	90,304
2006	3,423	90,598	14,327	5,134	483	4,880	1,327	821	387	55	87	121,522
2007	3,761	59,195	9,099	3,831	61	6,912	2,394	669	570	548	54	87,094
2008	3,789	75,792	12,622	6,420	150	5,176	1,871	437	773	229	0	107,259
2009	3,801	101,634	11,361	5,972	184	4,921	1,576	893	883	0	152	131,377
2010	3,549	39,901	8,206	2,355	77	5,603	1,225	609	285	59	354	62,223
2011	3,714	45,760	8,781	1,766	34	5,616	1,138	416	732	0	239	68,196
2012	927	37,118	10,067	2,501	18	4,418	631	359	635	0	267	56,941
Ave	4,608	67,732	11,670	2,893	164	11,054	7,264	2,203	1,131	245	491	109,427

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009-2011a-b, In Prep; Romberg et al. In prep.
Note: ND = no data collected.

[a] Includes kokanee as reported in the SWHS.

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

[c] No breakdown of other lakes/streams available from 1977-1982. Those years may contain some non-NKPMA data, especially the smelt harvests.

[d] SWHS data from revised estimates November 25, 2009.

Table 6.–Anglers-days of effort and harvest for Kenai River and Kasilof River personal use fisheries, 1996-2013.

Year	Days Open	Days Fished	Sockeye	Chinook	Coho	Pink	Chum	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	15,969
2013	5	1,082	14,439	46	129	3	5	14,621
Min.	5	582	9,506	46	0	2	0	9,561
Ave	9	1,338	19,259	198	90	22	7	19,576
Max.	13	1,855	28,867	514	420	102	23	29,591

Year	Days Open	Days Fished	Sockeye	Chinook	Coho	Pink	Chum	Total
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	85,528	18	1,666	683	339	88,233
Min.	27	1,091	9,737	16	90	19	17	9,900
Ave	38	4,728	47,382	61	849	666	114	49,072
Max.	44	8,556	85,528	138	1,768	1,862	339	88,233

-continued-

Table 6.

Year	Days Open	Days Fished	Sockeye	Chinook	Coho	Pink	Chum	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
Min.	18	10,503	98,262	11	559	619	58	101,771
Ave	22	19,614	248,683	729	2,216	3,548	369	255,544
Max.	27	34,374	537,765	1,509	4,745	11,127	915	548,583

Table 7.–Early-run Kenai River Chinook salmon population data, 1986–2013.

Year	Cook Inlet Marine Harvest	Misc. Marine	Kenaitze Educational[a]	Inriver Run [b]	Sport Harvest Above Sonar[c]	Catch-and-Release Mortality	Spawning Escapement	Total Run	Harvest Rate
1989	193	0	73	12,290	8,394	149	3,747	12,556	0.702
1990	235	0	40	9,842	1,807	378	7,657	10,117	0.243
1991	241	0	2	10,620	1,945	152	8,523	10,863	0.215
1992	300	0	73	11,930	2,241	236	9,453	12,303	0.232
1993	407	0	118	12,490	9,342	286	2,862	13,015	0.780
1994	343	0	56	13,160	8,171	285	4,704	13,559	0.653
1995	412	0	37	12,890	10,217	357	2,316	13,339	0.826
1996	235	0	104	9,764	6,623	287	2,854	10,103	0.718
1997	282	0	122	11,140	6,429	349	4,362	11,544	0.622
1998	289	0	131	11,930	1,170	254	10,506	12,350	0.149
1999	245	0	114	13,480	8,129	261	5,090	13,839	0.632
2000	239	0	124	10,790	1,818	185	8,787	11,153	0.212
2001	184	0	198	14,020	2,399	205	11,416	14,402	0.207
2002	168	0	48	10,860	899	78	9,883	11,076	0.108
2003	202	0	126	20,450	2,839	389	17,222	20,778	0.171
2004	194	0	72	23,460	3,386	257	19,817	23,726	0.165
2005	187	341	76	20,810	3,810	253	16,747	21,414	0.218
2006	252	0	65	18,180	4,693	205	13,282	18,497	0.282
2007	201	41	16	13,630	3,493	220	9,917	13,888	0.286
2008	107	102	40	10,210	3,500	123	6,587	10,459	0.370
2009	71	16	49	7,741	1,466	97	6,178	7,877	0.216
2010	88	48	32	7,830	1,337	90	6,403	7,998	0.199
2011	110	0	42	9,895	1,337	92	8,466	10,047	0.157
2012	89	0	19	5,387	316	10	5,061	5,495	0.079
2013[d]	not avail.	0	11	2,038	0	5	2,033	2,049	0.008
Avg. (1986-2002)	254	0	89	13,344	6,265	256	6,824	13,671	0.479
Avg. (2003-2013)	150	50	50	12,694	2,380	158	10,156	12,930	0.196
Avg. (1986-2013)	215	20	72	13,089	4,739	218	8,133	13,380	0.368

Source: Statewide Harvest Surveys from Mills 1987-1994, Howe et al. 1995, 1996, 2001a-d, Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011, In Prep; Romberg et al. In prep; Alexandersdottir and Marsh 1990; Nelson et al. 1999; Hammarstrom and Timmons 2001a; Reimer et al. 2002, Reimer, A. 2003, 2004a-b, 2007; Eskelin, A. 2007, 2009, 2010; Perschbacher 2012a-d, J. Perschbacher, Sport Fish Biologist, ADF&G, Soldotna, personal communication; McKinley and Fleischman 2013; 1994-2012 Educational data supplied by the Kenaitze Indian Tribe; Tim McKinley personal communication.

Note: ND = no data available.

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

[b] Inriver sonar estimate from 1986 to 2012 estimated using a run reconstruction model from McKinley and Fleischman 2013, FMS 13-03.

[c] 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.

[d] 2013 estimates are preliminary until biometrically reviewed and published.

Table 8.–Late-run Kenai River Chinook salmon population data, 1986–2013.

Year	Deep Creek Marine Harvest[a]	Eastside Setnet Harvest[b]	Drift Gillnet Harvest[b]	Comm & PU[c]	Kenaitze Educational	Sub[d]	PU Dipnet[e]	Sport Harvest Below Sonar[f,g]	Inriver Run Estimated by Sonar[h]	Sport Harvest Above Sonar[f,g]	Catch-and-Release Mortality[f]	Spawning Escapement	Total Run	Harvest Rate
1986	378	13,619	1,100	ND	ND	ND	ND	ND	62,740	9,872	316	52,552	77,837	0.325
1987	731	14,536	2,731	ND	ND	ND	235	ND	63,550	13,100	123	50,327	81,783	0.385
1988	892	8,834	1,330	ND	ND	ND	0	ND	61,760	19,695	176	41,889	72,816	0.425
1989	821	7,498	0	ND	ND	22	0	ND	36,370	9,691	88	26,591	44,711	0.405
1990	963	2,843	373	91	ND	13	ND	ND	34,200	6,897	69	27,234	38,483	0.292
1991	1,023	3,361	145	130	ND	288	ND	ND	38,940	7,903	16	31,021	43,887	0.293
1992	1,269	7,363	326	50	ND	402	0	ND	42,290	7,556	234	34,500	51,700	0.333
1993	1,700	9,672	451	81	ND	27	0	ND	50,210	17,775	478	31,957	62,142	0.486
1994	1,121	10,700	276	9	1	392	ND	ND	47,440	17,837	572	29,031	59,939	0.516
1995	1,241	8,291	314	25	3	ND	712	ND	44,770	12,609	472	31,689	55,355	0.428
1996	1,223	7,944	219	31	1	ND	295	ND	42,790	8,112	337	34,341	52,503	0.346
1997	1,759	7,780	293	30	20	ND	364	ND	41,120	12,755	570	27,795	51,367	0.459
1998	1,070	3,495	199	35	2	ND	254	ND	47,110	7,515	595	39,000	52,165	0.252
1999	602	6,501	345	59	4	ND	488	1,170	43,670	12,425	682	30,563	52,839	0.422
2000	631	2,531	162	27	6	ND	410	831	47,440	14,391	499	32,550	52,038	0.374
2001	552	4,128	371	80	8	ND	638	1,336	53,610	15,144	825	37,641	60,724	0.380
2002	256	6,511	249	15	6	ND	606	1,929	56,800	10,678	665	45,457	66,372	0.315
2003	120	10,174	744	53	11	ND	1,016	823	85,110	16,120	1,803	67,187	98,052	0.315
2004	996	14,897	916	218	10	ND	792	2,386	79,690	14,988	1,019	63,683	99,905	0.363
2005	624	15,183	1,103	639	11	ND	997	2,287	77,440	15,927	1,267	60,246	98,284	0.387
2006	563	6,840	631	61	11	ND	1,034	3,322	62,270	12,490	830	48,950	74,732	0.345
2007	478	8,445	547	38	6	0	1,509	1,750	47,370	9,690	670	37,010	60,143	0.385
2008	310	5,203	392	23	15	0	1,362	1,011	42,840	10,128	370	32,342	51,156	0.368
2009	154	3,839	515	64	4	0	1,189	1,132	29,940	7,904	626	21,410	36,837	0.419
2010	335	4,567	323	32	21	0	865	445	23,250	6,762	264	16,224	29,839	0.456
2011	528	5,596	356	88	5	0	1,243	458	27,090	6,894	479	19,717	35,363	0.442
2012	30	484	115	41	0	0	40	2	27,910	101	95	27,714	28,622	0.032
2013[j]	not avail.	2,256	267	117	8	0	11	37	17,015	1,541	79	15,395	19,711	0.219
Avg. (1986-2002)	955	7,389	523	51	6	191	308	1,317	47,930	11,997	395	35,538	57,451	0.379
Avg. (2003-2013)	414	7,044	537	125	9	0	914	1,241	47,266	9,322	682	37,262	57,513	0.339
Avg. (1986-2013)	754	7,253	528	85	8	88	586	1,261	47,669	10,946	508	36,215	57,475	0.363

-continued-

Table 8.–Page 2 of 2.

Source: Statewide Harvest Surveys from Mills 1987–1994, Howe et al. 1995, 1996, 2001a-d, Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011, In Prep; Romberg et al. In prep; Hammarstrom and Timmons 2001b; Brannian and Fox 1996; Ruesch and Fox 1996; Reimer and Sigurdsson 2004; Dunker and Lafferty 2007, Dunker, K.J. 2010, K. J. Dunker, Sport Fish Biologist, ADF&G, Anchorage, personal communication; Shields and Dupuis 2013b, P. Shields, Commercial Fish Biologist, ADF&G, Soldotna, personal communication; Fleischman and McKinley 2013, FMS 13-02; Tim McKinley personal communication; Robert Begich personal communication.

Note: ND = no data available.

[a] From Fleischman and McKinley 2013, FMS 13-02.

[b] Eastside set net and drift gillnet commercial harvest data using genetic stock allocation from Fleischman and McKinley 2013, Tony Eskelin personal communication.

[c] Eastside set net and drift gillnet personal use data using genetic stock allocation from Fleischman and McKinley 2013, Tony Eskelin personal communication.

[d] Total includes fish harvested from Cohoe, Salamatof, and Kalifornsky Beaches, and the Kenai River.

[e] 1986–1994 from SWHS; 1995 (Ruesch and Fox 1996); 1996–2012 are estimates from returned permits.

[f] Some harvest is below sonar and not counted against escapement.

[g] Sport harvest includes Creel survey estimates for the area from Cook Inlet to the Soldotna Bridge and estimates from the SWHS for Soldotna Bridge to outlet of Skilak Lake.

[h] Inriver sonar estimate estimated using a run reconstruction model from Fleischman and McKinley 2013, FMS 13-02 for 1986-2012 at river mile 8.6 sonar site.

2013 sonar estimate estimated based on recommendations based on Fleischman and McKinley 2013, FMS No. 13-02.

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

[j] 2013 estimates are preliminary until biometrically reviewed and published.

Table 9.–Historical summary of early-run Kasilof River/Crooked Creek Chinook salmon stocks, 1996–2013.

	Harvest[a]			Run to Weir[b]			Total Run[b]			Spawning Escapement[b]		
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[c]	5,627	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1998[c]	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[d]	4,791	ND	ND	3,326	2,526	800	8,117	2,526	800	2,705	ND	ND
2003[d]	3,090	0	3,090	4,127	2,923	1,204	7,217	2,923	4,294	3,597	ND	ND
2004[d]	2,407	0	2,407	4,873	2,641	2,232	7,280	2,641	4,639	4,356	2,196	2,160
2005[e]	2,665	572	2,093	3,168	2,108	1,060	5,833	2,680	3,153	2,936	1,909	1,027
2006[e]	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[e]	2,654	1,107	1,547	1,527	1,038	489	4,181	2,145	2,036	1,452	965	487
2008[e]	1,984	832	1,129	1,414	1,018	396	3,398	1,850	1,525	1,181	879	302
2009[e]	1,532	576	956	929	674	255	2,461	1,250	1,211	734	617	117
2010[e,f]	1,333	273	1,060	1,352	1,090	262	2,685	1,363	1,322	1,348	1,088	260
2011[e,g]	2,054	ND	ND	933	677	256	2,987	ND	ND	782	654	128
2012[h]	872	ND	ND	796	633	163	1,668	ND	ND	731	631	100
2013[i]	*not avail.*	ND	ND	1,409	1,211	198	*not avail.*	ND	ND	1,213	1,102	111
Ave (2005-2013)	1,731	491	913	1,575	1,115	460	3,150	1,326	1,304	1,438	1,040	398

Source: Cope, J. 2012; J. L. Cope, Sport Fish Biologist, ADF&G, Soldotna, personal communication; Howe et al. 2001a-d, Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data collected.

[a] Excludes ocean age-1 fish 2003-2010; 1996-2003 and 2011-2012 data from SWHS; 2004 - 2010 data from inseason creel survey. Data does not include harvest from Kasilof River personal use fishery.

[b] Excludes ocean age-1 fish 1999-2012; Run includes harvest, broodstock, facility mortalities, and escapement counts.

[c] Weir not operational.

[d] Retention of naturally-produced Chinook salmon prohibited by EO for part of the 2002 season. The hatchery contribution to the harvest was not estimated for 2002 due to non-representative 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%.

[e] Retention of naturally-produced Chinook salmon 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 apply.

[f] Retention of naturally-produced Chinook salmon prohibited by EO from 6/5/10 - 6/17/10.

[g] Creel survey discontinued in 2011.

[h] Retention of naturally-produced Chinook salmon prohibited by EO from 6/15/12 - 6/30/12. Bait and multiple hooks prohibited by EO from 6/22/12 to 6/30/12.

[i] Retention of naturally-produced Chinook salmon prohibited by EO from 5/1/13 - 6/30/13

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Table 10.–Late-run Kasilof River Chinook salmon harvest and abundance, 1996–2012.

Year	ESSN Harvest [a]	Inriver Sport Harvest	Inriver Abundance[b]
1996	3,469	833	ND
1997	3,398	1,101	ND
1998	1,526	637	ND
1999	2,839	658	ND
2000	1,105	1,086	ND
2001	1,803	1,378	ND
2002	2,843	451	ND
2003	4,443	1,144	ND
2004	6,505	1,038	ND
2005	6,630	1,052	12,097
2006	2,987	883	8,611
2007	3,686	1,062	8,522
2008	2,272	793	8,276
2009	1,676	2,164	ND
2010	2,337	1,310	ND
2011	2,055	1,660	ND
2012	211	55	ND
2013	637	*not avail.*	ND
Min	211	55	8,276
Ave	2,801	1,018	9,377
Max	6,630	2,164	12,097

Source: Statewide Harvest Surveys from Howe et al. 1995, 1996, 2001a-d, Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, *In Prep; Romberg et al. In prep*.

Note: ND = no data collected.

[a] Uses 2010 & 2011 ESSN genetic stock allocation estimates to calculate Kasilof River king salmon harvest component, found in Fleischman and McKinley 2013, FMS 13-02; Tony Eskelin, ADF&G, Soldotna, personal communication.

[b] Mark Recapture tagging abundance estimates. Source: Reimer and Fleishman 2012.

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

	Shore Guided				Shore Unguided				Shore Total			
Year	Number Anglers	Angler Hours	Catch	Harvest	Number Anglers	Angler Hours	Catch	Harvest	Number Anglers	Angler Hours	Catch	Harvest
2004	0	0	0	0	5,138	15,096	1,643	503	5,138	15,096	1,643	503
2005	0	0	0	0	5,142	16,452	1,366	497	5,142	16,452	1,366	497
2006	0	0	0	0	7,910	23,199	887	296	7,910	23,199	887	296
2007	0	0	0	0	6,181	17,953	747	329	6,181	17,953	747	329
2008	57	248	14	14	6,511	19,712	564	274	6,568	19,960	578	288
2009	50	204	0	0	6,242	17,091	354	169	6,292	17,295	354	169
2010	4	10	0	0	4,743	14,371	660	170	4,747	14,381	660	170

	Boat Guided				Boat Unguided				Boat Total			
Year	Number Anglers	Angler Hours	Catch	Harvest	Number Anglers	Angler Hours	Catch	Harvest	Number Anglers	Angler Hours	Catch	Harvest
2004	4,328	24,670	3,463	1,479	2,550	12,089	983	426	6,878	36,759	4,446	1,905
2005	4,615	32,840	3,446	1,768	2,297	11,300	743	401	6,912	44,140	4,189	2,169
2006	5,410	38,065	3,330	1,818	2,928	13,994	553	375	8,338	52,059	3,883	2,193
2007	4,625	32,363	3,162	1,940	2,109	10,926	516	384	6,734	43,289	3,678	2,324
2008	4,420	31,113	2,303	1,490	2,325	10,740	304	207	6,745	41,853	2,607	1,697
2009	3,526	24,255	1,711	1,196	1,575	7,361	211	166	5,101	31,616	1,922	1,362
2010	4,790	33,792	2,334	1,089	963	4,800	135	74	5,753	38,592	2,469	1,163

	Guided Total				Unguided Total				Total			
Year	Number Anglers	Angler Hours	Catch	Harvest	Number Anglers	Angler Hours	Catch	Harvest	Number Anglers	Angler Hours	Catch	Harvest
2004	4,328	24,670	3,463	1,479	7,688	27,185	2,626	929	12,016	51,855	6,089	2,408
2005	4,615	32,840	3,446	1,768	7,439	27,752	2,109	898	12,054	60,592	5,555	2,666
2006	5,410	38,065	3,330	1,818	10,838	37,193	1,440	671	16,248	75,258	4,770	2,489
2007	4,625	32,363	3,162	1,940	8,290	28,879	1,263	713	12,915	61,242	4,425	2,653
2008	4,477	31,361	2,317	1,504	8,836	30,452	868	481	13,313	61,813	3,185	1,985
2009	3,576	24,459	1,711	1,196	7,817	24,452	565	335	11,393	48,911	2,276	1,532
2010	4,794	33,802	2,334	1,089	5,706	19,171	795	244	10,500	52,973	3,129	1,333
Ave	4,546	31,080	2,823	1,542	8,088	27,869	1,381	610	12,634	58,949	4,204	2,152
% of Total	36%	53%	67%	72%	64%	47%	33%	28%				

Source: Cope 2011 and 2012.

Note: 2010 was the last year data was collected; creel survey discontinued in 2011.

[a] Some totals presented here may vary slightly from calculated totals due to rounding differences.

Table 12.–Historical releases of adipose-clipped Crooked Creek Chinook salmon, 1994–2013.

Release year	Broodstock Origin	Hatchery	No. of smolt released	No. of AFC smolt released	% 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
Avg. (1994-2002)			163,568		
Avg. (2003-2013)			88,110		

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

Table 13.–Angler effort, harvest, and escapement, Russian River early-run (ER) and late-run (LR) sockeye salmon, 1963–2013.

		Sport Harvest[b]		Subsistence Harvest [c]		Spawning Escapement[d]		Local Run[e]	
Year	Effort[a]	ER	LR	ER	LR	ER	LR	ER	LR
1960 [f]	ND	ND	ND	ND	ND	7,200	30,488	ND	ND
1961 [f]	ND	ND	ND	ND	ND	6,640	16,048	ND	ND
1962 [f]	ND	3,408	1,292	ND	ND	26,536	21,232	29,944	22,524
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	12,515	39,996	16,065	42,446
1965 [f]	9,720	10,030	2,160	ND	ND	21,318	17,796	31,348	19,956
1966 [f]	18,280	14,950	7,290	ND	ND	16,649	29,481	31,599	36,771
1967 [f]	16,960	7,240	5,720	ND	ND	13,626	42,132	20,866	47,852
1968 [f]	17,280	6,920	5,820	ND	ND	9,116	41,800	16,036	47,620
1969	14,930	5,870	1,150	ND	ND	5000 [g]	28,515	5,870	29,665
1970	10,700	5,750	600	ND	ND	5,384	23,701	11,134	24,301
1971	15,120	2,810	10,730	ND	ND	1,075	54,542	3,885	65,272
1972	25,700	5,040	16,050	ND	ND	9,075	79,150	14,115	95,200
1973	30,690	6,740	8,930	ND	ND	13,101	24,690	19,841	33,620
1974	21,120	6,440	8,500	ND	ND	12,959	24,115	19,399	32,615
1975	16,510	1,400	8,390	ND	ND	5,426	30,388	6,826	38,778
1976	26,310	3,380	13,700	ND	ND	14,618	32,056	17,998	45,756
1977	69,510	20,400	27,440	ND	ND	4,465	16,601	24,865	44,041
1978	69,860	37,720	24,530	ND	ND	34,908	33,666	72,628	58,196
1979 [h]	55,000	8,400	26,840	ND	ND	19,577	88,007	27,977	114,847
1980	56,330	27,220	33,500	ND	ND	28,045	84,555	55,265	118,055
1981	51,030	10,720	23,720	ND	ND	20,499	45,166	31,219	68,886
1982	51,480	34,500	10,320	ND	ND	55,022	31,822	89,522	42,142
1983	31,860	8,360	16,000	ND	ND	20,718	34,284	29,078	50,284
1984	49,550	35,880	21,970	ND	ND	28,767	92,791	64,647	114,761
1985	50,770	12,300	58,410	ND	ND	28,893	138,377	41,193	196,787
1986	52,250	35,100	30,810	ND	ND	34,749	41,868	69,849	72,678
1987	113,010	154,200	40,580	ND	ND	58,019	57,426	212,219	98,006
1988	72,030	54,780	19,540	ND	ND	50,020	42,850	104,800	62,390
1989	60,570	11,290	55,210	ND	ND	15,017	138,532	26,628	193,742
1990	84,710	30,215	56,180	ND	ND	25,575	84,575	56,931	140,755
1991	85,741	65,390	31,450	ND	ND	30,316	79,982	97,779	111,432
1992	60,499	30,512	26,101	ND	ND	36,330	63,091	66,842	89,192
1993	58,093	37,261	26,772	ND	ND	38,735	100,381	75,996	127,153
1994	64,134	48,923	26,375	ND	ND	39,678	125,821	88,601	152,196
1995	48,185	23,572	11,986	ND	ND	27,883	62,502	51,455	74,488
1996	69,032	75,203	20,142	ND	ND	52,255	35,263	127,458	55,405
1997	60,923	36,788	12,910	ND	ND	33,742	67,474	70,530	80,384
1998	56,121	42,711	25,110	ND	ND	33,852	113,353	76,563	138,463
1999	64,536	34,283	32,335	ND	ND	33,916	142,164	68,199	174,499
2000	69,864	40,732	30,229	ND	ND	31,300	57,813	72,032	88,042
2001	55,972	35,400	18,550	ND	ND	77,576	75,478	112,976	94,028

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Table 13.–Page 2 of 2.

		Sport Harvest[b]		Subsistence Harvest [c]		Spawning Escapement[d]		Local Run[e]	
Year	Effort[a]	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	298	27,298	52,949	64,483	70,110
2008	55,444	42,492	23,680	928	478	30,989	46,635	74,409	70,793
2009	64,518	59,097	33,935	543	431	52,178	80,088	111,818	114,454
2010	39,873	23,412	9,333	615	246	27,074	38,848	51,101	48,427
2011	47,264	22,697	14,412	642	311	29,129	41,529	52,468	56,252
2012	41,152	15,231	15,074	867	461	24,115	54,911	40,213	70,446
2013	*not avail.*	*not avail.*	*not avail*	698	372	35,776	31,364	*not avail.*	*not avail.*
Avg. (1960-2012)	48,194	28,136	20,494	663	371	29,613	60,891	58,206	82,903
Avg. (2003-2012)	54,384	34,375	21,200	663	371	40,444	73,131	75,217	94,553

Source: Mills 1979 - 1994, Howe et al. 1995, 1996, 2001a-d, Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep; Pappas and Marsh 2004; Subsistence data, USFWS.

Note: ND = no data collected.

[a] Effort is angler days of effort in the fishery. 1963-1996 estimated from an in-season creel survey and only measures effort primarily for sockeye from June 11 to August 20. 1997-2011 estimated from the SWHS and includes effort for the whole year and for other species.

[b] Harvest from 1963-1996 estimated from an inseason creel survey. Harvest from 1997-2011 estimated from the annual SWHS.

[c] Subsistence fishery started in 2007.

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

[e] Escapement above weir plus harvest; 1989-1991 includes 60 fish (in 1989) used to test brood source for disease, 1,572 fish (in 1990) and 729 fish (in 1991) used as brood source for stocking in Resurrection Bay.

[f] Fish tower counts were used from 1960 through 1968. A weir was used to count sockeye salmon from 1969 to present.

[g] Breach in weir during the early-run, used a footsurvey at Upper Russian Creek to estimate the number of early-run Russian sockeye salmon.

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

Table 14.–Daily escapement of early- and late-run sockeye salmon at the Russian River weir from 2010-2013.

	2010			2011			2012			2013		
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
Early-run sockeye salmon												
07-Jun				3	3	0.000	0	0	0.000	0	0	0.000
08-Jun				173	176	0.006	0	0	0.000	23	23	0.001
09-Jun	17	17	0.001	539	715	0.025	34	34	0.001	105	128	0.004
10-Jun	47	64	0.002	483	1,198	0.041	57	91	0.004	211	339	0.009
11-Jun	2	66	0.002	711	1,909	0.066	75	166	0.007	184	523	0.015
12-Jun	74	140	0.005	638	2,547	0.087	74	240	0.010	1,659	2,182	0.061
13-Jun	76	216	0.008	630	3,177	0.109	78	318	0.013	3,442	5,624	0.157
14-Jun	162	378	0.014	582	3,759	0.129	663	981	0.041	2,184	7,808	0.218
15-Jun	42	420	0.016	762	4,521	0.155	515	1,496	0.062	1,359	9,167	0.256
16-Jun	60	480	0.018	322	4,843	0.166	541	2,037	0.084	3,011	12,178	0.340
17-Jun	24	504	0.019	331	5,174	0.178	536	2,573	0.107	2,837	15,015	0.420
18-Jun	21	525	0.019	651	5,825	0.200	615	3,188	0.132	3,775	18,790	0.525[a]
19-Jun	18	543	0.020	468	6,293	0.216	547	3,735	0.155	2,740	21,530	0.602
20-Jun	54	597	0.022	252	6,545	0.225	1,474	5,209	0.216	2,179	23,709	0.663
21-Jun	97	694	0.026	276	6,821	0.234	859	6,068	0.252	2,094	25,803	0.721
22-Jun	1,142	1,836	0.068	575	7,396	0.254	1,606	7,674	0.318	1,632	27,435	0.767
23-Jun	1,806	3,642	0.135	814	8,210	0.282	2,420	10,094	0.419	1,017	28,452	0.795
24-Jun	2,072	5,714	0.211	1,864	10,074	0.346	2,173	12,267	0.509 [a]	843	29,295	0.819
25-Jun	1,814	7,528	0.278	1,798	11,872	0.408	2,104	14,371	0.596	572	29,867	0.835
26-Jun	1,919	9,447	0.349	1,406	13,278	0.456	1,685	16,056	0.666	444	30,311	0.847
27-Jun	1,025	10,472	0.387	1,277	14,555	0.500 [a]	1,303	17,359	0.720	399	30,710	0.858
28-Jun	1,119	11,591	0.428	1,926	16,481	0.566	625	17,984	0.746	348	31,058	0.868
29-Jun	1,215	12,806	0.473	2,056	18,537	0.636	635	18,619	0.772	248	31,306	0.875
30-Jun	1,611	14,417	0.533 [a]	2,571	21,108	0.725	445	19,064	0.791	204	31,510	0.881
01-Jul	1,423	15,840	0.585	1,577	22,685	0.779	520	19,584	0.812	258	31,768	0.888
02-Jul	1,165	17,005	0.628	1,004	23,689	0.813	574	20,158	0.836	572	32,340	0.904
03-Jul	941	17,946	0.663	1,148	24,837	0.853	567	20,725	0.859	354	32,694	0.914
04-Jul	1,009	18,955	0.700	814	25,651	0.881	651	21,376	0.886	119	32,813	0.917
05-Jul	979	19,934	0.736	628	26,279	0.902	663	22,039	0.914	101	32,914	0.920
06-Jul	1,155	21,089	0.779	958	27,237	0.935	796	22,835	0.947	146	33,060	0.924
07-Jul	1,011	22,100	0.816	520	27,757	0.953	322	23,157	0.960	232	33,292	0.931
08-Jul	1,158	23,258	0.859	417	28,174	0.967	302	23,459	0.973	438	33,730	0.943
09-Jul	770	24,028	0.887	372	28,546	0.980	83	23,542	0.976	361	34,091	0.953
10-Jul	950	24,978	0.923	124	28,670	0.984	144	23,686	0.982	382	34,473	0.964
11-Jul	648	25,626	0.947	130	28,800	0.989	195	23,881	0.990	283	34,756	0.971
12-Jul	521	26,147	0.966	82	28,882	0.992	94	23,975	0.994	615	35,371	0.989
13-Jul	438	26,585	0.982	118	29,000	0.996	46	24,021	0.996	240	35,611	0.995
14-Jul	489	27,074	1.000	129	29,129	1.000	94	24,115	1.000	165	35,776	1.000

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	2010			2011			2012			2013		
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
Late-run sockeye salmon.												
15-Jul	343	343	0.009	151	151	0.004	43	43	0.001	179	179	0.006
16-Jul	497	840	0.022	127	278	0.007	166	209	0.004	694	873	0.028
17-Jul	420	1,260	0.032	123	401	0.010	188	397	0.007	396	1,269	0.040
18-Jul	556	1,816	0.047	138	539	0.013	419	816	0.015	413	1,682	0.053
19-Jul	382	2,198	0.057	101	640	0.015	508	1,324	0.024	443	2,125	0.067
20-Jul	521	2,719	0.070	210	850	0.020	442	1,766	0.032	306	2,431	0.077
21-Jul	640	3,359	0.086	210	1,060	0.026	495	2,261	0.041	272	2,703	0.086
22-Jul	549	3,908	0.101	362	1,422	0.034	408	2,669	0.049	461	3,164	0.100
23-Jul	506	4,414	0.114	693	2,115	0.051	345	3,014	0.055	1,285	4,449	0.141
24-Jul	482	4,896	0.126	808	2,923	0.070	653	3,667	0.067	827	5,276	0.167
25-Jul	133	5,029	0.129	487	3,410	0.082	1,459	5,126	0.093	653	5,929	0.188
26-Jul	234	5,263	0.135	799	4,209	0.101	1,325	6,451	0.117	1,837	7,766	0.246
27-Jul	937	6,200	0.160	1,439	5,648	0.136	922	7,373	0.134	2,891	10,657	0.338
28-Jul	808	7,008	0.180	775	6,423	0.155	801	8,174	0.149	1,638	12,295	0.389
29-Jul	1430	8,438	0.217	1,361	7,784	0.187	640	8,814	0.161	578	12,873	0.408
30-Jul	814	9,252	0.238	878	8,662	0.209	307	9,121	0.166	432	13,305	0.421
31-Jul	831	10,083	0.260	1,013	9,675	0.233	569	9,690	0.176	622	13,927	0.441
01-Aug	1050	11,133	0.287	471	10,146	0.244	1,015	10,705	0.195	942	14,869	0.471
02-Aug	587	11,720	0.302	968	11,114	0.268	424	11,129	0.203	1,534	16,403	0.520[a]
03-Aug	507	12,227	0.315	643	11,757	0.283	844	11,973	0.218	751	17,154	0.543
04-Aug	642	12,869	0.331	759	12,516	0.301	410	12,383	0.226	564	17,718	0.561
05-Aug	568	13,437	0.346	892	13,408	0.323	365	12,748	0.232	819	18,537	0.587
06-Aug	634	14,071	0.362	813	14,221	0.342	425	13,173	0.240	580	19,117	0.605
07-Aug	554	14,625	0.376	743	14,964	0.360	1,151	14,324	0.261	1,059	20,176	0.639
08-Aug	407	15,032	0.387	1,187	16,151	0.389	1,104	15,428	0.281	972	21,148	0.670
09-Aug	487	15,519	0.399	1,195	17,346	0.418	1,253	16,681	0.304	1,143	22,291	0.706
10-Aug	772	16,291	0.419	1,015	18,361	0.442	2,014	18,695	0.340	918	23,209	0.735
11-Aug	328	16,619	0.428	884	19,245	0.463	1,730	20,425	0.372	796	24,005	0.760
12-Aug	451	17,070	0.439	1,510	20,755	0.500 [a]	2,162	22,587	0.411	637	24,642	0.780

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	2010			2011			2012			2013		
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
Late run sockeye salmon (continued)												
13-Aug	519	17,589	0.453	1,410	22,165	0.534	2,538	25,125	0.458	725	25,367	0.803
14-Aug	574	18,163	0.468	1,576	23,741	0.572	3,542	28,667	0.522 [a]	472	25,839	0.818
15-Aug	824	18,987	0.489	1,135	24,876	0.599	3,211	31,878	0.581	302	26,141	0.828
16-Aug	1092	20,079	0.517 [a]	848	25,724	0.619	2,533	34,411	0.627	517	26,658	0.844
17-Aug	1004	21,083	0.543	846	26,570	0.640	2,281	36,692	0.668	344	27,002	0.855
18-Aug	839	21,922	0.564	844	27,414	0.660	1,511	38,203	0.696	335	27,337	0.866
19-Aug	604	22,526	0.580	830	28,244	0.680	1,310	39,513	0.720	288	27,625	0.875
20-Aug	1173	23,699	0.610	940	29,184	0.703	1,466	40,979	0.746	277	27,902	0.884
21-Aug	2490	26,189	0.674	707	29,891	0.720	1,586	42,565	0.775	342	28,244	0.895
22-Aug	2018	28,207	0.726	1,172	31,063	0.748	1,435	44,000	0.801	240	28,484	0.902
23-Aug	1245	29,452	0.758	1,220	32,283	0.777	1,266	45,266	0.824	210	28,694	0.909
24-Aug	1466	30,918	0.796	1,109	33,392	0.804	901	46,167	0.841	410	29,104	0.922
25-Aug	1270	32,188	0.829	1,251	34,643	0.834	1,028	47,195	0.859	395	29,499	0.934
26-Aug	1041	33,229	0.855	1,103	35,746	0.861	1,689	48,884	0.890	316	29,815	0.944
27-Aug	1135	34,364	0.885	1,110	36,856	0.887	1,272	50,156	0.913	343	30,158	0.955
28-Aug	965	35,329	0.909	1,003	37,859	0.912	796	50,952	0.928	277	30,435	0.964
29-Aug	630	35,959	0.926	766	38,625	0.930	841	51,793	0.943	208	30,643	0.971
30-Aug	527	36,486	0.939	456	39,081	0.941	957	52,750	0.961	224	30,867	0.978
31-Aug	427	36,913	0.950	561	39,642	0.955	751	53,501	0.974	204	31,071	0.984
01-Sep	486	37,399	0.963	432	40,074	0.965	455	53,956	0.983	175	31,246	0.990
02-Sep	475	37,874	0.975	422	40,496	0.975	270	54,226	0.988	118	31,364	0.993
03-Sep	395	38,269	0.985	424	40,920	0.985	366	54,592	0.994	209	31,573	1.000
04-Sep	260	38,529	0.992	319	41,239	0.993	301	54,893	1.000			
05-Sep	154	38,683	0.996	202	41,441	0.998	18	54,911	1.000			
06-Sep	119	38,802	0.999	88	41,529	1.000						
07-Sep	46	38,848	1.000									

Source: Sandee Simons, Fisheries Technician III, Crew leader. Russian River Sockeye Project, unpublished data, 2010-2013.

[a] Mid-point of run.

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Table 15.–Kenai River recreational harvest of sockeye salmon by river section as determined by the Statewide Harvest Survey, 1981-2012.

	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	229,228
1984	4,419	28.1	2,183	13.9	2,300	14.6	6,800	43.3	ND	ND	15,702	270,422
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	388,677
2006	52,364	30.2	71,854	41.4	22,177	12.8	19,941	11.5	7,089	4.1	173,425	329,122
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
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
Min.	4,419	23.4	2,183	13.9	2,300	9.8	4,849	4.6	3,612	0.0	15,702	178,716
Ave	69,004	34.0	68,853	32.7	27,814	15.4	26,177	16.9	4,821	1.8	194,409	320,995
Max.	173,143	43.3	202,429	44.4	55,414	24.2	50,032	43.3	13,469	4.6	455,454	410,381

Source: Statewide Harvest Surveys from Mills 1982-1994, Howe et al. 1995, 1996, 2001a-d, Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data available.

[a] SWHS began consistently reporting in 2002.

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Table 16.–Kenai River drainage sockeye salmon escapement and inriver harvest, 1981-2013.

						Harvests above Sonar									
Year	Personal Use Dip Net and Educational Harvest [a]	Sport Harvest Below Sonar [b]	Kenai River Sonar Count	Total Inriver Run	Kenai R. Below Soldaotna Bridge	Kenai R Above Soldotna Bridge	Kenai R Above Soldotna Bridge	Kenai R Reach Not Specified [d]	Skilak Lake and Kenai River tributaries [e]	Late Run Russian River	Hidden Lake/Creek Personal Use and Sport [f]	Inriver Federal Subsistence [g]	Total Harvest Above Sonar	Hidden Creek Escapement	Spawning Escapement
1981	ND	3,116	575,848	578,965	5,270	2,154	14,451	ND	ND	23,720	0	ND	40,325	7,970	527,554
1982	Insignificant	6,922	809,173	816,095	11,706	4,784	38,397	ND	ND	10,320	ND	ND	53,501	259	755,413
1983	7,562	13,577	866,455	887,594	22,961	9,384	48,306	ND	0	16,000	0	ND	73,690	0	792,765
1984	ND	2,613	481,473	484,086	4,419	1,806	11,283	ND	0	21,970	17	ND	35,076	0	446,397
1985	ND	8,835	680,897	689,732	14,941	6,106	42,272	124	0	58,410	149	ND	107,061	0	573,836
1986	ND	12,522	645,906	658,428	21,177	8,655	51,221	ND	13	30,810	0	ND	90,699	8,335	546,872
1987	24,090	50,274	2,245,615	2,319,979	85,020	34,746	155,799	ND	2,029	40,580	689	ND	233,843	28,964	1,982,808
1988	16,880	29,345	1,356,958	1,403,183	49,627	20,282	103,124	ND	382	19,540	583	ND	143,911	38,318	1,174,729
1989	51,192	66,162	2,295,576	2,412,931	111,889	45,727	165,336	681	1,654	55,210	331	ND	268,939	0	2,026,638
1990	3,477	19,640	950,358	973,474	33,213	13,573	85,074	0	670	56,180	107	ND	155,604	61,598	733,155
1991	13,433	31,536	954,843	999,812	53,331	21,795	108,271	76	2,411	31,450	63,681	ND	227,684	30,814	696,345
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	18,848	1,188,534
1993	35,592	27,717	1,134,922	1,198,231	46,873	19,156	90,306	0	825	26,772	133	ND	137,192	5,634	992,096
1994	15,804	17,954	1,412,047	1,445,805	30,363	12,409	63,253	ND	213	26,375	102	ND	102,352	2,255	1,307,440
1995	15,720	29,451	884,922	930,094	49,806	20,355	75,622	ND	177	11,805	83	ND	108,042	4,945	771,936
1996	104,110	39,810	1,129,274	1,273,194	67,324	27,514	118,967	ND	307	19,136	225	ND	166,149	46,881	916,244
1997	116,107	43,642	1,512,733	1,672,482	73,805	30,163	103,328	ND	312	12,910	274	ND	146,987	39,544	1,326,202
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	51,383	877,707
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	32,644	916,632
2000	99,571	57,978	900,700	1,058,249	98,048	40,070	132,935	ND	377	30,229	190	ND	203,801	27,493	669,406
2001	152,580	51,374	906,333	1,110,287	86,880	35,506	113,882	ND	24	18,550	142	ND	168,104	24,028	714,201
2002	182,229	46,693	1,339,682	1,568,604	78,964	32,271	143,211	3,742	1,509	31,999	308	ND	213,040	44,081	1,082,561
2003	227,207	60,722	1,656,026	1,943,955	102,689	41,967	173,068	10,168	96	28,085	302	ND	253,686	6,364	1,395,976
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	10,741	1,679,806
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	6,980	1,647,023
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	15,910	1,876,180

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Table 16.–Page 2 of 2.

						Harvests above Sonar									
Year	Personal Use Dip Net and Educational Harvest [a]	Sport Harvest Below Sonar [b]	Kenai River Sonar Count	Total Inriver Run	Kenai R. Below Soldaotna Bridge	Kenai R Above Soldotna Bridge	Kenai R Above Soldotna Bridge	Kenai R Reach Not Specified[d]	Skilak Lake and Kenai River tributaries [e]	Late Run Russian River	Hidden Lake/Creek Personal Use & Sport[f]	Inriver Federal Subsistence [g]	Total Harvest Above Sonar	Hidden Creek Escapement	Spawning Escapement
2007	295,866	60,623	1,229,945	1,586,434	102,521	41,898	199,415	6,876	94	16,863	240	298	265,684	6,831	957,430
2008	239,075	46,053	917,139	1,202,267	77,882	31,829	144,325	7,823	171	23,680	0	478	208,306	4,854	703,979
2009	346,773	45,868	1,090,055	1,482,696	77,568	31,700	167,746	7,005	102	33,935	1,019	431	241,938	4,862	843,255
2010	395,586	59,651	1,294,885	1,750,122	100,878	41,227	194,934	8,823	255	9,333	1,744	903	257,219	22,560	1,015,106
2011	543,043	85,720	1,599,217	2,227,980	144,964	59,244	234,159	5,717	13	14,412	97	1,089	314,731	9,117	1,275,369
2012	528,610	102,376	1,581,555	2,212,541	173,132	70,756	278,675	3,611	20	15,072	37	547	368,718	15,319	1,197,518
2013	350,302	*not avail.*	1,359,893	*not avail.*	*not avail.*	*not avail.*	*not avail.*	*not avail.*	*not avail.*	*not avail.*	*not avail.*	*not avail.*	*not avail.*	21,056	*not avail.*
Avg. (2008-2012)	410,620	67,930	1,296,570	1,775,120	114,880	46,950	203,970	6,600	110	19,290	580	690	278,180	11,340	1,007,050
Avg. (2003-2012)	327,370	61,240	1,528,780	1,917,380	103,560	42,320	187,170	7,640	120	21,200	430	620	259,260	10,350	1,259,160
Avg. (1996-2012)	246,160	54,820	1,370,500	1,671,480	92,700	37,890	159,640	7,280	230	22,490	380	620	225,550	21,740	1,123,210
Avg. (1981-2012)	162,930	40,600	1,250,730	1,428,800	68,660	28,060	122,770	5,060	440	26,170	2,350	620	182,330	18,050	1,050,350

Source: Statewide Harvest Surveys from Mills 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prepa-b; Brannian and Fox 1996; Reimer and Sigurdsson 2004, Dunker and Lafferty 2007, Dunker 2010, K. J. Dunker, Sport Fish biologist, Anchorage, personal communication; King 1995, 1996; Pappas and Marsh 2004; Shields and Dupuis 2013b, P. Shields, Commercial Fish Biologist, ADF&G, Soldotna, personal communication; Educational harvest data, Kenaitze Indian Tribe; 2007-2012 Subsistence data, USFWS.

Note: ND = no data available

[a] Personal use harvest 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 a creel survey was 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 two percentages is applied to all other year's below-bridge harvest to estimate the harvest below the sonar.

[c] Data revised in 2011 when Commercial Fisheries converted all Bendix data to DIDSON-equivalent estimates.

[d] SWHS began reporting this data consistently in 2002.

[e] Tributaries include Soldotna Crk., Funny R., Moose R., Cooper Crk., Quartz Crk., and Ptarmigan Crk.

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

[g] 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.

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Table 17.–Estimated sport harvest of Kenai River coho salmon by river section, 1977-2012.

	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			All Sections		
Year	Prior to Sept 1	After Sept 1	Total	Prior to Sept 1	After Sept 1	Total	Prior to Sept 1	After Sept 1	Total	Prior to Sept 1	After Sept 1	Total	Prior to Sept 1	After Sept 1	Total	Prior to Sept 1	After Sept 1	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
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
Averages																		
2008-2012	18,250	9,285	27,535	6,020	3,011	9,031	3,267	3,062	6,330	1,884	1,136	3,020	877	215	1,091	30,298	16,709	
2003-2012	18,499	8,678	27,177	7,012	2,817	9,829	2,981	2,710	5,691	2,218	1,143	3,361	997	303	1,313	31,707	15,651	
1995-2012	18,081	7,972	26,053	6,575	2,291	8,866	2,915	2,339	5,254	2,183	954	3,138	1,048	332	1,392	30,395	13,759	47,007
1981-2012			28,463			8,404			6,358			3,384			1,035			

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep. *Note*: ND = no data available

[a] SWHS began reporting consistently in 2002.

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Table 18.–Northern Kenai Peninsula Management Area (except Kenai River drainage) coho salmon sport harvest, 1981-2012.

Year	Kenai River Trubutaries[a]	Tustumena Lake[b]	Kasilof River	Crooked Creek	Total	Swanson River	Swanson Canoe Route Lakes	Total	Six Mile Creek	Resurrection Creek	Chickaloon River	Other[c]	Total
1981	ND	ND	335	ND	335	ND	ND	ND	ND	ND	ND	ND	ND
1982	ND	ND	325	ND	325	ND	ND	ND	ND	ND	ND	ND	ND
1983	ND	ND	409	ND	409	525	ND	525	ND	ND	ND	ND	ND
1984	2,432	ND	1,085	ND	1,085	1,484	ND	1,484	ND	ND	ND	ND	ND
1985	1,455	ND	560	ND	560	ND	187	187	ND	ND	ND	ND	ND
1986	2,828	ND	1,783	497	2,280	ND	969	969	45	13	ND	0	58
1987	4,274	36	3,785	ND	3,821	ND	1,485	1,485	72	36	ND	0	108
1988	3,165	200	2,928	291	3,419	5,603	546	6,149	236	18	ND	55	309
1989	4,300	111	4,222	1,952	6,285	6,379	127	6,506	79	127	ND	0	206
1990	3,172	236	1,590	486	2,312	1,501	0	1,501	316	125	ND	0	441
1991	4,511	52	4,754	265	5,071	811	81	892	125	29	ND	0	154
1992	4,567	32	3,304	251	3,587	1,984	49	2,033	49	89	154	97	389
1993	2,317	258	3,698	867	4,823	3,477	10	3,487	344	171	439	0	954
1994	4,779	30	4,457	1,026	5,513	1,876	0	1,876	534	81	18	27	660
1995	4,163	218	5,349	98	5,665	1,132	0	1,132	472	39	0	0	511
1996	5,567	144	2,612	471	3,227	2,578	76	2,654	551	224	155	0	930
1997	4,606	345	1,286	0	1,631	1,153	0	1,153	381	84	20	56	541
1998	4,612	119	2,107	0	2,226	2,371	123	2,494	470	274	115	0	859
1999	3,954	48	3,269	0	3,317	2,054	0	2,054	92	233	0	0	325
2000	3,970	229	2,965	0	3,194	2,506	0	2,506	429	52	136	0	617
2001	5,245	90	3,173	110	3,373	1,959	117	2,076	459	125	19	86	689
2002	6,510	93	6,046	35	6,174	2,467	0	2,467	1,025	114	22	163	1,324
2003	5,713	46	4,082	0	4,128	3,087	80	3,167	262	125	23	0	410
2004	6,706	338	4,217	270	4,825	1,466	45	1,511	582	138	0	0	720
2005	3,886	117	3,124	117	3,358	2,367	0	2,367	146	39	120	72	377
2006	5,479	85	3,782	54	3,921	2,028	32	2,060	545	121	0	0	666
2007	3,246	15	1,740	0	1,755	1,660	10	1,670	252	289	0	0	541
2008	3,896	252	3,613	0	3,865	2,814	0	2,814	354	195	0	0	549
2009	5,535	61	2,725	63	2,849	1,790	0	1,790	664	103	0	0	767
2010	2,643	45	2,327	0	2,372	1,074	19	1,093	691	422	60	0	1,173
2011	4,510	0	2,359	0	2,359	1,348	0	1,348	150	0	0	0	150
2012	4,830	0	3,610	0	3,610	264	19	283	294	36	0	0	330
Avg. (1981-1999)	3,794	141	2,519	477	2,942	2,352	244	2,152	269	110	113	17	460
Avg. (2003-2012)	4,644	96	3,158	50	3,304	1,790	21	1,810	394	147	20	7	568
Avg. (1981-2012)	4,237	123	2,863	264	3,177	2,139	142	2,058	356	122	61	21	547

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data available

[a] Includes entire Kenai R drainage (Russian R, Beaver Cr, Funny R, Grant Cr, Hidden Cr/Lk, Jean Lk, Kenai Lk, Moose R, Quartz Cr, Sevena Lk, Skilak Lk, Soldotna Cr, and Trail Lk).

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

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

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Table 19.–Sport catch and harvest of pink salmon in the northern Kenai Peninsula management area, 1977-2012.

	Kenai River		Resurrection Creek		Russian River		Kasilof River		Sixmile Creek		Other	
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	1,817
1978	ND	26,579	ND	ND	ND	1,300	ND	ND	ND	ND	ND	2,291
1979	ND	127	ND	ND	ND	0	ND	ND	ND	ND	ND	1,136
1980	ND	18,580	ND	ND	ND	930	ND	ND	ND	ND	ND	646
1981	ND	86	ND	ND	ND	0	ND	ND	ND	ND	ND	1,976
1982	ND	25,572	ND	ND	ND	1,142	ND	187	ND	ND	ND	1,215
1983	ND	1,825	ND	ND	ND	52	ND	31	ND	ND	ND	1,343
1984	ND	28,562	ND	ND	ND	461	ND	337	ND	ND	ND	2,531
1985	ND	1,306	ND	ND	ND	112	ND	62	ND	ND	ND	932
1986	ND	19,924	ND	1,105	ND	521	ND	245	ND	278	ND	219
1987	ND	941	ND	815	ND	254	ND	145	ND	181	ND	162
1988	ND	15,795	ND	1,728	ND	54	ND	145	ND	73	ND	1,164
1989	ND	1,421	ND	475	ND	187	ND	87	ND	129	ND	86
1990	126,251	27,385	10,911	3,265	1,313	627	558	186	2,208	139	714	59
1991	5,192	2,416	757	424	175	100	233	233	158	33	658	300
1992	74,021	10,029	17,871	4,983	1,823	311	449	193	321	137	2,271	394
1993	3,001	1,003	3,936	1,011	566	274	184	0	1,270	215	978	260
1994	42,357	8,701	6,150	1,582	671	272	313	114	1,043	286	753	151
1995	2,724	991	8,627	2,237	1,503	200	344	228	788	203	1,015	114
1996	84,974	15,406	13,190	3,286	1,007	409	583	509	1,461	98	3,299	398
1997	4,339	1,371	4,032	866	1,419	524	115	93	73	30	8,903	936
1998	81,776	8,926	31,739	7,418	790	244	1,038	105	1,233	75	3,450	358
1999	6,806	1,895	4,947	691	758	246	100	47	348	0	413	107
2000	185,915	19,081	31,030	2,661	3,467	357	2,582	137	1,466	184	5,962	1,724
2001	8,774	2,069	11,584	1,586	2,140	272	198	91	1,112	87	1,464	639
2002	186,967	22,995	12,010	2,362	3,933	933	3,607	618	792	48	8,079	2,390
2003	9,319	2,847	7,046	1,750	3,291	431	551	116	1,181	94	999	311
2004	155,910	20,638	9,212	2,087	4,163	1,222	1,929	187	231	15	3,256	727
2005	17,277	5,112	6,602	836	788	123	432	197	140	21	702	62
2006	154,671	12,448	22,645	4,122	4,737	539	1,517	291	879	158	3,577	107
2007	15,118	3,308	26,482	2,876	1,352	312	219	0	1,129	91	3,840	632
2008	186,789	15,108	25,524	5,500	2,853	244	4,612	424	810	66	5,066	333
2009	14,099	4,038	31,700	4,801	1,604	582	675	343	3,270	200	755	57
2010	104,698	12,959	9,557	1,499	1,230	51	2,533	553	1,350	29	4,829	461
2011	10,058	3,586	6,044	1,310	1,077	227	267	152	89	0	1,437	77
2012	135,114	17,637	6,357	917	9,353	688	4,972	896	898	0	2,628	342
Ave	70,267	10,023	13,389	2,303	2,174	396	1,218	224	967	106	2,828	735

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Table 20.–Estimated Kenai River rainbow trout catch and harvest by river section, 1984-2012.

	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	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest
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
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
Avg. (2008-2012)	16,650	660	4.4	21,040	690	3.4	61,540	600	1.0	87,590	470	0.5	2,580	50	2.0	189,400	2,470	1.3
Avg. (2003-2012)	15,030	780	5.5	17,350	770	4.9	50,350	600	1.3	80,040	360	0.4	3,890	60	1.8	166,660	2,560	1.6
Avg. (1984-2012)	9,040	740	11.7	9,100	690	11.5	25,290	770	8.2	48,080	350	4.2				92,920	2,590	6.5

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b,2011a-b, In Prep; Romberg et al. In prep. Catch estimates from 1984-1989 are unpublished estimates from the SWHS data base M.J. Mills, Sport Fish Biometrician, ADF&G, Anchorage; personal communication.

Note: ND = 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 21.–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]	≥200mm	SE	≥300mm	SE	≥200mm	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: Eskelin and Evans 2013; Eskelin, A., Sport Fish Biologist, ADF&G, Soldotna, personal communication.

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

Table 22.–Estimated Kenai River Dolly Varden, catch and harvest by river section, 1984-2012.

	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			Kenai River Total		
Year	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest	Catch	Harvest	% Harvest
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	1003	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
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
Avg. (2008-2012)	11,590	980	9.2	12,570	760	6.7	31,890	460	1.5	70,130	450	0.6	1,090	30	3.0	127,280	2,680	2.1
Avg. (2003-2012)	12,080	1,340	11.2	11,430	1,000	9.3	31,390	700	2.5	69,650	480	0.7	2,470	100	5.0	127,010	3,620	2.9
Avg. (1984-2012)	12,000	2,840	17.0	8,640	1,500	19.8	23,760	2,410	9.5	50,650	1,750	3.8				96,190	8,550	7.4

Source: Statewide Harvest Surveys from Mills 1985-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = 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 23.–Rainbow Trout catch and harvest, and effort for all species, Russian River, Swanson River drainage, Quartz Creek, Ptarmigan Creek, Skilak Lake, and Kenai Lake, 1984-2012.

	Russian River			Swanson River Drainage					Quartz Creek			Ptarmigan Creek			Skilak Lake			Kenai Lake		
					Swanson River		Swanson Canoe Route													
Year	Effort[a]	Catch	Harvest	Effort[ab]	Catch	Harvest	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort	Catch	Harvest	Effort[a]	Catch	Harvest
1984	55,861	ND	324	5,671	ND	3,492	ND	0	3,413	ND	87	1,857	ND	237	67	ND	12	502	ND	25
1985	80,054	ND	0	4,058	ND	ND	ND	3,069	451	ND	69	988	ND	295	121	ND	0	607	ND	ND
1986	70,729	ND	0	9,831	ND	ND	ND	4,939	4,146	ND	122	1,483	ND	474	413	ND	0	2,722	ND	15
1987	91,600	ND	91	7,353	ND	ND	ND	1,940	5,361	ND	54	942	ND	18	4,129	ND	145	580	ND	36
1988	76,180	ND	91	14,042	ND	928	ND	1,365	3,965	ND	54	1,946	ND	18	3,838	ND	72	855	ND	36
1989	53,598	ND	96	7,664	ND	552	ND	1,190	4,893	ND	67	790	ND	29	2,810	ND	67	377	ND	20
1990	68,861	4,789	198	8,578	6,996	1,520	3,664	1,510	5,655	500	198	2,041	906	260	2,817	458	115	1,042	73	42
1991	76,433	7,221	230	8,416	4,316	1,118	4,065	1,233	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	4,583	1,100	8,573	2,462	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	2,431	424	6,877	1,588	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	2,433	585	5,885	1,331	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	4,040	747	5,301	1,576	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	2,390	221	3,716	1,107	3,018	914	53	336	464	40	1,780	1,536	21	878	90	90
1997	46,914	30,852	130	5,748	2,583	411	5,564	1,271	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	3,235	535	3,985	1,248	3,166	2,252	0	701	2,053	0	1,645	625	209	520	183	43
1999	64,536	37,764	83	6,885	1,840	267	6,853	1,759	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	4,630	1,142	7,952	1,701	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	2,899	528	5,299	2,262	3,105	1,814	0	430	625	0	1,701	568	65	2,509	762	153
2002	68,263	29,484	16	3,692	4,347	679	2,714	992	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	5,146	362	1,691	476	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	1,504	373	1,523	482	6,589	7,939	0	687	3,027	0	2,460	911	436	497	140	93
2005	55,801	20,026	232	4,886	1,674	144	1,695	609	6,106	2,897	0	599	1,253	0	594	851	32	2,072	252	55
2006	70,804	28,059	256	4,669	1,435	425	2,610	348	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	2,753	904	7,195	1,559	8,694	6,193	0	896	1,291	0	1,462	484	0	648	494	49
2008	55,444	20,333	219	7,227	2,540	360	4,918	691	7,105	5,900	0	389	1,087	0	1,692	962	18	728	313	88
2009	64,518	21,047	214	4,621	1,635	167	4,942	1,005	6,217	8,770	0	44	1,750	0	1,126	998	0	687	28	18
2010	39,873	14,710	97	3,203	972	189	2,165	477	4,859	2,859	0	317	1,366	0	1,085	372	15	955	263	63
2011	47,264	17,817	108	4,296	1,684	650	158	283	2,184	1,457	0	38	744	0	918	345	0	869	116	0
2012	41,152	21,275	216	1,097	528	168	439	0	1,238	644	0	87	518	11	538	11	0	1,179	147	0
Ave	61,149	21,090	160	6,095	2,895	692	4,251	1,327	4,818	2,857	53	985	1,420	82	1,920	983	68	1,298	516	97

Source: Statewide Harvest Surveys from Mills 1985-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data available.

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

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

Table 24.–Dolly Varden catch and harvest, and effort for all species, Quartz Creek, Russian River, Ptarmigan Creek, Swanson River drainage, Skilak Lake, and Kenai Lake, 1984-2012.

										Swanson River Drainage										
	Quartz Creek			Russian River			Ptarmigan Creek				Swanson River		Swanson Canoe Rt		Skilak Lake			Kenai Lake		
Year	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a,b]	Catch	Harvest	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest
1984	3,413	ND	3,791	55,861	ND	1,072	1,857	ND	2,120	5,671	ND	324	ND	0	67	ND	0	502	ND	224
1985	451	ND	121	80,054	ND	399	988	ND	1,387	4,058	ND	ND	ND	277	121	ND	0	607	ND	69
1986	4,146	ND	1,605	70,729	ND	826	1,483	ND	2,508	9,831	ND	ND	ND	367	413	ND	0	2,722	ND	76
1987	5,361	ND	181	91,600	ND	72	94	ND	417	7,353	ND	ND	ND	240	4,129	ND	91	580	ND	109
1988	3,965	ND	1,292	76,180	ND	473	1,946	ND	527	14,042	ND	36	ND	272	3,838	ND	110	855	ND	546
1989	4,893	ND	2,399	53,598	ND	361	790	ND	628	7,664	ND	86	ND	86	2,810	ND	438	377	ND	134
1990	5,655	8,672	2,842	68,861	2,290	760	2,041	4,081	1,041	8,578	104	42	531	271	2,817	583	187	1,042	926	302
1991	5,354	14,329	1,905	76,433	6,134	1,148	1,200	3,445	705	8,416	365	131	626	104	4,120	1,240	378	1,064	757	326
1992	7,906	9,864	2,441	67,443	3,629	664	1,750	4,342	1,188	8,294	49	16	1,270	418	3,820	1,35	172	1,536	246	98
1993	9,152	21,473	4,317	61,018	4,141	1,001	1,742	8,202	1,057	8,508	201	88	954	419	3,289	653	145	2,586	1,656	764
1994	7,241	11,702	2,175	65,996	4,443	595	1,425	1,877	296	7,537	773	81	1,069	655	1,805	772	233	2,624	1,017	443
1995	5,179	4,659	1,004	58,090	6,430	554	1,914	1,642	801	6,865	332	272	860	95	2,957	1,031	224	3,240	2,730	606
1996	3,018	3,186	339	50,122	5,983	135	336	231	0	6,471	655	509	1,653	519	1,780	1,311	146	878	230	48
1997	3,422	13,766	350	46,914	6,564	376	758	2,128	54	5,748	135	0	1,118	533	2,346	5,878	327	1,745	36	160
1998	3,166	16,990	396	47,942	5,957	73	701	4,195	185	5,093	244	40	899	248	1,645	214	17	520	67	25
1999	4,708	8,051	223	64,536	11,791	196	883	3,191	77	6,885	23	0	1,534	348	1,182	782	110	1,462	611	88
2000	2,423	6,318	80	69,864	11,596	168	732	821	44	5,250	334	59	2,275	963	2,072	1,487	175	1,033	333	95
2001	3,105	10,280	65	55,972	11,087	253	430	3,096	11	4,161	613	145	1,313	457	1,701	243	48	2,509	456	176
2002	4,245	11,510	114	68,263	8,566	175	888	1,242	0	3,692	313	79	643	221	1,668	1,414	134	2,502	935	309
2003	4,357	19,627	123	50,448	10,504	263	899	1,028	50	2,298	0	0	221	37	2,068	825	64	1,097	107	54
2004	6,589	31,267	342	60,784	25,713	324	687	3,609	68	3,640	388	99	25	13	2,460	653	152	497	40	13
2005	6,106	23,953	216	55,801	9,218	232	599	3,018	0	4,886	134	38	125	99	594	464	0	2,072	262	165
2006	5,582	31,731	219	70,804	11,390	261	1,061	4,291	0	4,669	51	13	245	99	1,152	321	39	619	143	24
2007	8,694	44,588	442	57,755	7,857	196	896	2,126	143	6,712	1,868	317	208	89	1,462	607	22	648	376	77
2008	7,105	34,401	152	55,444	9,481	354	389	954	29	7,227	167	70	250	98	1,692	405	0	728	-	0
2009	6,217	40,456	135	64,518	10,741	146	441	1,185	0	4,621	0	0	447	252	1,126	754	0	687	11	11
2010	4,859	14,416	182	39,873	7,645	45	317	2,058	0	3,203	56	12	747	48	1,085	552	0	955	161	29
2011	2,184	5,399	345	47,264	7,375	165	389	704	21	4,296	20	10	52	64	918	26	16	869	145	25
2012	1,238	6,157	37	41,152	7,659	47	227	1,106	10	1,097	0	0	269	10	538	10	10	1,179	108	0
Ave	4,818	17,078	960	61,149	8,530	391	990	2,547	461	6,095	297	95	754	252	1,920	938	112	1,301	508	172

Source: Statewide Harvest Surveys from Mills 1985-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data available

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

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

Table 25. –Kenai Peninsula stocked lakes total effort, catch, and harvest of stocked species 1983-2012.

Year	Number of Fish Stocked	Effort [a]	Catch	CPUE	Harvest	HPUE
1983	110,076	3,018	ND	ND	3,618	1.20
1984	212,319	870	ND	ND	386	0.44
1985	241,574	1,473	ND	ND	1,266	0.86
1986	222,910	2,538	ND	ND	1,472	0.58
1987	188,730	2,054	ND	ND	669	0.33
1988	233,798	4,433	ND	ND	2,000	0.45
1989	193,663	2,068	ND	ND	804	0.39
1990	258,970	3,746	5,058	1.35	2,530	0.68
1991	311,395	3,763	6,697	1.78	2,186	0.58
1992	264,558	5,750	11,489	2.00	5,422	0.94
1993	294,483	5,682	15,428	2.72	5,324	0.94
1994	369,560	10,579	17,912	1.69	7,418	0.70
1995	317,836	8,447	13,106	1.55	4,654	0.55
1996	224,170	5,380	19,830	3.69	6,604	1.23
1997	342,433	6,018	17,849	2.97	9,759	1.62
1998	259,813	6,588	20,652	3.13	8,898	1.35
1999	356,647	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
Ave	262,432	5,075	13,315	2.26	4,203	0.79

Source: Statewide Harvest Surveys from Mills 1984-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009-2011a-b, In Prep; Romberg et al. In prep.; stocking data from Diane Loopstra, ADF&G, Anchorage, personal communication.

Note: ND = no data available.

[a] Effort in angler-days fished.

Table 26.–Kenai Peninsula lake trout catch and harvest as determined by Statewide Harvest Survey 1977-2012.

	Hidden Lake		Kenai Lake		Kenai River		Skilak Lake		Tustumena Lake		Kasilof River		Other Lakes		Other Rivers		Total	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
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 [a]	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
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	12	12	1,866	416
2012	369	123	171	114	15	7	27	27	0	0	95	79	64	16	0	0	741	366
Ave	1,247	900	782	319	720	341	606	240	215	117	176	98	522	576	67	78	4,334	2,543

Source: Statewide Harvest Surveys from Mills 1979-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data available.

Table 27.–Arctic Grayling catch and harvest, and effort for all species for Crescent Lake, Paradise Lakes, Lower Fuller Lake, Grayling Lake, Twin Lakes and Bench Lake, 1984-2012.

	Crescent Lake			Lower Paradise Lake			Upper Paradise Lake			Lower Fuller Lake			Grayling Lake			Twin Lake			Bench Lake		
Year	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest	Effort[a]	Catch	Harvest
1984	770	ND	574	ND	ND	ND	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	ND	ND	ND
1986	1,147	ND	826	ND	ND	ND	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	ND	ND	ND
1988	1,255	ND	382	ND	ND	ND	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	ND	ND	ND
1990	971	2,530	260	21	229	0	106	2,269	135	33	52	0	49	42	0	ND	ND	ND	96	62	21
1991	1,223	6,262	736	ND	ND	ND	49	13	0	16	0	0	98	27	0	65	67	0	ND	ND	ND
1992	1,014	5,966	398	64	210	38	64	60	0	12	15	0	96	128	120	160	120	60	75	8	0
1993	1,713	6,716	619	ND	ND	ND	30	101	17	52	787	17	146	141	65	ND	ND	ND	56	205	44
1994	1,836	7,400	672	13	163	24	26	245	0	94	332	122	122	653	296	83	907	82	90	98	0
1995	1,874	4,448	677	491	3,535	313	82	270	26	86	282	53	167	209	17	ND	ND	ND	14	18	0
1996	756	2,990	423	91	1,917	24	169	1,674	0	201	169	95	95	291	170	43	495	0	55	50	50
1997	957	3,623	357	30	201	0	141	1,460	203	126	444	54	140	131	9	68	848	229	15	54	0
1998	1,145	6,784	536	62	1,150	50	82	820	81	105	448	104	282	276	34	24	50	50	13	307	0
1999	1,266	3,187	550	154	3,490	32	426	1,727	145	52	169	11	68	135	0	91	339	90	15	11	0
2000	1,504	6,782	462	181	1,870	192	176	2,105	253	175	629	100	91	188	38	27	100	0	0	0	0
2001	1,099	6,493	245	387	1,595	51	109	182	124	109	408	120	90	184	126	0	0	0	44	16	7
2002	1,457	6,656	427	41	305	183	420	1,820	303	121	662	0	28	120	0	0	0	0	91	977	15
2003	1,412	6,785	1,008	74	282	14	30	422	0	129	876	35	80	117	12	50	140	0	0	0	0
2004	1,104	5,510	101	58	715	195	143	1,496	244	108	543	16	33	79	0	0	0	0	33	57	57
2005	1,028	5,231	438	0	0	0	284	2,091	172	163	692	32	37	0	0	35	321	0	0	0	0
2006	790	3,161	166	0	0	0	86	470	0	173	260	0	52	386	55	49	207	0	0	0	0
2007	1,389	6,202	365	62	93	35	62	210	35	37	117	23	37	117	35	0	0	0	0	0	0
2008	959	2,542	306	0	0	0	163	234	101	175	2,718	0	197	1,979	228	0	0	0	35	0	0
2009	1,609	7,456	814	0	0	0	0	0	0	141	828	36	14	50	0	21	67	33	0	0	0
2010	758	1,916	170	17	1,114	0	0	0	0	197	520	37	17	35	0	84	683	55	34	92	23
2011	996	3,150	606	87	294	0	46	53	13	165	697	99	30	53	0	0	0	0	36	196	0
2012	896	2,857	446	36	689	103	107	603	86	71	112	0	69	50	0	0	0	0	0	0	0
Ave	1,176	4,985	463	89	850	60	122	797	84	110	511	41	89	234	52	40	217	30	32	98	10

Source: Statewide Harvest Surveys from Mills 1985-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b; 2011a-b, In Prep; Romberg et al. In prep.

Note: ND = no data available.

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

Table 28.–Northern Kenai Peninsula Management Area catch and harvest of Northern Pike, 1981-2012.

	Kenai River		Mackeys Lakes		Sevena Lake		Stormy Lake		Tote Road Lakes		Other Lakes/Streams[a]		Total NKPMA	
Year	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
1981	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	32	0	32
1982	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	105	0	105
1983	ND	ND	ND	294	ND	ND	ND	ND	ND	ND	ND	0	0	294
1984	ND	ND	ND	187	ND	ND	ND	ND	ND	ND	ND	0	0	187
1985	ND	69	ND	52	ND	ND	ND	ND	ND	ND	ND	0	0	121
1986	ND	0	ND	0	ND	ND	ND	ND	ND	ND	ND	0	0	0
1987	ND	12	ND	0	ND	ND	ND	ND	ND	ND	ND	0	0	12
1988	ND	0	ND	0	ND	ND	ND	ND	ND	ND	ND	36	0	36
1989	ND	18	ND	10	ND	ND	ND	ND	ND	ND	ND	39	0	67
1990	10	10	156	10	0	0	0	0	0	0	145	20	311	40
1991	0	0	260	74	0	0	0	0	0	0	25	12	285	86
1992	9	0	9	9	179	85	0	0	0	0	324	145	521	239
1993	26	26	56	28	0	0	0	0	0	0	470	188	552	242
1994	0	0	0	0	0	0	0	0	0	0	789	36	789	36
1995	29	29	225	131	68	29	0	0	0	0	156	59	478	248
1996[b]	158	92	0	0	32	0	0	0	0	0	85	85	275	177
1997	14	7	213	0	0	0	0	0	0	0	29	21	256	28
1998	7	0	0	0	0	0	0	0	0	0	114	114	121	114
1999	0	0	0	0	47	47	0	0	0	0	376	282	423	329
2000	6	6	76	38	0	0	0	0	0	0	364	115	446	159
2001	0	0	13	13	155	155	103	103	0	0	1277	914	1548	1185
2002	94	12	0	0	322	322	34	34	0	0	12	12	462	380
2003	58	58	0	0	218	218	241	241	0	0	182	182	699	699
2004	553	58	241	241	0	0	45	15	0	0	2067	2007 [c]	2906	2321
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[d]	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	133	59	133	59
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
Ave	46	16	56	38	44	37	35	33	33	27	285	140	360	259

Source: Statewide Harvest Surveys from Mills 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b; 2011a-b, In Prep; Romberg et al. In prep. Note: ND = no data available.

[a] Includes data from Arc lake, Seven Lake, Island Lake, Derks Lake, Union Lake, "Other Lakes", and "Other Streams". 1981-1982 no breakdown of individual lakes/streams available.

[b] "Other" column includes 53 caught and harvested in SixMile Creek.

[c] Number may be inflated due to one large angler report.

[d] "Other" column includes 13 caught and harvested in Swanson R.

Table 29.–Kenai River salmon harvest in the Kenaitze tribal educational fishery, 1989-2013.

	Chinook				Sockeye				Coho						
Year	Early-Run [a]	%	Late-Run [b]	%	Early-Run [a]	%	Late-Run [b]	%	Early-Run [c]	%	Late-Run [d]	%	Pink Salmon	%	Total Salmon
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
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	0.1	1,757	32.3	3,080	56.6	383	7.0	183	3.4	24	0.4	5,446
Ave	74	2	8	0.2	1100	23.1	2,638	55.3	276	6.5	368	8.6	189	4.4	4,530

Source: Harvest data, Kenaitze Indian Tribe.

Note: ND = no data available.

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

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

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

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

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

Table 30.–Kasilof River salmon harvest in Kasilof area educational fisheries, 2002-2013.

	Chinook				Sockeye				Coho						
Year	Early-Run [a]	%	Late-Run [b]	%	Early-Run [a]	%	Late-Run [b]	%	Early-Run [c]	%	Late-Run [d]	%	Pink Salmon	%	Total Salmon
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	112	78.3	0	0.0	0	0.0	27	18.9	2	1.4	143
2013	3	0.9	0	0.0	299	86.2	1	0.3	28	8.1	16	4.6	0	0.0	347
Ave	6	12.9	0	0.0	80	65.4	2	2.9	5	4.1	15	12.2	3	2.5	111

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

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

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

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

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

[e] Prior to 2007, all data is from Kenaitze Educational Fishery; 2007-2012 includes data from Kasilof Regional Historical Fishery.

[f] Kenaitze Indian Tribe did not fish this area in 2011.

Table 31.–Alaska Territorial Lodge educational fishery salmon harvest in Northern Cook Inlet, 2008-2013.

	Chinook				Sockeye				Coho				Pink		Chum		Total
Year	Early-Run [a]	%	Late-Run [b]	%	Early-Run [a]	%	Late-Run [b]	%	Early-Run [c]	%	Late-Run [d]	%	Salmon	%	Salmon	%	Salmon
2007	49	16.8	0	0.0	9	3.1	95	32.6	121	41.6	5	1.7	8	2.7	4	1.37	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	180
2009	9	9.1	1	1.0	10	10.1	33	33.3	30	30.3	0	0.0	12	12.1	4	4.04	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	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	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	6.04	182
Ave	14	8.4	0	0.1	30	25.3	35	20.6	51	32.8	2	1.0	12	8.8	4	3.1	147

Source: Harvest data, Alaska Territorial Lodge.

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

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

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

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

Table 32.–Number of Kenai River fishing guides and vessels registered with Alaska State Parks, 1982–2012.

	Guide Business Type		Vessels Registered		
Year	Fishing	Non-Fishing	Motorized	Drift	Total
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

Source: Guide and vessel data, Alaska State Parks.

Note: ND = no data available

Table 33.–Guided freshwater logbook catch and harvest data for the Northern Kenai Peninsula Management Area from 2006-2012.

	King Salmon		Sockeye Salmon		Coho Salmon		Rainbow Trout		Dolly Varden		Arctic Grayling		Lake Trout		Other[a]	
	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest	Catch	Harvest
Kenai																
2006	15,083	8,739	12,884	6,719	9,122	7,839	46,609	622	33,991	356	1,140	18	0	0	16,633	2,719
2007	12,626	7,402	11,818	7,442	9,545	8,573	60,776	643	44,346	293	51	5	34	2	73	22
2008	9,754	7,167	8,620	5,372	12,069	11,249	50,799	238	42,303	178	39	0	57	7	8,487	1,591
2009	6,397	4,060	11,693	7,972	10,711	9,867	47,533	165	44,291	149	72	0	0	0	243	26
2010	4,929	3,539	11,886	7,921	10,620	9,839	46,541	136	36,234	187	41	0	59	1	5,056	1,038
2011	5,594	3,669	17,994	12,304	11,342	10,777	48,004	144	38,325	215	88	0	22	1	152	0
2012	1,313	329	37,850	28,954	7,708	7,324	42,514	139	35,390	216	565	3	73	0	13,033	1,664
Ave	7,957	4,986	16,106	10,955	10,160	9,353	48,968	298	39,269	228	285	4	35	2	6,240	1,009
Kasilof																
2006	3,529	1,946	291	252	1,785	1,709	226	3	1,221	135	30	3	0	0	316	90
2007	4,183	2,617	338	304	963	932	902	21	1,489	146	0	0	0	0	43	21
2008	3,318	2,266	197	168	1,443	1,413	498	1	1,036	94	0	0	7	0	218	47
2009	3,115	2,335	173	165	939	896	210	5	682	62	5	1	4	0	21	15
2010	3,111	1,950	147	139	878	833	215	36	861	69	0	0	1	0	274	53
2011	3,670	2,701	308	282	1,024	1,003	259	10	490	32	0	0	0	0	27	5
2012	1,321	700	1,190	1,084	909	891	293	16	457	28	0	0	4	0	783	55
Ave	3,178	2,074	378	342	1,134	1,097	372	13	891	81	5	1	2	0	240	41
Other NKPMA[b]																
2006	24	4	382	134	263	113	2,067	70	1,482	5	527	19	0	0	903	99
2007	5	4	345	221	109	42	1,868	22	1,274	43	197	5	7	4	812	53
2008	2	0	622	379	78	25	1,121	16	1,099	17	715	126	9	1	414	19
2009	1	0	293	110	120	49	765	11	1,192	1	911	34	1	1	31	27
2010	2	2	257	142	30	26	824	2	1,146	1	126	9	3	3	60	3
2011	0	0	314	68	47	38	714	8	1,104	0	367	2	0	0	209	14
2012	0	0	475	215	150	30	749	7	867	5	352	0	48	0	169	23
Ave	5	1	384	181	114	46	1,158	19	1,166	10	456	28	10	1	371	34

Source: Freshwater Logbook Program from Sigurdsson and Powers 2009-2013; Bob Powers 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 34.–Guided freshwater logbook data of fishing effort from 2006-2012 for the Kenai River from May to October.

	May				June				July			
		Number of Anglers				Number of Anglers				Number of Anglers		
Year	Number of Trips	Resident	Non-Resident	Total	Number of Trips	Resident	Non-Resident	Total	Number of Trips	Resident	Non-Resident	Total
2006	165	132	419	551	2,774	1,342	8,086	9,428	6,413	2,636	21,041	23,677
2007	191	122	432	554	2,719	1,221	7,641	8,862	6,357	2,923	19,756	22,679
2008	160	73	382	455	2,525	1,258	7,006	8,264	6,085	2,729	18,610	21,339
2009	149	126	288	414	1,890	1,172	4,781	5,953	4,732	2,568	13,580	16,148
2010	129	154	254	408	1,510	676	4,120	4,796	4,560	2,391	13,215	15,606
2011	130	95	271	366	1,664	845	4,446	5,291	4,415	1,984	13,287	15,271
2012	128	84	299	383	1,238	573	3,253	3,826	3,414	1,024	10,222	11,246
Ave	150	112	335	447	2,046	1,012	5,619	6,631	5,139	2,322	15,673	17,995

	August				September				October			
		Number of Anglers				Number of Anglers				Number of Anglers		
Year	Number of Trips	Resident	Non-Resident	Total	Number of Trips	Resident	Non-Resident	Total	Number of Trips	Resident	Non-Resident	Total
2006	2,549	591	7,875	8,466	1,030	462	2,597	3,059	64	96	70	166
2007	2,752	975	7,919	8,894	1,009	544	2,532	3,076	92	114	149	263
2008	3,041	1,028	8,968	9,996	1,125	655	2,803	3,458	83	131	115	246
2009	2,354	973	6,367	7,340	1,179	900	2,576	3,476	64	102	66	168
2010	2,916	1,120	8,468	9,588	1,146	883	2,436	3,319	94	114	132	246
2011	3,045	1,277	8,751	10,028	1,238	928	2,821	3,749	82	110	122	232
2012	3,124	1,099	9,038	10,137	1,094	668	2,523	3,191	92	139	132	271
Ave	2,826	1,009	8,198	9,207	1,117	720	2,613	3,333	82	115	112	227

Source: Freshwater Logbook Program from Sigurdsson and Powers 2009-2013; Bob Powers personal communication.

Table 35.–Kenai River personal use sockeye salmon dip net fishery summary, 1981-2013.

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)
1981 [d]	ND	ND	ND	ND	3,116	575,848	0.0	ND
1982	7/26	8/5	10	Unknown	6,922	809,173	0.0	ND
1983	7/20	8/5	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	7/23	8/5	14	24,086	50,274	2,245,615	1.0	22,547
1988	7/22	8/5	15	16,880	29,345	1,356,958	1.2	29,013
1989	7/21	8/5	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]	7/27	8/5	7 [g]	12,189	47,622	1,429,864	0.8	10,371
1993	7/17	7/31	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	7/25	7/31	5 [g]	14,352	29,451	884,922	1.5	11,122
1996	7/10	8/5	27	102,821	39,810	1,129,274	8.1	10,503
1997	7/10	7/31	22	114,619	43,642	1,512,733	6.9	11,023
1998	7/10	7/28	18	103,847	33,980	1,084,996	8.5	10,802
1999	7/10	7/31	22	149,504	46,043	1,137,001	11.2	13,738
2000	7/10	7/31	22	98,262	57,978	900,700	9.3	12,354
2001	7/10	7/31	22	150,766	51,374	906,333	13.6	14,722
2002	7/10	7/31	22	180,028	46,693	1,339,682	11.5	14,840
2003	7/10	7/31	22	223,580	60,722	1,656,026	11.5	15,263
2004	7/10	7/31	22	262,831	62,397	1,945,383	11.6	18,513
2005	7/10	7/31	22	295,496	58,017	1,908,821	13.1	20,977
2006	7/10	8/10	13 [h]	127,630	30,964	2,064,728	5.7	12,685
2007	7/10	7/31	22	291,270	60,623	1,229,945	18.4	21,908
2008	7/10	7/31	22	234,109	46,053	917,139	19.6	20,772
2009	7/10	7/31	22	339,993	45,868	1,090,055	23.0	26,171
2010	7/10	7/31	22	389,552	59,651	1,294,885	22.3	28,342
2011	7/10	7/31	22	537,765	85,720	1,599,217	24.2	32,818
2012	7/10	7/31	22	526,992	102,414	1,581,555	23.8	34,374
2013	7/10	7/31	22	347,222	*not avail.*	1,359,893	*not avail.*	33,193
Avg. (2009-2013)				428,305	73,413	1,385,121	23.4	30,980
Avg. (2004-2013)				335,286	61,301	1,499,162	18.0	24,975
Avg. (1996-2013)				248,683	54,820	1,369,909	14.3	19,611

Source: Mills 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep; 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; Shields and Dupuis 2013b.

Note: ND = no data collected.

[a] Harvest not known in 1982; 1996-2012 reported harvest from returned permits, expanded to include permits not returned.

[b] Data revised in 2011 when Commercial Fisheries converted all Bendix data to DIDSON-equivalent estimates.

[c] 1981-1995 is individual days fished. 1996-2012 is 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 reflects this closure.

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

Table 36.–Kasilof River personal use sockeye salmon dip net fishery summary, 1981-2013.

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	7/4	7/31	28	10,300	443	262,271	3.8	5,370
1982	7/21	8/5	16	1,800	653	184,204	1.0	2,580
1983	7/15	8/5	21	11,124	1,863	184,839	5.6	4,417
1984	7/16	8/5	21	12,771	3,212	235,700	5.1	5,956
1985	7/15	8/5	22	16,284	1,903	491,938	3.2	9,260
1986	7/15	8/5	22	38,674	2,171	250,332	13.3	13,929
1987 [d]	7/10	8/5	26	18,454	10,872	248,861	6.6	8,910
1988	7/22	8/5	15	3,547	2,365	155,672	2.2	6,930
1989 [e]	ND	ND	ND	ND	4,632	164,954	ND	ND
1990 [e]	ND	ND	ND	ND	971	147,665	ND	ND
1991 [f]	ND	ND	ND	ND	5,216	233,647	ND	ND
1992 [f]	ND	ND	ND	ND	3,501	188,819	ND	ND
1993 [e]	ND	ND	ND	ND	2,308	151,801	ND	ND
1994	7/22	8/5	11 [g]	3,679	2,489	218,826	1.6	2,361
1995	7/17	7/31	11 [g]	4,160	3,535	202,430	2.0	2,845
1996	7/10	8/5	27	11,197	2,502	264,512	4.0	1,300
1997	7/10	8/5	27	9,737	4,128	263,779	3.5	1,091
1998	7/10	8/5	27	45,161	3,449	256,212	14.8	3,421
1999	7/10	8/5	27	37,176	4,654	312,481	10.5	3,611
2000	7/10	8/5	27	23,877	5,599	263,634	8.1	2,622
2001	7/10	8/5	27	37,612	6,005	318,738	10.4	3,382
2002	6/25	8/7	44	46,769	4,424	235,732	16.3	4,020
2003	6/25	8/7	44	43,870	5,971	353,523	10.9	3,874
2004	6/25	8/7	44	48,315	7,407	523,654	8.3	4,432
2005	6/25	8/7	44	43,151	5,982	360,060	10.5	4,500
2006	6/25	8/7	44	56,144	7,723	388,086	12.4	5,763
2007	6/25	8/7	44	43,293	3,843	365,186	10.5	4,627
2008	6/25	8/7	44	54,051	7,470	327,016	13.9	5,552
2009	6/25	8/7	44	73,035	6,763	326,282	18.0	7,650
2010	6/25	8/7	44	70,774	4,470	295,264	19.1	7,588
2011	6/25	8/7	44	49,766	8,182	245,529	16.4	6,571
2012	6/25	8/7	44	73,419	6,740	374,523	16.1	6,536
2013	6/25	8/7	44	85,528	*not avail.*	489,654	*not avail.*	8,556
Avg. (2009-2013)				70,504		346,250	17.4	7,380
Avg. (2004-2013)				59,748		369,525	13.9	6,178
Avg. (1996-2013)				47,382		331,326	12.0	4,728

Source: Mills 1982-1994; Howe et al. 1995, 1996, 2001a-d; Walker et al. 2003; Jennings et al. 2004, 2006a-b, 2007, 2009a-b, 2010a-b, 2011a-b, In Prep; Romberg et al. In prep; 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; Shields and Dupuis 2013b.

Note: ND = no data collected. NA = no data available.

[a] Harvest and participation during 1981 and 1982 are field creel survey estimates. 1982-1995 data from Statewide Harvest Survey 1996-2012 total reported harvest from returned permits, expanded to include permits not returned.

[b] Data revised in 2011 when Commercial Fisheries converted all Bendix data to DIDSON-equivalent estimates.

[c] 1981-1995 are individual days fished. 1996-2012 is 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 July 14 at 6:00 a.m. to July 15 at 6:00 p.m. 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/personal use permit fishery. Total days reflect this closure.

FIGURES

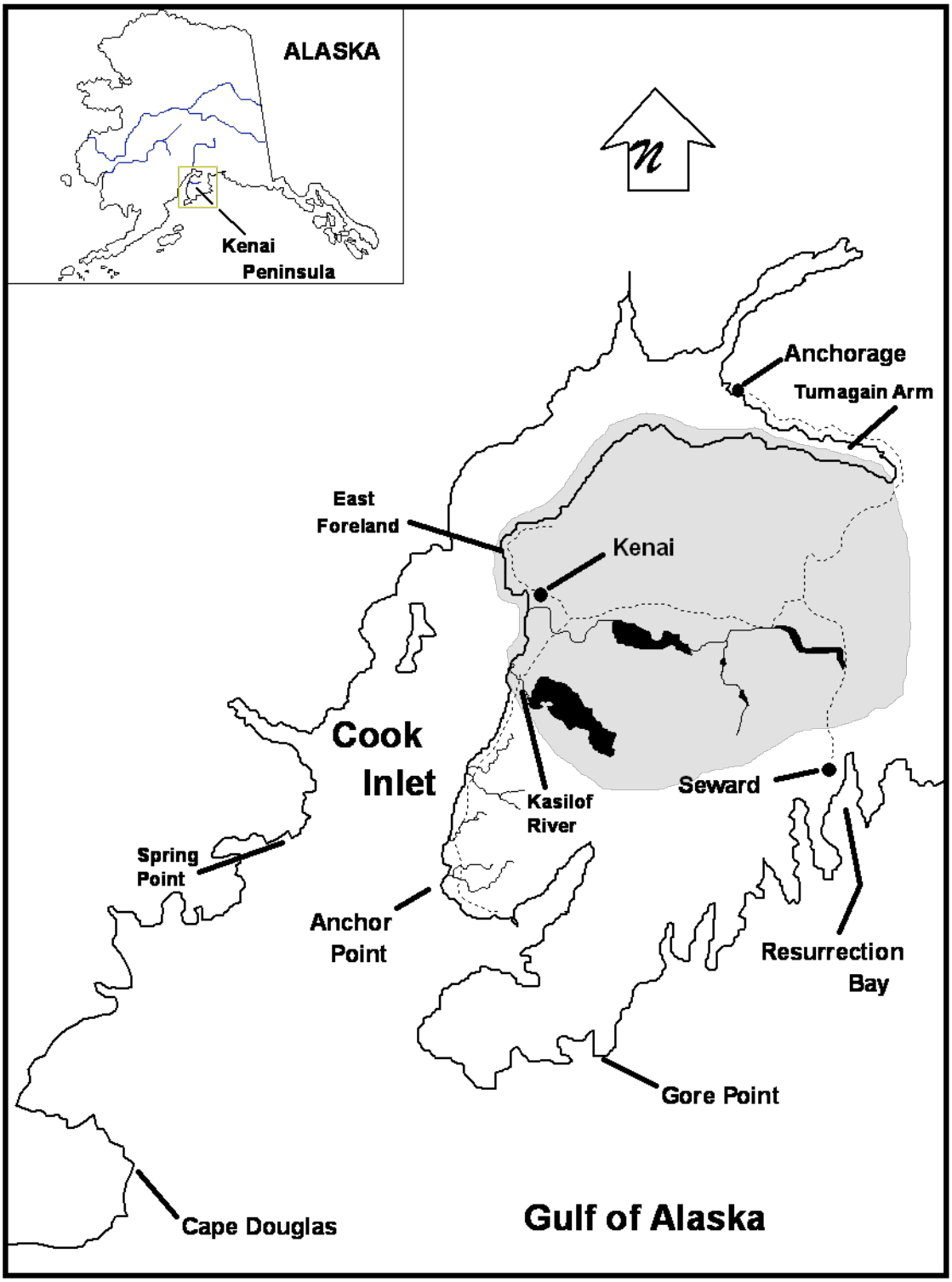

Figure 1.–The Northern Kenai Peninsula Management Area (shaded) includes all freshwater drainages and saltwater fisheries from the Kasilof River north to Turnagain Arm on the Kenai Peninsula.

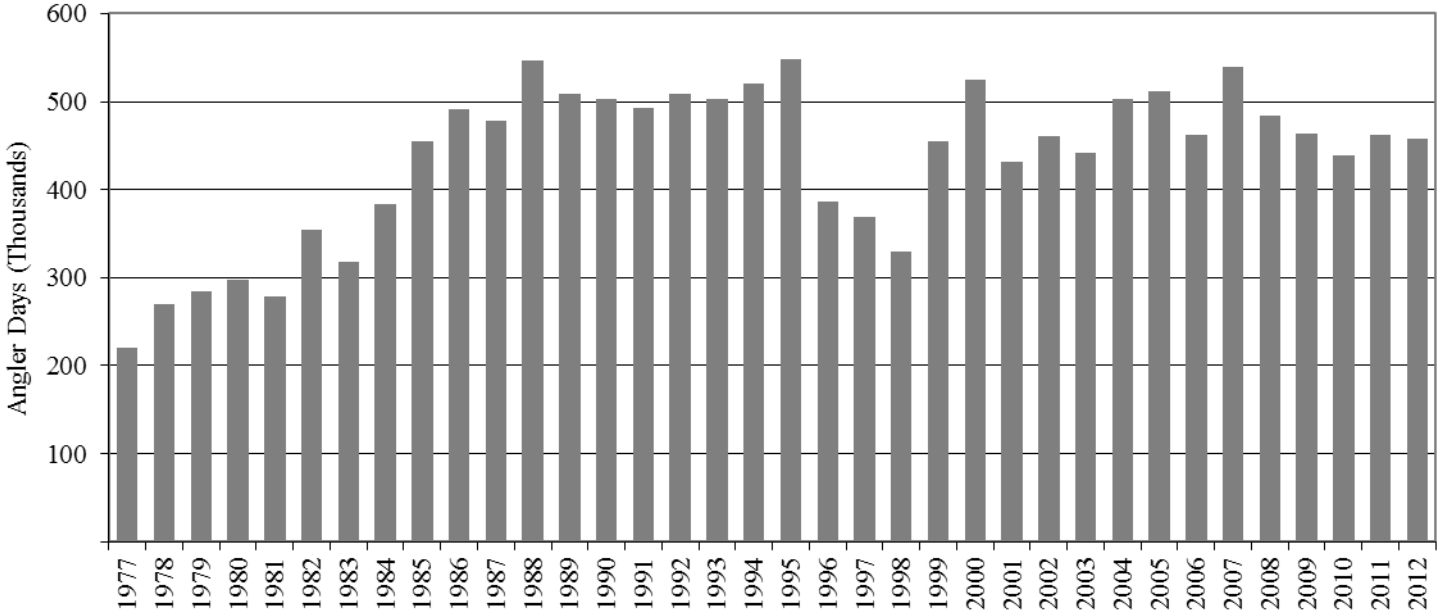

Figure 2.–Recreational angler participation in the Northern Kenai Peninsula Management Area, 1977–2012.

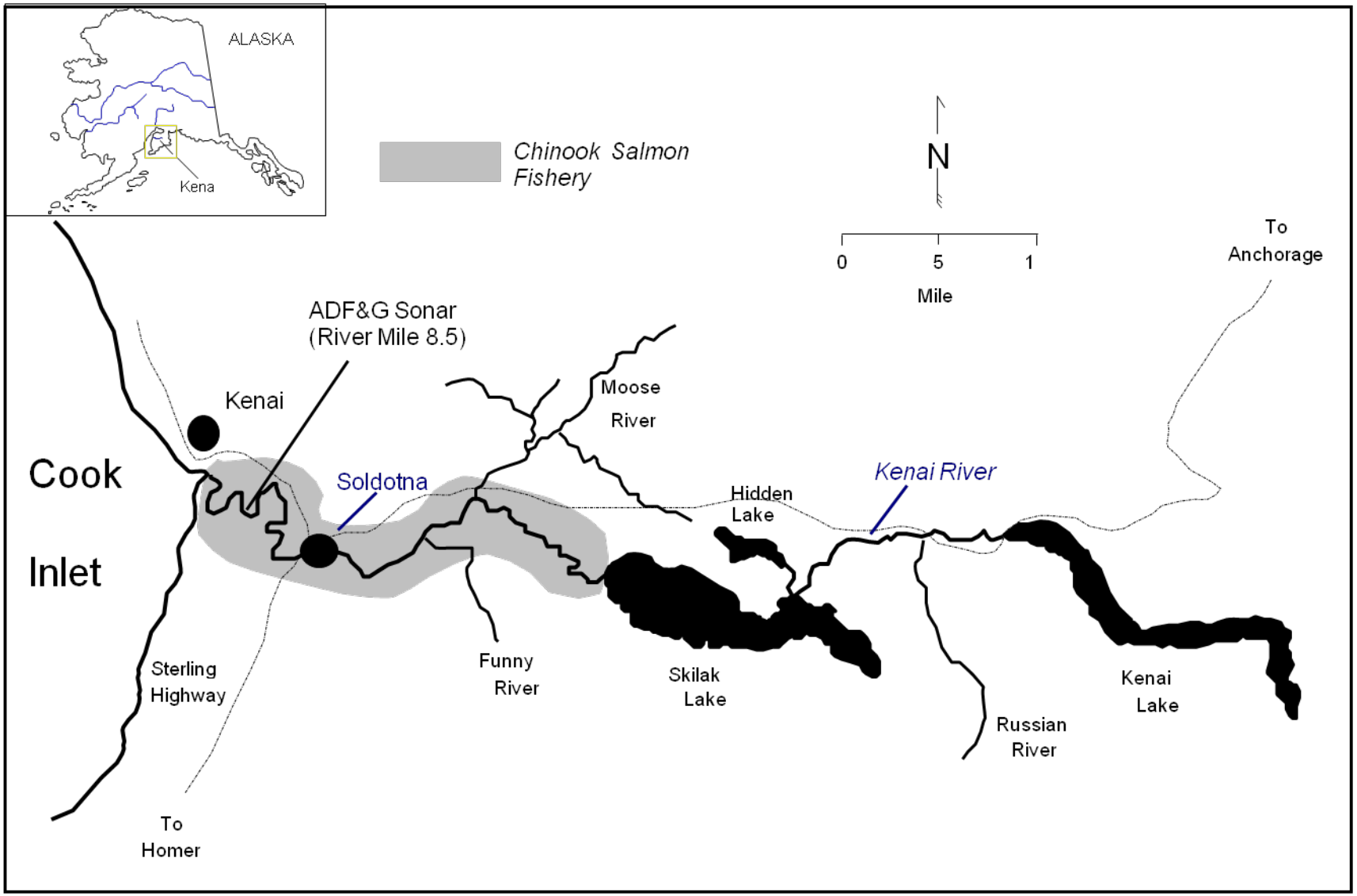

Figure 3.–Kenai River Chinook salmon fishery.

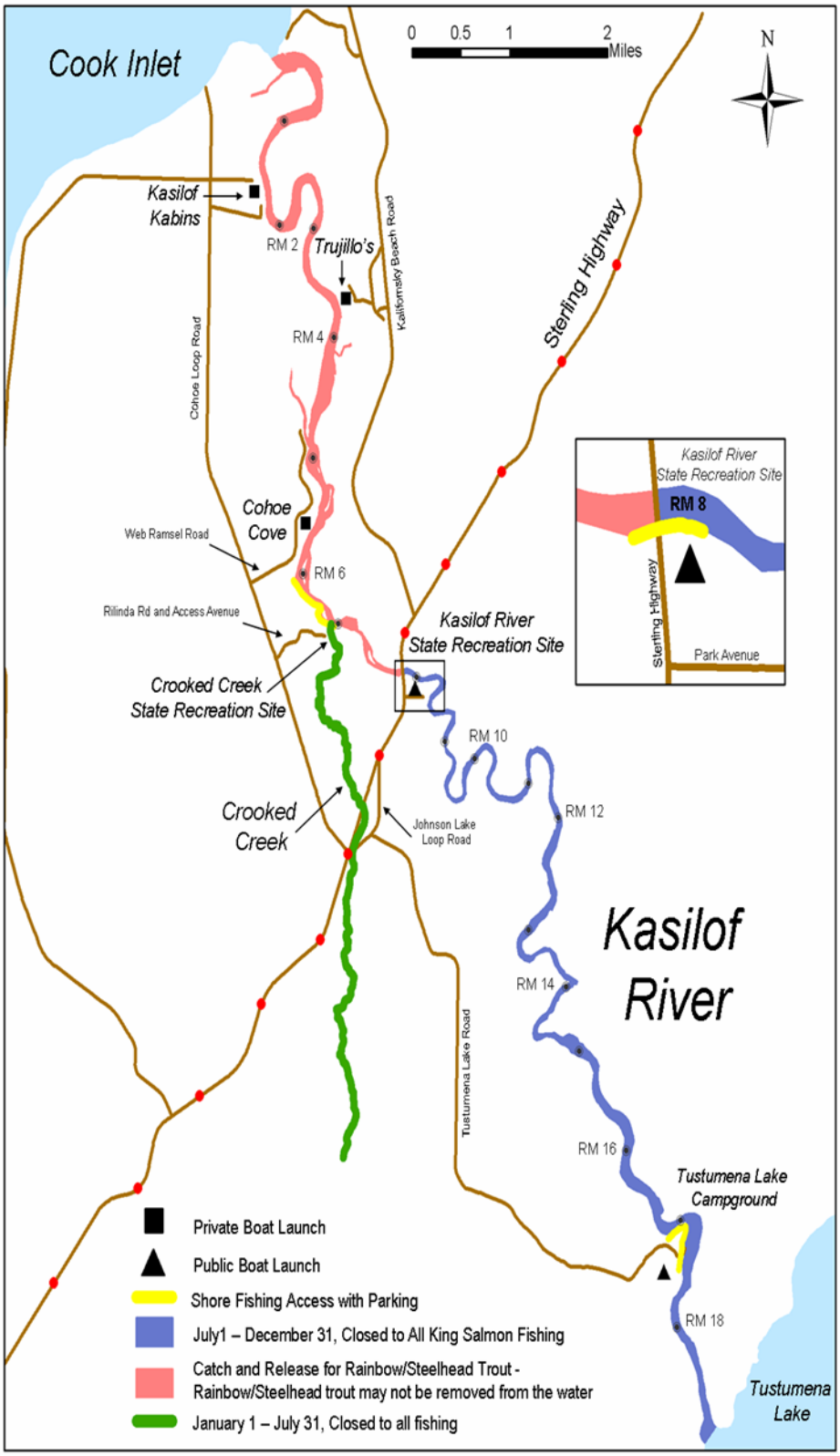

Figure 4.–Map of Kasilof River showing public access and specific regulatory areas.

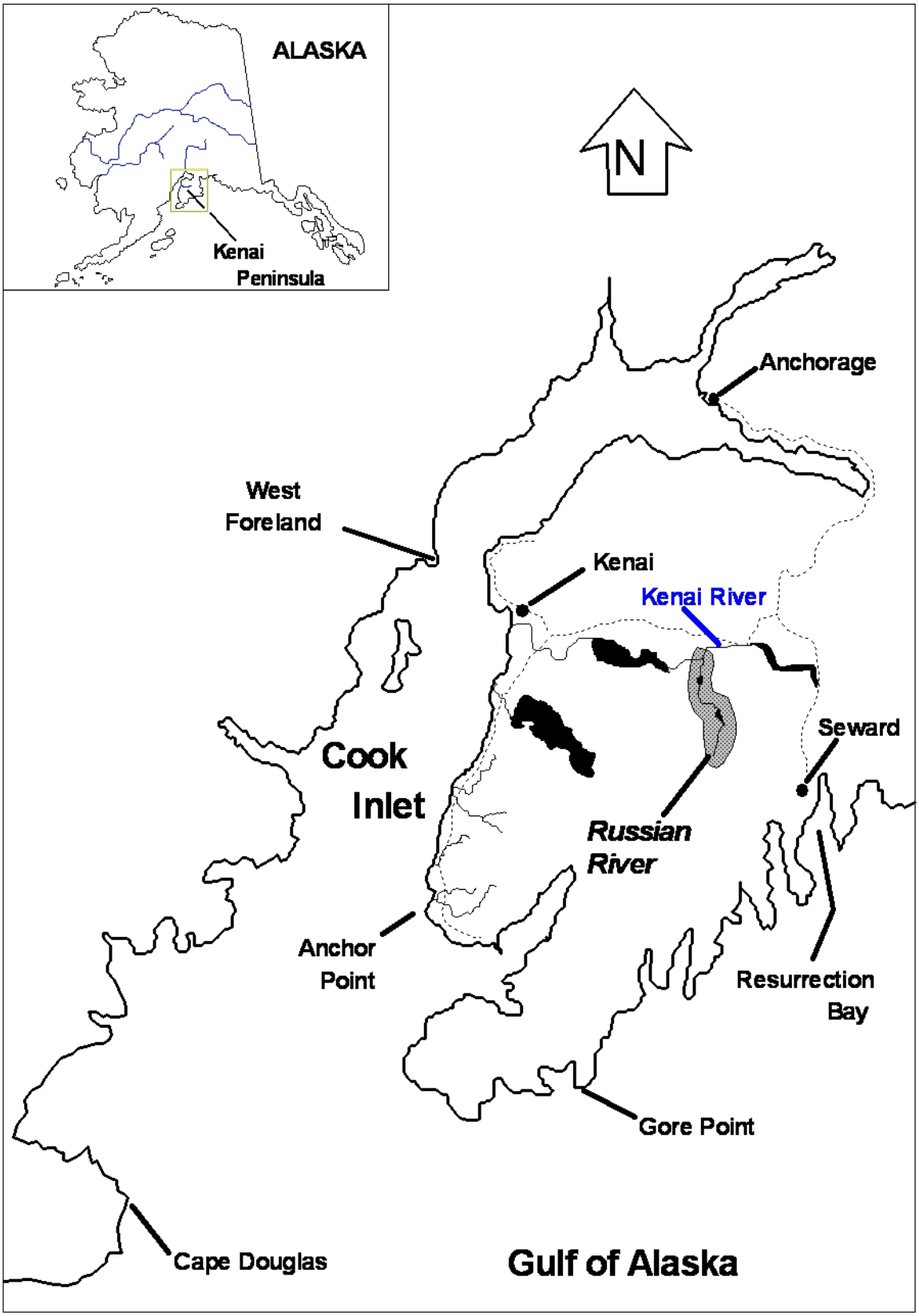

Figure 5.–Location of Russian River on the Kenai Peninsula, Alaska.

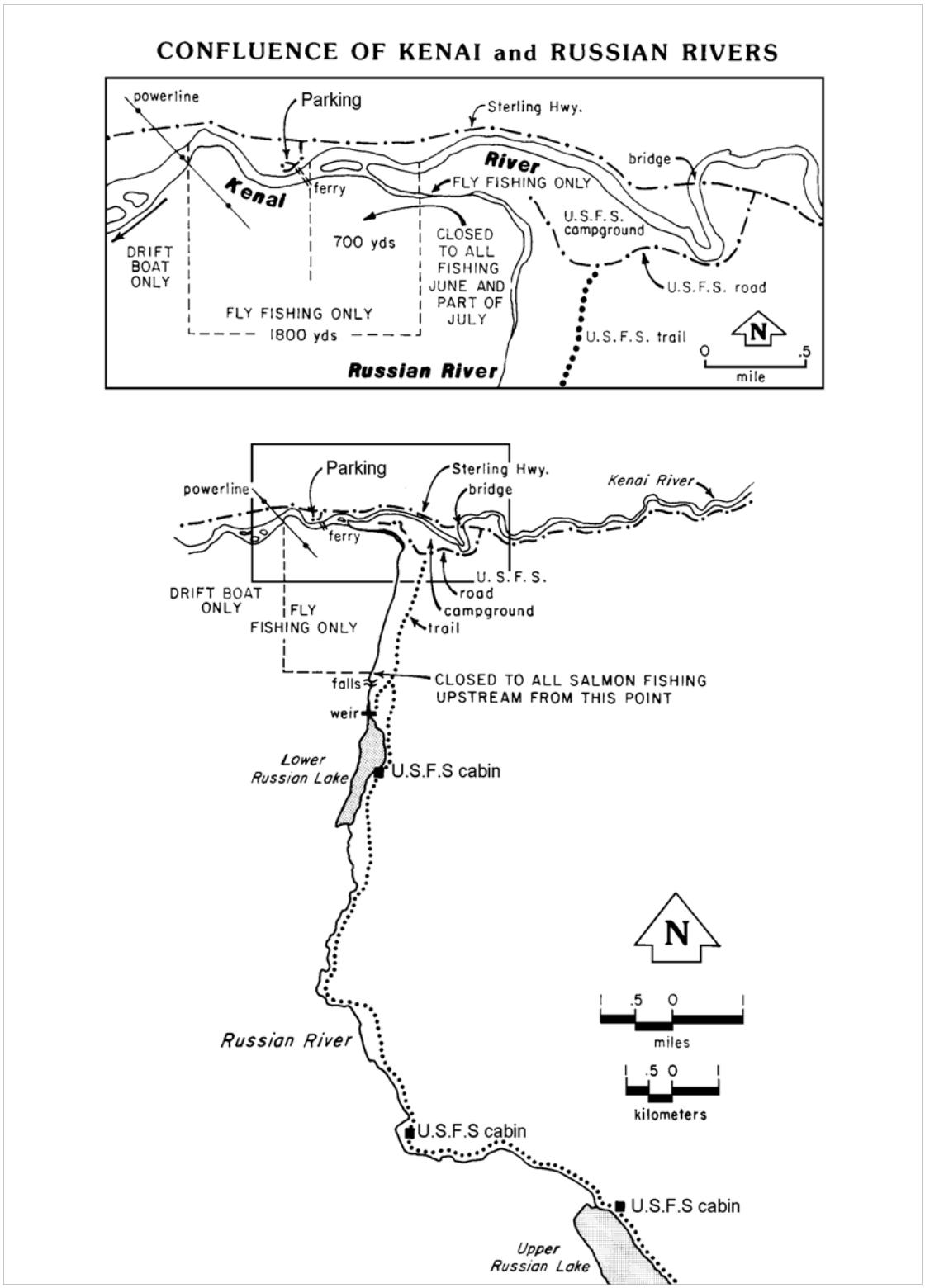

Figure 6.–Map of Russian River drainage.

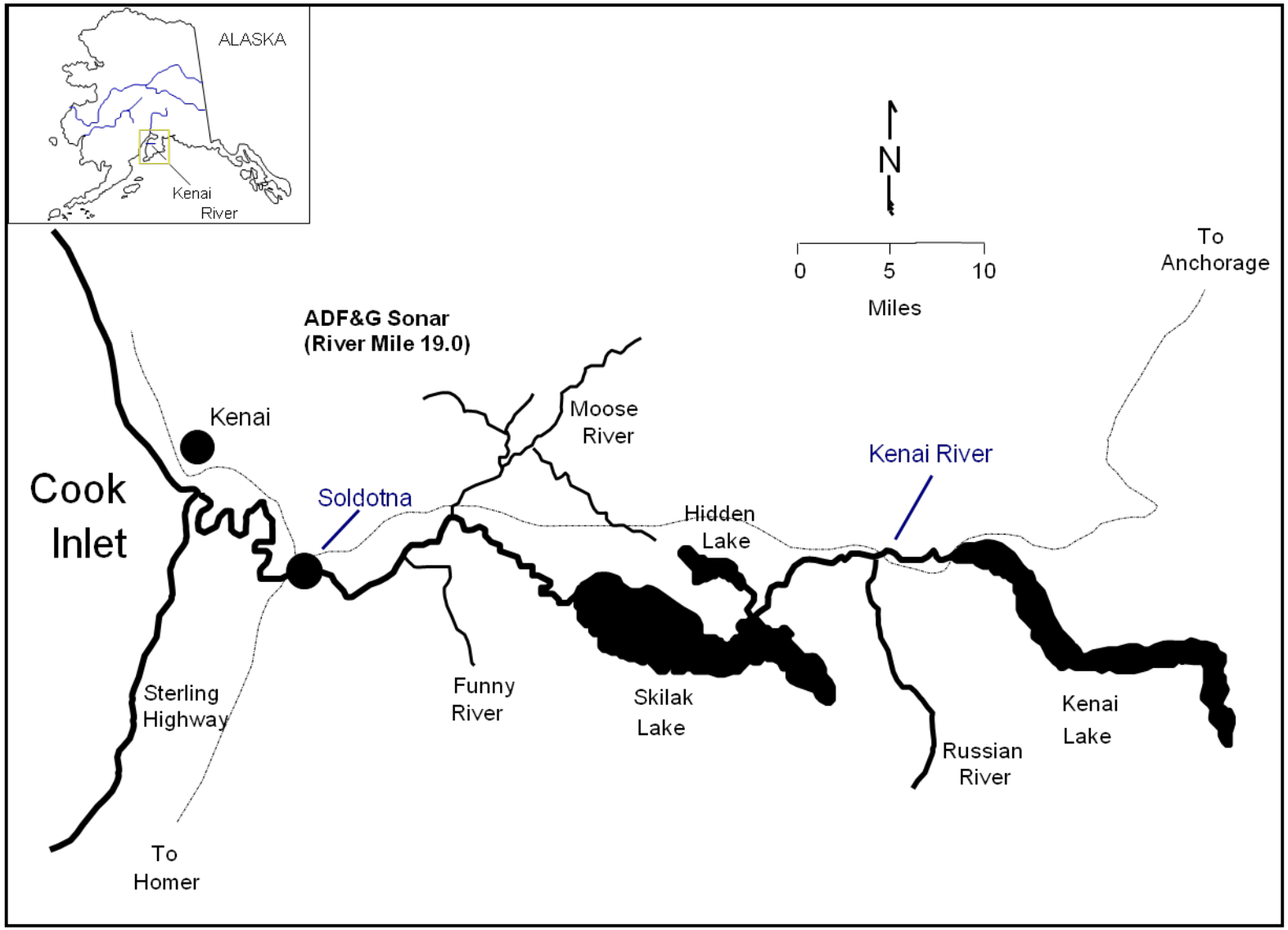

Figure 7.–Map of the Kenai River drainage.

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

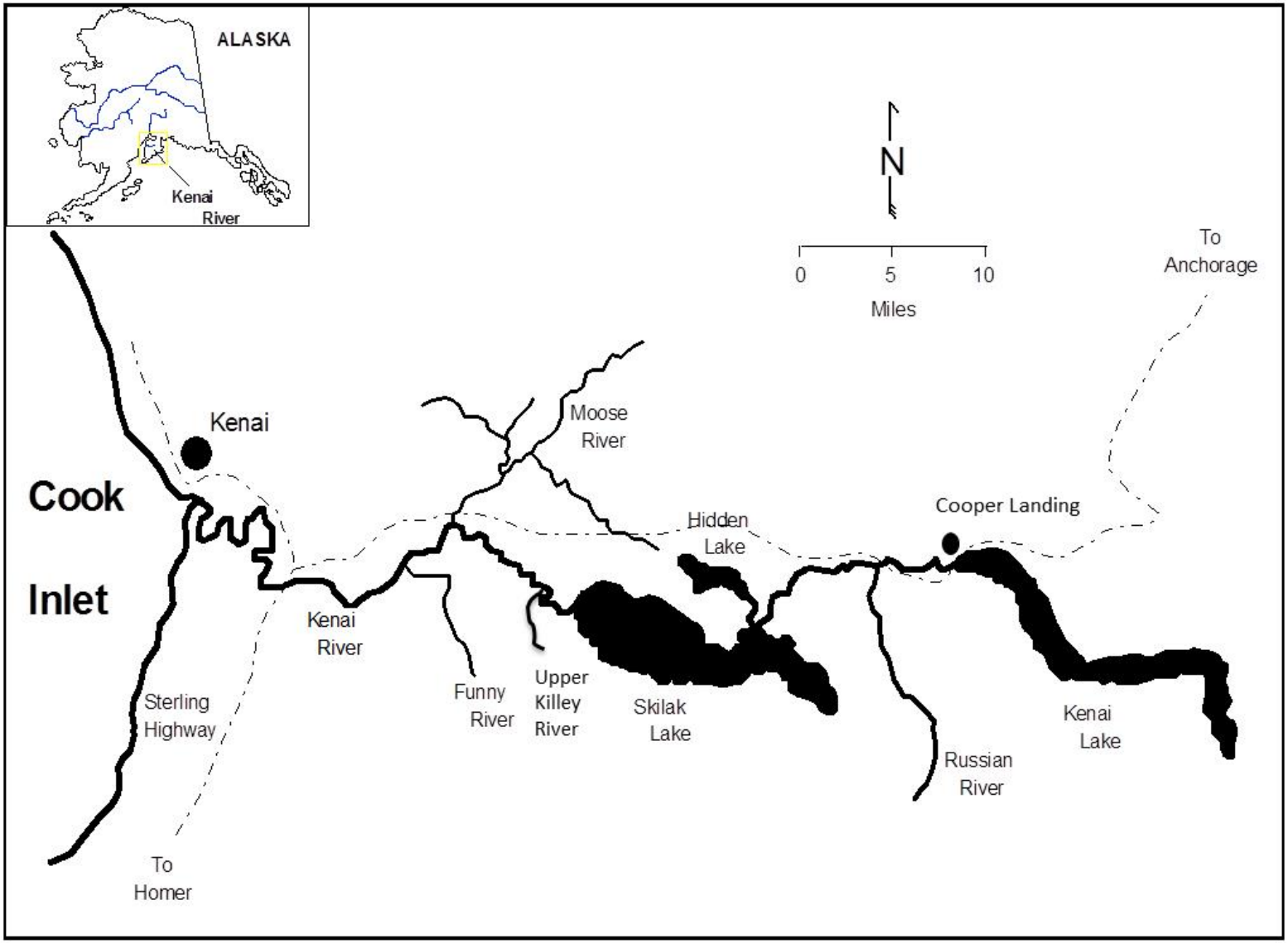

Figure 8.–Map of Kenai River drainage.

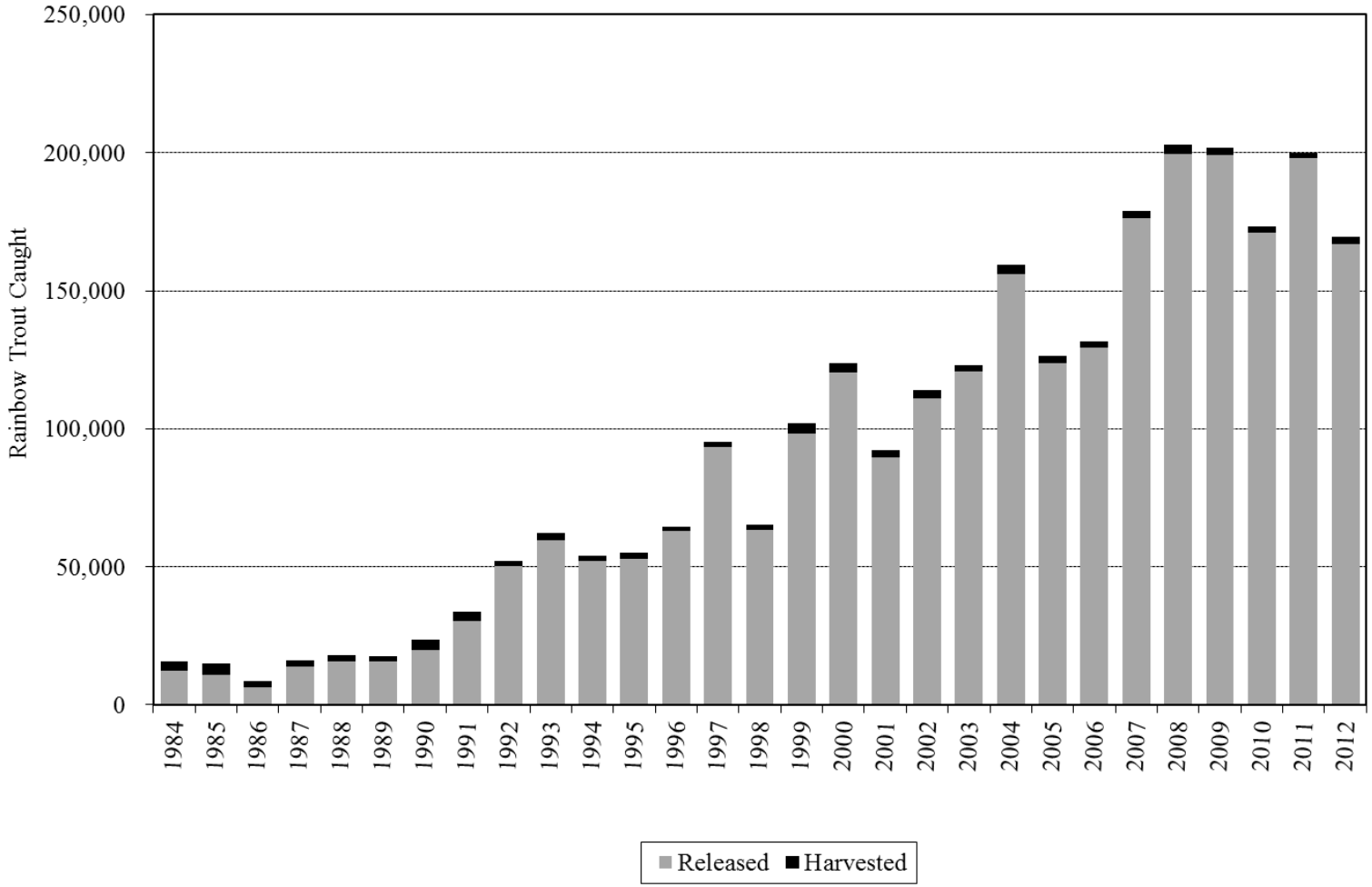

Figure 9.–Total number of rainbow trout caught, showing number released and number retained, Kenai River sport fishery, 1984-2012.

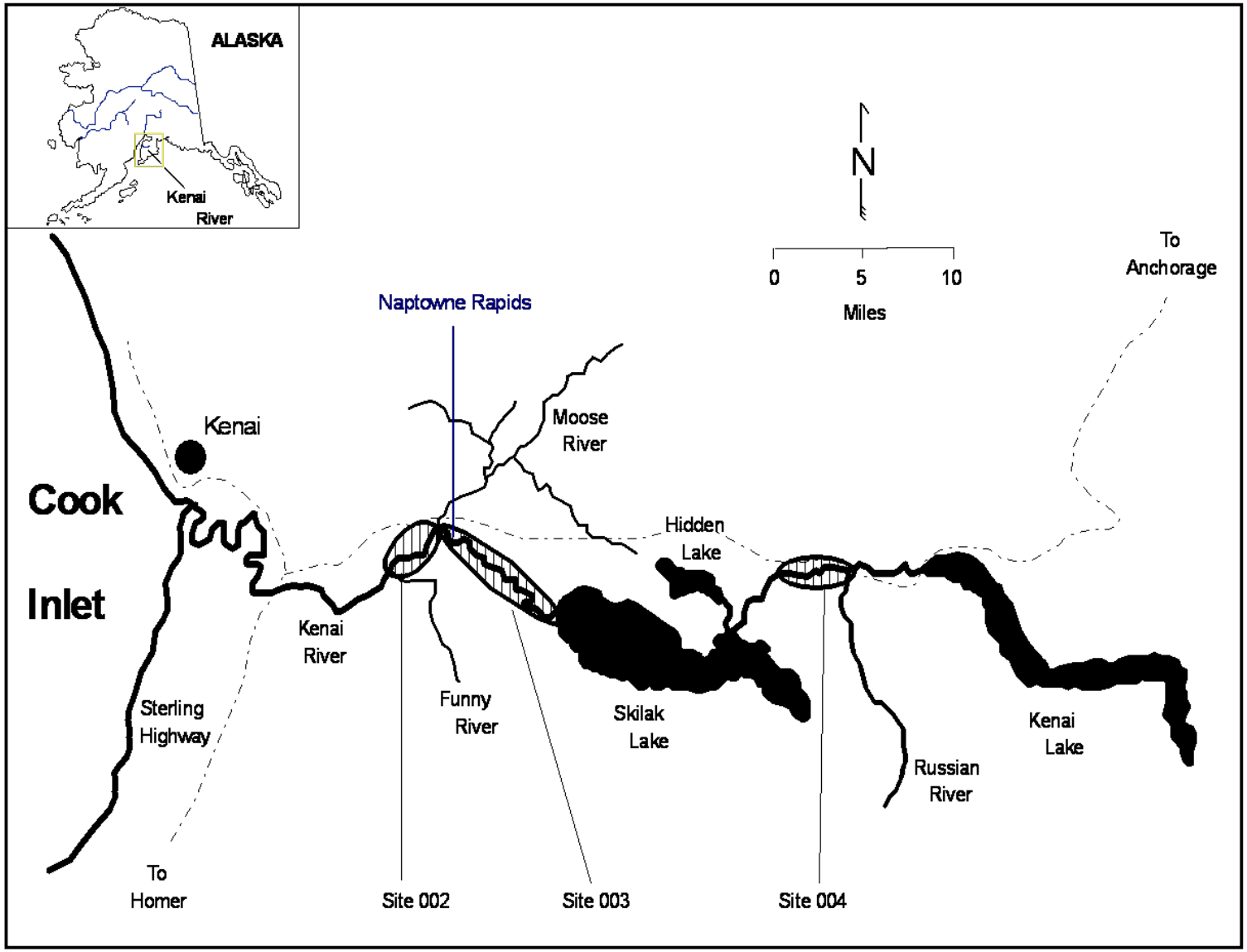

Figure 10.–Map of rainbow trout study areas in the Kenai River drainage.

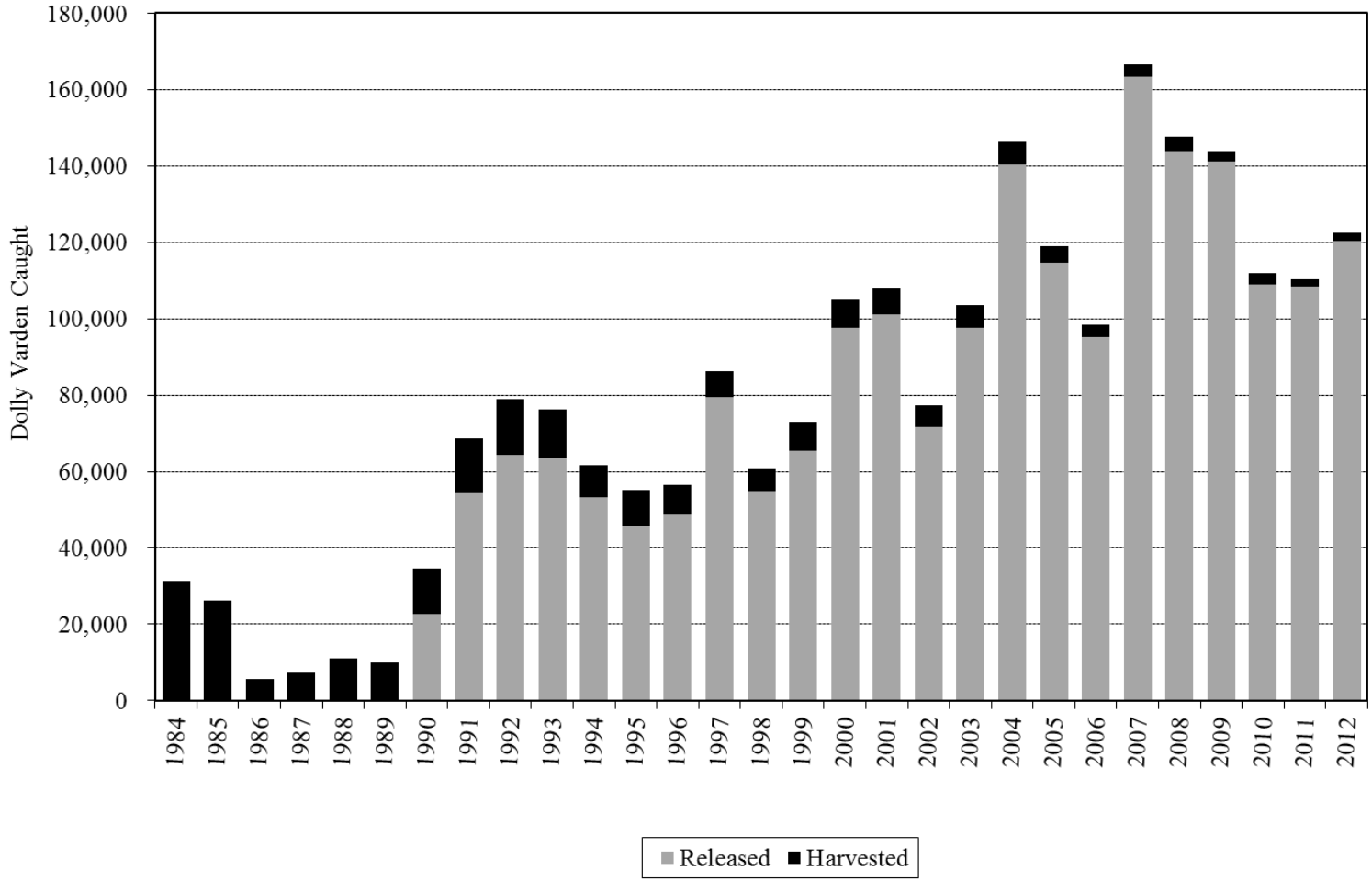

Figure 11.–Total number of Dolly Varden caught, showing number released and number retained, Kenai River sport fishery, 1984–2012.

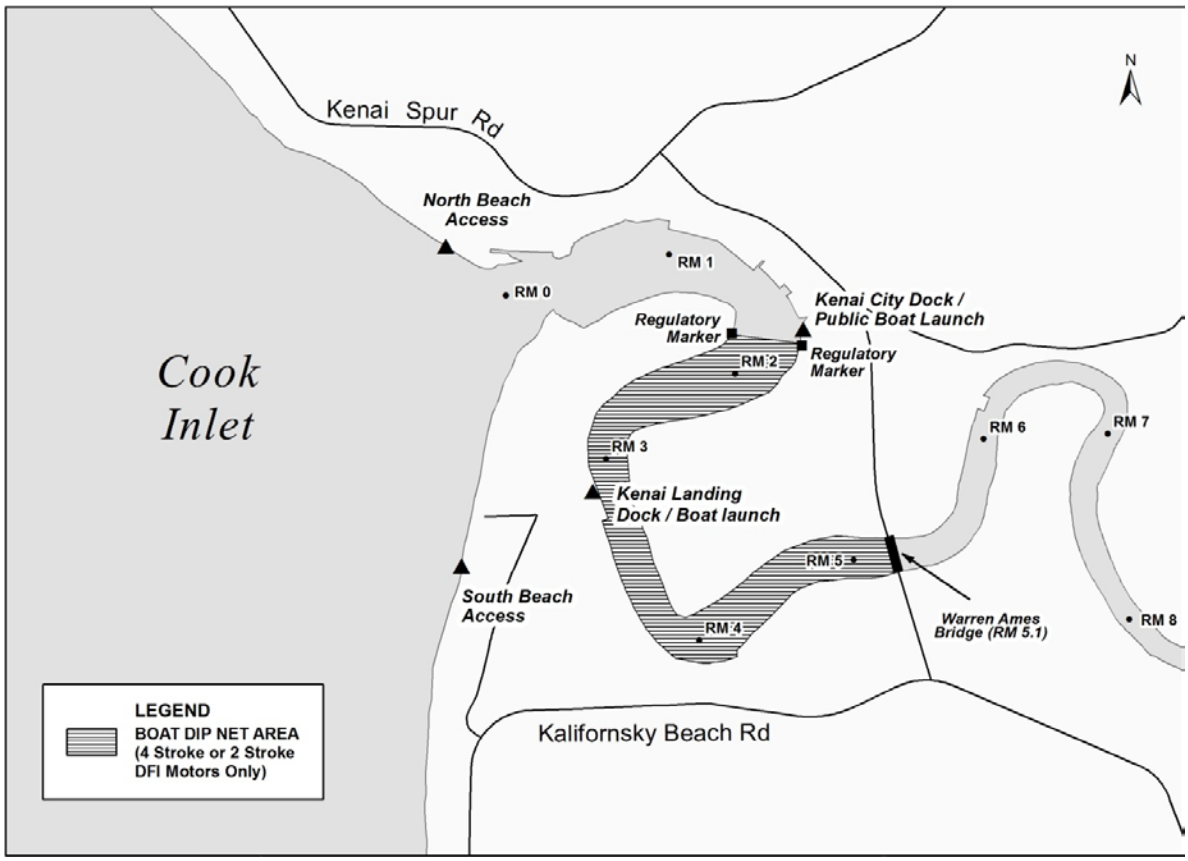

Figure 12.–Map of the Kenai River personal use fishery area open to dipnetting from a boat.

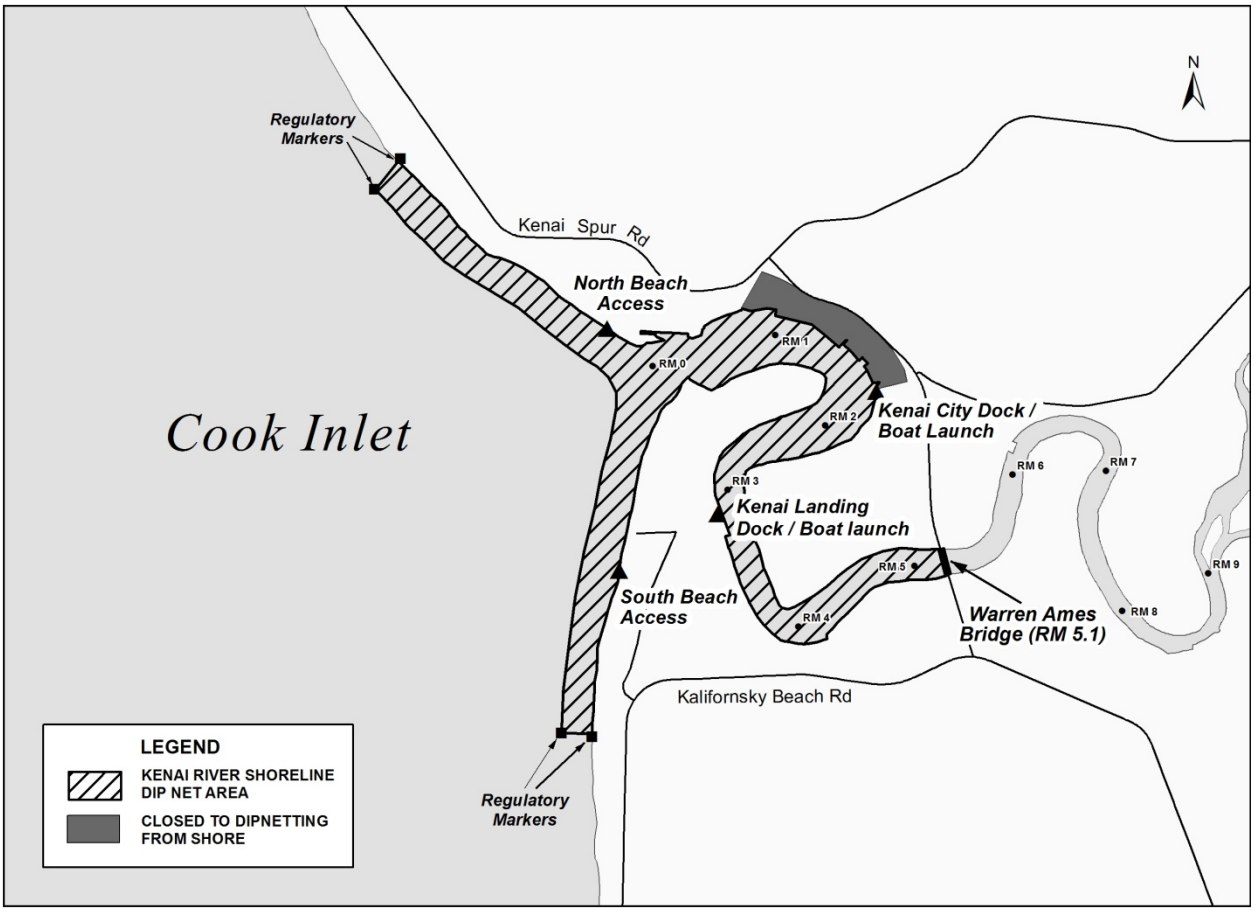

Figure 13.–Map of the Kenai River personal use dip net fishery.

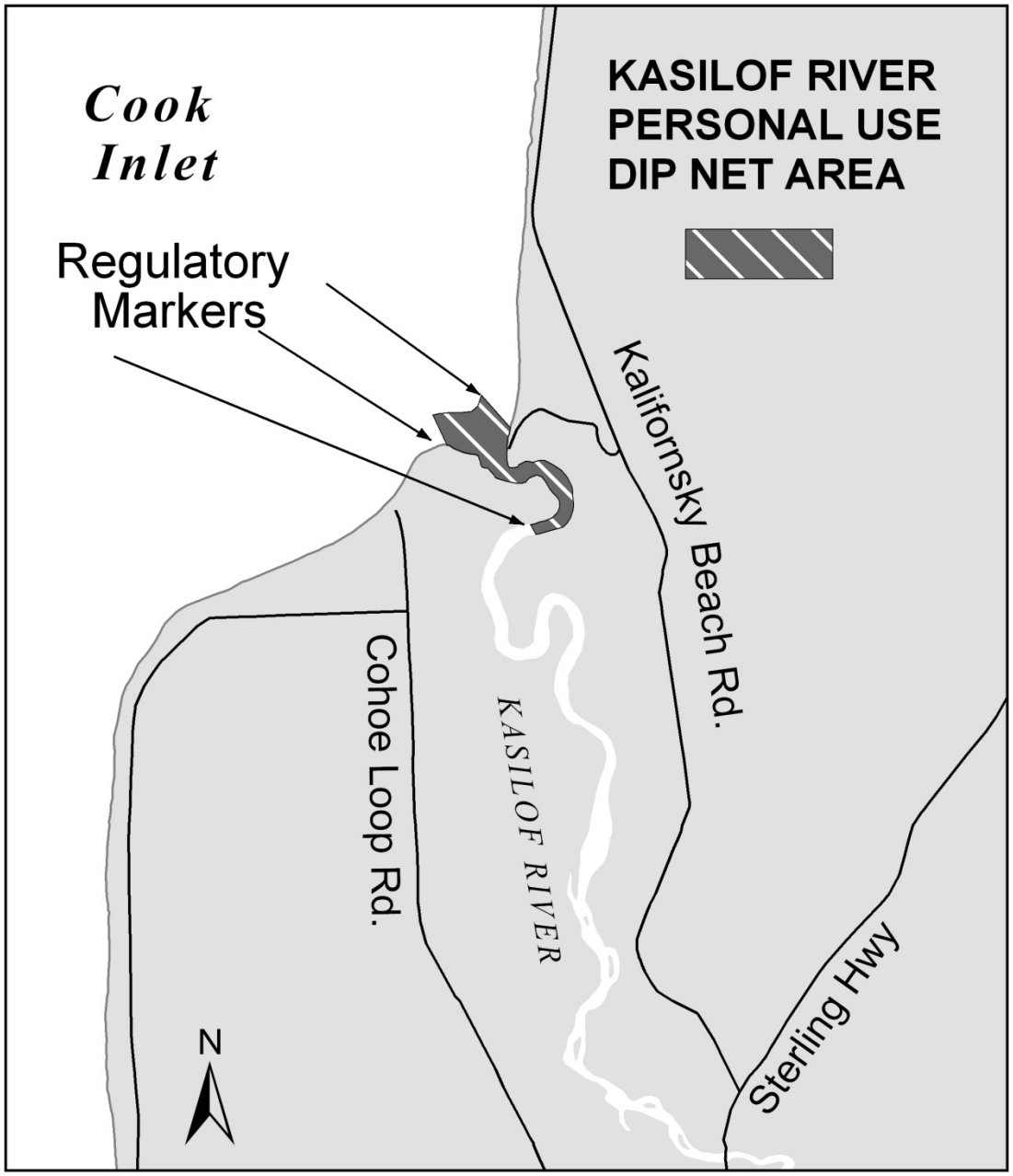

Figure 14.–Map of the Kasilof River personal use fishery area open to dip netting from shore.

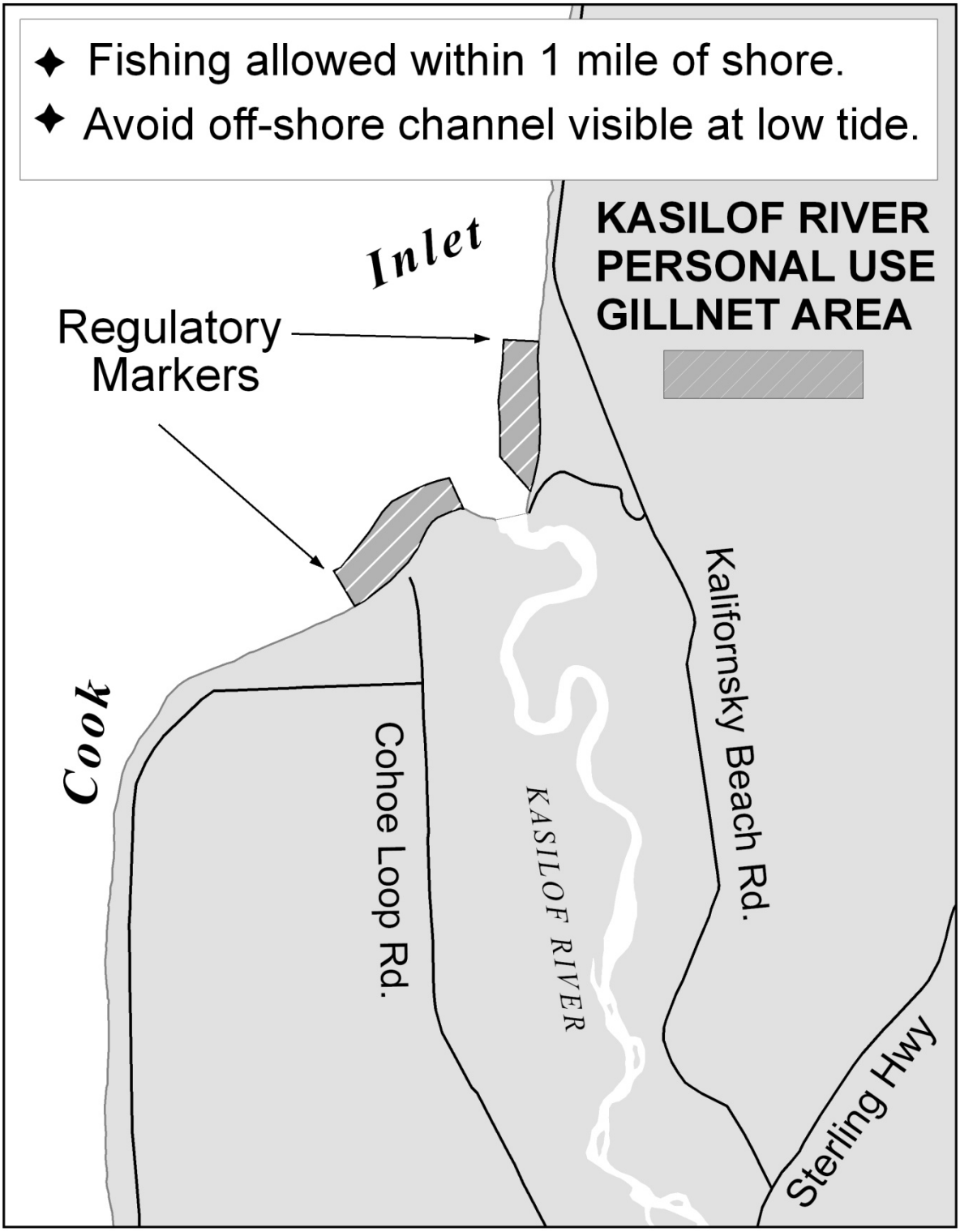

Figure 15.–Map of the Kasilof River personal use fishery area open to set gillnetting.

APPENDIX A
EMERGENCY ORDERS

Appendix A1.–Emergency orders issued for Northern Kenai Peninsula Management Area waters in 2010.

Emergency Order Number	Effective Date	Action/Justification
2-KS-1-12-10	Jun 5 12:01 a.m.	Anglers are advised that emergency closures have been announced for the Kenai River king salmon fishery. These closures will begin at 12:01a.m. Sat., 6/5/10. Please see the emergency order and news release for specifics.
2-KS-1-13-10	Jun 5 12:01 a.m.	Retention of naturally-produced king salmon in the Kasilof River will be prohibited through 11:59p.m., Wed., 6/30/10. Naturally-produced king salmon caught may not be possessed or retained, may not be removed from the water, and must be released immediately.
2-KS-1-16-10	Jun 12 12:01 a.m.	The Kenai River will open to catch-and-release fishing for king salmon 20 inches or greater, but less than 55 inches in length. Harvest will be allowed for king salmon less than 20 inches or 55 inches or greater in length.
2-KS-1-19-10	Jun 15 12:01 a.m.	The 2010 Kenai River early-run king salmon sport fishery will reopen to the harvest of king salmon less than 46 inches in length or greater than 55 inches in length beginning at 12:01a.m., Tue, 6/15/10.
2-KS-1-20-10	Jun 17 12:01 a.m.	Retention of naturally-produced king salmon in the Kasilof River will be allowed on Tuesdays, Thursdays, and Saturdays through Wed., 6/30/10.
2-KS-1-21-10	Jun 19 12:01 a.m.	Sufficient numbers of early-run king salmon have entered the Kenai River to allow anglers to fish with bait from a point approximately 100 yards downstream of the confluence of the Moose and Kenai Rivers.
2-RS-1-39-10	Jul 24 12:01 a.m.	In the Kenai River, the sportfishing bag and possession limit for salmon 16 inches or longer, except for king and coho salmon, will be increased to six. This does not include the Russian River and the Upper Kenai River "fly-fishing-only waters" near the Russian River.
2-RS-1-40-10	Jul 24 11:00 p.m.	The Kenai River personal use dip net fishery will be open 24 hours per day, through 11:59 p.m., Sat., 7/31/10.
2-RS-1-43-10	Aug 12 12:01 a.m.	Sockeye salmon fishing is closed by emergency order in the Russian River and the Kenai River "fly-fishing-only waters" near the Russian River.

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

Appendix A2.–Emergency orders issued for Northern Kenai Peninsula Management Area waters in 2011.

Emergency Order Number	Effective Date	Action/Justification
2-KS-1-17-11	Jun 29 12:01 a.m.	This emergency order prohibits the use of bait and prohibits retention of king salmon 20 inches or greater in length but less than 55 inches in length, while sport fishing in waters of the Kenai River drainage from an ADF&G marker located approximately 300yds 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 northern-most edge of the Sterling Highway Bridge, beginning 12:01 a.m. Wednesday, June 29, through 11:59 p.m. Thursday, July 14, 2011.
2-KS-1-20-11	Jul 15 12:01 a.m.	This emergency order prohibits the use of bait and prohibits retention of king salmon 20 inches or greater in length but less than 55 inches in length, while sport fishing in waters of the Kenai River drainage from an ADF&G marker located approximately 300yds 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 northern-most edge of the Sterling Highway Bridge, beginning 12:01 a.m. Friday, July 15, through 11:59 p.m. Sunday, July 31, 2011.
2-RS-1-21-11	Jul 21 12:01 a.m.	The sport fishing bag and possession limit for salmon 16 inches or longer (except for king and coho salmon) in the Kenai River, will be increased to six beginning Thursday, July 21. This does not include the Russian River "fly-fishing-only" waters near the Russian River.
2-RS-1-22-11	Jul 20 11:00 p.m.	The Kenai River personal use dip net fishery will be open 24 hours per day, beginning at 11:00 p.m. Wednesday, July 20, through 11:59 p.m. Sunday, July 31.
2-KS-1-23-11	Jul 24 12:01 a.m.	For the remainder of the season, king salmon caught in the Kenai River personal use dipnet fishery may not be retained. Any king salmon caught must be released immediately and returned to the water unharmed.
2-KS-1-24-11	Jul 25 12:01 a.m.	In the Kenai River, from its mouth upstream to ADF&G markers at the outlet of Skilak Lake, sport fishing gear is limited to not more than one unbaited, single-hook, artificial lure, beginning at 12:01 a.m. Monday, July 25, through 11:59 p.m. Sunday, July 31, 2011.

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

Appendix A3.–Emergency orders issued for Northern Kenai Peninsula Management Area waters in 2012.

Emergency Order Number	Effective Date	Action/Justification
2-KS-1-11-12	Jun 15 12:01 a.m.	This emergency order prohibits the retention of king salmon 20 inches or greater in length, but less than 55 inches in length, while sport fishing the waters of the Kenai River drainage downstream 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 beginning at 12:01 a.m., Friday, June 15 through 11:59 p.m., Saturday, June 30, 2012. In addition, this emergency order prohibits the use of bait and prohibits retention of king salmon 20 inches or greater in length but less than 55 inches in length, while sport fishing in waters of the Kenai River drainage from an ADF&G marker located approximately 300yds 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 northern-most edge of the Sterling Highway Bridge, beginning 12:01 a.m. Sunday, July 1 through 11:59 p.m. Saturday, July 14, 2012.
2-KS-1-12-12	Jun 29 12:01 a.m.	Effective 12:01 a.m., Friday, June 15, retention of naturally-produced king salmon in the Kasilof River will be prohibited through 11:59 p.m., Saturday, June 30, 2012.
2-KS-1-17-12	Jun 22 12:01 a.m.	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., Friday, June 22 through 11:59 p.m., Saturday, June 30, 2013. Sport fishing for king salmon will remain closed from 12:01 a.m., Sunday, July 1 through 11:59 p.m., Saturday, July 14, 2012 in waters of the Kenai River drainage from an ADF&G marker located approximately 300yds 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-1-18-12	Jul 1 12:01 a.m.	This emergency order prohibits the use of bait while sport fishing in the waters of the Kenai River drainage from an ADF&G marker located approximately 300yds 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, beginning 12:01 a.m., Sunday, July 1 through 11:59 p.m., Tuesday, July 31, 2012.
2-KS-1-19-12	June 22 12:01 a.m.	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., Friday, June 22 through 11:59 p.m., Saturday, June 30, 2012.
2-KS-1-26-12	Jul 1 12:01 a.m.	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., Sunday, July 1 through 11:59 p.m., Tuesday, July 31, 2012.

-continued-

Appendix A3.–Page 2 of 2.

Emergency Order Number	Effective Date	Action/Justification
2-KS-1-35-12	Jul 10 12:01 a.m.	Retention of king salmon in the Kenai River personal use dip net fishery that occurs from July 10 through July 31 each year, will be prohibited in 2012. Any king salmon caught may not be removed from the water and must be released immediately.
2-KS-1-37-12	Jul 10 12:01 a.m.	Kenai River anglers are advised that the department is implementing catch-and-release/trophy fishing-only restrictions for king salmon effective 12:01 a.m., Tuesday, July 10 through 11:59 p.m., Tuesday, July 31, 2012, except in the prior king salmon closure area, which will not be opened to catch-and-release/ trophy fishing-only until 12:01 a.m., Sunday, July 15 through 11:59 p.m., Tuesday, July 31, 2012.
2-KS-1-38-12	Jul 10 12:01 a.m.	The Kasilof River will be restricted to catch-and-release fishing for king salmon, effective 12:01 a.m., Tuesday, July 10 through 11:59 p.m., Tuesday, July 31, 2012.
2-KS-1-42-12	Jul 19 12:01 a.m.	Effective 12:01 a.m. Thursday, July 19, the Kenai River will close to king salmon fishing in an effort to conserve late-run king salmon escapement.
2-KS-1-43-12	Jul 19 12:01 a.m.	The Kasilof River will be closed to all salmon fishing, effective 12:01 a.m., Thursday, July 19 through 11:59 p.m., Tuesday, July 31, 2012.
2-RS-1-45-12	Jul 21 12:01 a.m.	This emergency order increases the bag and possession limits for salmon, other than king salmon and coho 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. Effective beginning 12:01 a.m., Saturday, July 21, 2013.
2-RS-1-46-12	Jul 20 11:00 p.m.	The Kenai River personal use dip net fishery will be open 24 hours per day, beginning at 11:00 p.m. Friday, July 20 through 11:59 p.m. Tuesday, July 31, 2012.
2-KS-1-48-12	Aug 1 12:01 a.m.	Kenai River anglers are advised that, in an effort to continue protection of late-run king salmon, the department is prohibiting the use of bait and multiple hooks in the Kenai River from its mouth upstream to the Sterling Highway bridge in Soldotna effective 12:01 a.m., Thursday, August 2 through 11:59 p.m., Wednesday, August 15, 2012.
2-KS-1-52-12	Aug 9 12:01 a.m.	Kenai River anglers are advised that the department is reopening the lower Kenai River downstream of the Sterling Highway bridge in Soldotna to the use of bait and multiple hooks, effective 12:01 a.m., Thursday, August 9, 2012.

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

Appendix A4.–Emergency orders issued for Northern Kenai Peninsula Management Area waters in 2013.

Emergency Order Number	Effective Date	Action/Justification
2-KS-1-07-13	May 1 12:01 a.m.	Prohibits the retention of naturally-produced king salmon and reduces the bag and possession limit of hatchery-produced king salmon 20 inches or greater in length to one fish in the Kasilof River beginning 12:01 a.m., Wednesday, May 1, through 11:59 p.m., Sunday June 30, 2013. 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.
2-KS-1-11-13	May 16 12:01 a.m.	This emergency order prohibits the use of bait and prohibits retention of king salmon 20 inches or greater in length but less than 55 inches in length, while sport fishing in waters of the Kenai River drainage from an ADF&G marker located approximately 300yds 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 northern-most edge of the Sterling Highway Bridge, beginning 12:01 a.m. Thursday, May 16, through 11:59 p.m. Sunday, July 14, 2013.
2-RS-1-20-13	June 19 8:00 a.m.	This emergency order opens the Russian River Sanctuary Area to fishing for sockeye salmon. Effective 8:00 a.m., Wednesday, June 19, 2013.
2-KS-1-21-13	June 20 12:01 a.m.	This emergency order prohibits the use of bait and limits sport fishing gear to one unbaited, single-hook, artificial lure while sport fishing in the Kasilof River downstream of the Sterling Highway Bridge beginning 12:01 a.m., Thursday, June 20, through 11:59 p.m., Sunday, June 30, 2013
2-KS-1-22-13	June 20 12:01 a.m.	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 beginning at 12:01 a.m., Thursday, June 20, through 11:59 p.m., Sunday, June 30, 2013. Sport fishing for king salmon will remain closed from 12:01 a.m., Monday, July 1, through 11:59 p.m., Sunday, July 14, 2013 in waters of the Kenai River drainage from an ADF&G marker located approximately 300yds 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-RS-1-23-13	June 22 12:01 a.m.	This emergency order increases the bag and possession limits for salmon, other than king salmon, from 3/day, 3/possession to 6/day, 12/possession in that area of the Kenai River upstream from Skilak Lake to ADF&G markers located approximately 300yds upstream of Sportsman's Landing and the River from its mouth upstream to an ADF&G marker located approximately 600yds downstream from the Russian River Falls. Effective from 12:01 a.m., Saturday, June 22, through 11:59 p.m., Sunday, July 14, 2013.
2-KS-1-24-13	Jul 1 12:01 a.m.	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 and in the Moose River from its confluence with the Kenai River upstream to the northernmost edge of the Sterling Highway bridge beginning at 12:01 a.m., Monday, July 1, through 11:59 p.m., Wednesday, July 31, 2013.

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Emergency Order Number	Effective Date	Action/Justification
2-KS-1-25-13	Jul 1 12:01 a.m.	This emergency order closes the north bank of the Kenai River near river mile 22, from the mouth of Soldotna Creek upstream approximately 475 feet to fishing from shore. This area is closed to all fishing, except fishing from a boat that is located more than 10 feet from shore and not connected to shore or any riparian habitat. Anglers may not walk or wade within 10 feet in either direction of the waterline. The area is posted with regulatory markers.
2-KS-2-34-13	Jul 10 6:00 a.m.	King salmon may not be retained in the Kenai River personal use dip net fishery beginning 6:00 a.m., Wednesday, July 10, through 11:59 p.m., Wednesday, July 31, 2013. Any king salmon caught may not be removed from the water and must be released immediately.
2-KS-2-36-13	Jul 15 12:01 a.m.	This emergency order extends the current king salmon closure in waters of the Kenai River drainage from an ADF&G regulatory marker located approximately 300 yds downstream 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 through 11:59 p.m., Wednesday, July 31, 2013.
2-RS-1-37-13	Jul 13 12:01 a.m.	This emergency order increases the bag and possession limits 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/day and 2/possession may be coho salmon. Effective 12:01 a.m., Saturday, July 13 through 11:59 p.m., Wednesday, Aug 7.
2-RS-1-38-13	Jul 13 12:01 a.m.	This emergency order extends the area that salmon may be harvested in 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.
2-RS-1-41-13	Ju1 20 12:01 a.m.	This emergency order increases the bag and possession limits for salmon, other than king salmon and coho 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. Effective beginning 12:01 a.m., July 20, 2013.
2-RS-1-42-13	Ju1 22 11:00 p.m.	The Kenai River personal use dip net fishery will be open 24 hours per day, beginning at 11:00 p.m. Monday, July 22, through 11:59 p.m. Wednesday, July 31, 2013.
2-KS-1-46-13	Aug 1 12:01 a.m.	In the Kenai River, from its mouth upstream to the Sterling Highway bridge in Soldotna, sport fishing gear is limited to not more than one unbaited, single-hook, artificial lure, beginning at 12:01 a.m. Thursday, August 1, through 11:59 p.m. Thursday, August 15, 2013.
2-DV-1-52-13	Nov 21 12:01 a.m.	The retention of Arctic char/Dolly Varden and use of five lines while fishing through the ice in Stormy Lake will be prohibited through the 2013-2014 winter fishery as part of an effort to restore the native fish stocks. Beginning Thursday, November 21, sport fishing through the ice is permitted using two closely attended lines, provided only one hook or artificial lure is used on each line.

APPENDIX B
RUSSIAN RIVER SOCKEYE ASL DATA

Appendix B1.– Estimated age and sex composition and length-at-age of early-run sockeye salmon at Russian River weir, 2010.

	Age (Freshwater.Ocean Years)				
	1.2	1.3	2.2	2.3	Total
Female					
Sample Size	0	7	8	63	78
Percent	0	4.5	5.1	40.1	49.7
SE (Percent)	0	1.7	1.8	3.9	4.0
Escapement	0	1,218	1,381	10,857	13,456
SE (Escapement)	0	447	477	1,061	1,083
Mean Length (mm)	0	584	551	577	575
SE	0	6	10	3	3
Male					
Sample Size	1	10	8	60	79
Percent	0.6	6.4	5.1	38.2	50.3
SE (Percent)	0.6	2.0	1.8	3.9	4.0
Escapement	162	1,733	1,381	10,342	13,618
SE (Escapement)	173	531	477	1,053	1,083
Mean Length (mm)	510	579	545	588	582
SE	0	6	8	3	3
Combined					
Sample Size	1	17	16	123	157
Percent	0.6	10.9	10.2	78.3	100.0
SE (Percent)	0.6	2.5	2.4	3.3	
Escapement	162	2,951	2,762	21,199	27,074
SE (Escapement)	173	674	655	893	
Mean Length (mm)	510	581	548	583	579
SE	0	4	6	2	2

Appendix B2– Estimated age and sex composition and length-at-age of late-run sockeye salmon at Russian River weir, 2010.

	Age (Freshwater.Ocean Years)							
	1.2	1.3	2.1	2.2	2.3	3.1	3.2	Total
Female								
Sample Size	6	3	7	15	25	0	0	56
Percent	4.0	2.0	4.7	10.1	16.8	0.0	0.0	37.6
SE (Percent)	1.6	1.2	1.7	2.5	3.1	0.0	0.0	4.0
Escapement	1,554	777	1,826	3,924	6,526	0	0	14,607
SE (Escapement)	629	447	676	960	1,193	0	0	1,546
Mean Length (mm)	517	567	423	513	569	0	0	530
SE	11	7	4	8	4	0	0	7
Male								
Sample Size	4	5	56	10	16	1	1	93
Percent	2.7	3.3	37.6	6.7	10.7	0.7	0.7	62.4
SE (Percent)	1.3	1.5	4.0	2.1	2.5	0.7	0.7	4.0
Escapement	1,049	1,282	14,607	2,603	4,157	272	272	24,241
SE (Escapement)	517	575	1,546	800	987	260	260	1,546
Mean Length (mm)	516	587	410	484	588	425	555	464
SE	20	8	1	14	5	0	0	8
Combined								
Sample Size	10	8	63	25	41	1	1	149
Percent	6.7	5.3	42.3	16.8	27.5	0.7	0.7	100.0
SE (Percent)	2.1	1.9	4.1	3.1	3.7	0.7	0.7	NA
Escapement	2,603	2,059	16,433	6,526	10,683	272	272	38,848
SE (Escapement)	800	719	1,577	1,193	1,426	260	260	NA
Mean Length (mm)	517	579	411	501	576	425	555	489
SE	10	7	1	8	4	0	0	6

Appendix B3.–Estimated age and sex composition and length-at-age of early-run sockeye salmon at Russian River weir, 2011.

	Age (Freshwater.Ocean Years)			
	1.3	2.2	2.3	Total
Female				
Sample Size	42	8	31	81
Percent	28.0	5.3	20.7	54.0
SE (Percent)	3.7	1.8	3.3	4.1
Escapement	8,156	1,544	6,030	15,730
SE (Escapement)	1,072	536	967	1,188
Mean Length (mm)	598	566	602	596
SE	2.1	7.1	1.9	1.8
Male				
Sample Size	35	5	29	69
Percent	23.3	3.3	19.3	46.0
SE (Percent)	3.5	1.5	3.2	4.1
Escapement	6,787	961	5,622	13,399
SE (Escapement)	1,008	428	944	1,188
Mean Length (mm)	599	581	601	598
SE	1.6	10.7	2.6	1.7
Combined				
Sample Size	77	13	60	150
Percent	51.3	8.7	40.0	100.0
SE (Percent)	4.1	2.3	4.0	n/a
Escapement	14,943	2,534	11,652	29,129
SE (Escapement)	1,191	670	1,168	n/a
Mean Length (mm)	599	572	601	597
SE	1.4	6.1	1.6	1.3

Appendix B4.–Estimated age and sex composition and length-at-age of late-run sockeye salmon at Russian River weir, 2011.

	Age (Freshwater.Ocean Years)								
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	Total
Female									
Sample Size	1	1	8	41	126	36	7	1	221
Percent	0.2	0.2	1.9	9.8	30.1	8.6	1.7	0.2	52.9
SE (Percent)	0.2	0.2	0.7	1.5	2.3	1.4	0.6	0.2	2.4
Escapement	83	83	789	4,070	12,500	3,571	706	83	21,969
SE (Escapement)	83	100	278	606	934	569	262	100	1,013
Mean Length	390	515	583	407	513	561	409	505	500
SE	0.0	0.0	8.5	1.8	1.8	3.8	6.7	0.0	3.8
Male									
Sample Size	2	1	14	102	38	34	5	1	197
Percent	0.5	0.2	3.3	24.4	9.1	8.1	1.2	0.2	47.1
SE (Percent)	0.3	0.2	0.9	2.1	1.4	1.3	0.5	0.2	2.4
Escapement	208	83	1,370	10,133	3,779	3,364	498	83	19,560
SE (Escapement)	141	100	365	872	586	556	220	100	1,013
Mean Length	395	480	589	405	511	567	411	530	467
SE	0.0	0.0	7.3	1.2	3.7	3.8	7.8	0.0	5.4
Combined									
Sample Size	3	2	22	143	164	70	12	2	418
Percent	0.7	0.5	5.3	34.2	39.2	16.7	2.9	0.5	100.0
SE (Percent)	0.4	0.3	1.1	2.3	2.4	1.8	0.8	0.3	n/a
Escapement	291	208	2,201	14,203	16,279	6,935	1,204	208	41,529
SE (Escapement)	170	141	453	963	993	760	341	141	n/a
Mean Length	393	498	587	405	512	564	410	518	484
SE	1.7	17.5	5.5	1.0	1.6	2.7	4.9	12.5	3.3

Appendix B5.–Estimated age and sex composition and length-at-age of early-run sockeye salmon at Russian River weir, 2012.

	Age (Freshwater.Ocean Years)			
	1.3	2.2	2.3	Total
Female				
Sample Size	8	16	48	72
Percent	5.3	10.6	31.8	47.7
SE (Percent)	1.8	2.5	3.8	4.1
Escapement	1,278	2,556	7,669	11,503
SE (Escapement)	441	289	437	469
Mean Length (mm)	582	541	580	572
SE	7.1	3.9	2.9	3.0
Male				
Sample Size	6	17	56	79
Percent	4.0	11.2	37.1	52.3
SE (Percent)	1.6	2.6	3.9	4.1
Escapement	965	2,701	8,947	12,612
SE (Escapement)	383	622	950	984
Mean Length (mm)	580	554	594	584
SE	9.6	6.1	3.2	3.3
Combined				
Sample Size	14	33	104	151
Percent	9.3	21.8	68.9	100.0
SE (Percent)	2.4	3.4	3.8	n/a
Escapement	2,243	5,257	16,615	24,115
SE (Escapement)	572	813	912	n/a
Mean Length (mm)	581	548	588	578
SE	5.6	3.7	2.3	2.3

Appendix B6– Estimated age and sex composition and length-at-age of late-run sockeye salmon at Russian River weir, 2012.

	Age (Freshwater.Ocean Years)								
	1.1	1.2	1.3	2.1	2.2	2.3	3.1	3.2	Total
Female									
Sample Size	0	13	2	1	89	7	0	2	114
Percent	0.0	6.4	1.0	0.5	44.0	3.5	0.0	1.0	56.4
SE (Percent)	0.0	1.7	0.7	0.5	3.5	1.3	0.0	0.7	3.5
Escapement	0	3,514	549	275	24,161	1,922	0	549	30,970
SE (Escapement)	0	933	384	275	1,922	714	0	384	1,922
Mean Length (mm)	0	520	570	495	522	581	0	530	526
SE	0.0	7.0	20.0	0.0	2.5	5.0	0.0	2.6	2.6
Male									
Sample Size	1	4	7	15	39	22	0	0	88
Percent	0.5	2.0	3.5	7.4	19.3	10.9	0.0	0.0	43.6
SE (Percent)	0.5	1.0	1.3	1.9	2.8	2.2	0.0	0.0	3.5
Escapement	275	1,098	1,922	4,063	10,598	5,985	0	0	23,941
SE (Escapement)	275	549	714	1,043	1,538	1,208	0	0	1,922
Mean Length (mm)	365	534	584	396	525	593	0	0	523
SE	0.0	25.3	13.5	13.9	5.1	6.1	0.0	0.0	8.2
Combined									
Sample Size	1	17	9	16	128	29	0	2	202
Percent	0.5	8.4	4.5	7.9	63.3	14.4	0.0	1.0	100.0
SE (Percent)	0.5	2.0	1.5	1.9	3.4	2.5	0.0	0.7	n/a
Escapement	275	4,613	2,471	4,338	34,759	7,907	0	549	54,911
SE (Escapement)	275	1,098	824	1,043	1,867	1,373	0	384	n/a
Mean Length (mm)	365	523	581	402	523	590	0	530	525
SE	0.0	7.7	11.0	14.4	2.3	4.8	25.0	0.0	3.9

Appendix B7.–Estimated age and sex composition and length-at-age of early-run sockeye salmon at Russian River weir, 2013.

	Age (Freshwater.Ocean Years)				
	1.2	1.3	2.2	2.3	Total
Female					
Sample Size	2	60	1	37	100
Percent	1.0	31.9	0.5	19.7	53.2
SE (Percent)	0.8	3.4	0.5	2.9	3.7
Escapement	358	11,413	179	7,048	19,033
SE (Escapement)	268	1,220	190	1,041	1,306
Mean Length (mm)	548	585	550	596	588
SE	2.5	2.4	0.0	3.0	2.0
Male					
Sample Size	0	53	1	34	88
Percent	0.0	28.2	0.5	18.1	46.8
SE (Percent)	0.0	3.3	0.5	2.8	3.7
Escapement	0	10,089	179	6,475	16,743
SE (Escapement)	0	1,177	190	1,005	1,306
Mean Length (mm)	0	588	545	596	591
SE	0.0	2.1	0.0	2.9	1.8
Combined					
Sample Size	2	113	2	71	188
Percent	1.0	60.1	1.1	37.8	100.0
SE (Percent)	0.8	3.6	0.8	3.6	n/a
Escapement	358	21,501	394	13,523	35,776
SE (Escapement)	268	1,281	268	1,270	n/a
Mean Length (mm)	548	586	548	596	589
SE	2.5	1.6	2.5	2.1	1.4

Appendix B8.–Estimated age and sex composition and length-at-age of late-run sockeye salmon at Russian River weir, 2013.

	1.1	1.2	1.3	1.4	2.1	2.2	2.3	Total
Female								
Sample Size	0	1	8	0	0	38	15	62
Percent	0.0	0.8	6.1	0.0	0.0	28.8	11.4	47.0
SE (Percent)	0.0	0.8	2.1	0.0	0.0	4.0	2.8	4.4
Escapement	0	253	1926	0	0	9093	3599	14839
SE (Escapement)	0	240	657	0	0	1250	875	1377
Mean Length (mm)	0	535	579	0	0	519	572	540
SE	0.0	0.0	6.4	0.0	0.0	3.1	2.6	4.0
Male								
Sample Size	1	3	8	1	11	21	25	70
Percent	0.8	2.3	6.1	0.8	8.3	15.9	18.9	53.0
SE (Percent)	0.8	1.3	2.1	0.8	2.4	3.2	3.4	4.4
Escapement	253	726	1,926	253	2,621	5,020	5,967	16,734
SE (Escapement)	240	410	657	240	761	1,010	1,080	1,377
Mean Length (mm)	385	493	587	610	399	521	577	528
SE	0.0	3.3	6.3	0.0	2.0	7.4	3.2	8.3
Combined								
Sample Size	1	4	16	1	11	59	40	132
Percent	0.8	3.0	12.1	0.8	8.3	44.7	30.3	100.0
SE (Percent)	0.8	1.5	2.9	0.8	2.4	4.3	4.0	n/a
Escapement	253	947	3,820	253	2,621	14,113	9,567	31,573
SE (Escapement)	240	474	900	240	761	1,370	1,269	n/a
Mean Length (mm)	385	504	583	610	399	520	575	534
SE	0.0	10.7	4.5	0.0	2.0	3.3	2.2	4.8