Technical Paper No. 431

Local and Traditional Knowledge of Abundance of Chinook Salmon in the Kenai River

by
Bronwyn Jones
and
Malla Kukkonen

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Alaska Department of Fish and Game **Division of Subsistence**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in Division of Subsistence reports. All others, including deviations from definitions listed below, are noted in the text at first mention, in the titles or footnotes of tables, and in figures or figure captions.

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
standard length	SL
total length	TL

Mathematics, statistics

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

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by

Bronwyn Jones and Malla Kukkonen,
Alaska Department of Fish and Game, Division of Subsistence, Anchorage

Alaska Department of Fish and Game
Division of Subsistence
333 Raspberry Road
Anchorage, AK 99518

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The Division of Subsistence Technical Paper Series was established in 1979 and represents the most complete collection of information about customary and traditional uses of fish and wildlife resources in Alaska. The papers cover all regions of the state. Some papers were written in response to specific fish and game management issues. Others provide detailed, basic information on the subsistence uses of particular communities which pertain to a large number of scientific and policy questions.

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Bronwyn Jones and Malla Kukkonen
Alaska Department of Fish and Game, Division of Subsistence,
333 Raspberry Road, Anchorage, AK 99518-1599 USA

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ABSTRACT

In Alaska, statewide declines of Chinook salmon led to the development of the Chinook Salmon Research Initiative—a program aimed at better understanding these declines. Among the indicator stocks chosen for this study was the Kenai River in Southcentral Alaska. The Kenai River supports two distinct Chinook salmon runs, early and late. Together with its sockeye, coho, and pink salmon runs, the river provides opportunity for sport, personal use, educational, and commercial fisheries. This report focuses on Local Traditional Knowledge (LTK) of the Kenai River Chinook salmon stocks from long-term users of the Kenai River watershed as it pertains to patterns and trends of use in each stock.

Key words: Chinook salmon, king salmon, local traditional knowledge, Kenai River, Chinook Salmon Research Initiative

1. INTRODUCTION

Project Background

Chinook salmon (*Oncorhynchus tshawytscha*) are the largest species in the Pacific salmon genus and are commonly referred to as king salmon. Chinook salmon are critically important to subsistence, commercial, and sport users across diverse fisheries in Alaska. This salmon species is valued for its large size, rich meat, arrival timing, and high market value. In Alaska, Chinook salmon exhibit stream-type[1] life history where adult runs occur during spring and summer, and spawning takes place during summer and fall. The majority of juveniles spend one year in freshwater before smolting, and make extensive ocean migrations to feed and mature. Freshwater run timing of adult Chinook salmon varies across Alaska, starting as early as April in some areas, or as late as mid-July in other rivers. In some river systems, there are two runs of Chinook salmon; for example, earlier arriving fish that perhaps spawn in smaller, tributary habitats, and later arriving fish that spawn in larger, mainstem habitats. The Kenai River, located in Southcentral Alaska, supports such multiple runs of Chinook salmon (ADF&G Chinook Salmon Research Team 2013).

Recent statewide downturns in productivity and abundance of Chinook salmon stocks have created social and economic hardships for many communities in rural and urban Alaska. In response, the Alaska Department of Fish and Game (ADF&G) recognized a need to: 1) more precisely characterize trends in Chinook salmon productivity and abundance; 2) acquire data that may help to understand Chinook salmon declines; and 3) establish better means of tracking future Chinook salmon population trends (ADF&G Chinook Salmon Research Team 2013).

In 2012, ADF&G worked with federal and academic partners to develop a comprehensive research plan to increase Chinook salmon stock assessment capabilities in Alaska. These meetings, combined with the proceedings from a public forum and written comments resulted in the publication of ADF&G's "Chinook Salmon Stock Assessment and Research Plan, 2013," which outlines research priorities identified during this process. The research plan prioritized filling knowledge gaps as they pertain to 12 indicator stocks in Alaska that represent "diverse life history and migratory characteristics across a broad geographic range." The Kenai River Chinook salmon stock was included among the 12 indicator stocks recommended for the stock assessment program (ADF&G Chinook Salmon Research Team 2013).

Among the goals recognized in the research plan for enhancing the stock assessment programs is increasing the availability of Local Traditional Knowledge (LTK) as it pertains to patterns and trends of use in each stock (ADF&G Chinook Salmon Research Team 2013). The plan also recognizes that LTK can provide scientists and managers with detailed observations on Chinook salmon abundance, distribution, run timing, condition, and habitat at a variety of temporal and spatial scales. In addition to empirical data, these observations can also elucidate questions and hypotheses for future research.

To address the LTK component of the stock assessment plans, the Division of Subsistence of ADF&G developed a series of research initiatives to document this knowledge in communities proximal to most of the indicator stocks. This report is focused on the findings of the LTK research project associated with the Kenai River indicator stock, including local historical knowledge of the abundance and presence of Chinook salmon in the Kenai River collected from long-term users of the Kenai River watershed.

Study Area—The Kenai River Watershed

The headwaters of the Kenai River are located in the Kenai Mountains on the Kenai Peninsula in Southcentral Alaska. The river flows approximately 82 miles west from Kenai Lake, draining more than 2,000 square miles of diverse landscape including glaciers, large lakes, high mountains, and lowlands and emptying into Cook Inlet near the City of Kenai (Alaska Department of Natural Resources, Division of Land, Division

1. NOAA Fisheries, National Oceanic and Atmospheric Association, "Chinook Salmon (*Oncorhynchus tshawytscha*)," Accessed January 18, 2017, http://www.nmfs.noaa.gov/pr/species/fish/chinook-salmon.html.

of Parks & Outdoor Recreation 1998). From east to west, the major tributaries of the Kenai River include Snow River, Trail Creek, Quartz Creek, Russian River, Killey River, Moose River, Funny River, Slikok Creek, and Beaver Creek (Figure 1-1). For convenience of management (see, for example, the "Kenai River Comprehensive Management Plan 1997") and to better reflect the way people think about, describe, and access as well use the river, the Kenai River has been divided into 3 segments that are referred as "Upper River" (approximately 17.3 river miles from Kenai Lake to Skilak Lake), "Middle River" (approximately 19.5 river miles from Skilak Lake to Naptowne Rapids), and "Lower River" (approximately 21 river miles from the Sterling Highway bridge in Soldotna to the mouth) (Alaska Department of Fish and Game Division of Sport Fish [n.d.]). The last 12 river miles of the Lower River are tidally influenced, and Kenai residents who live by the Kenai River closest to the river mouth often see seals swimming in the estuary during high tides.

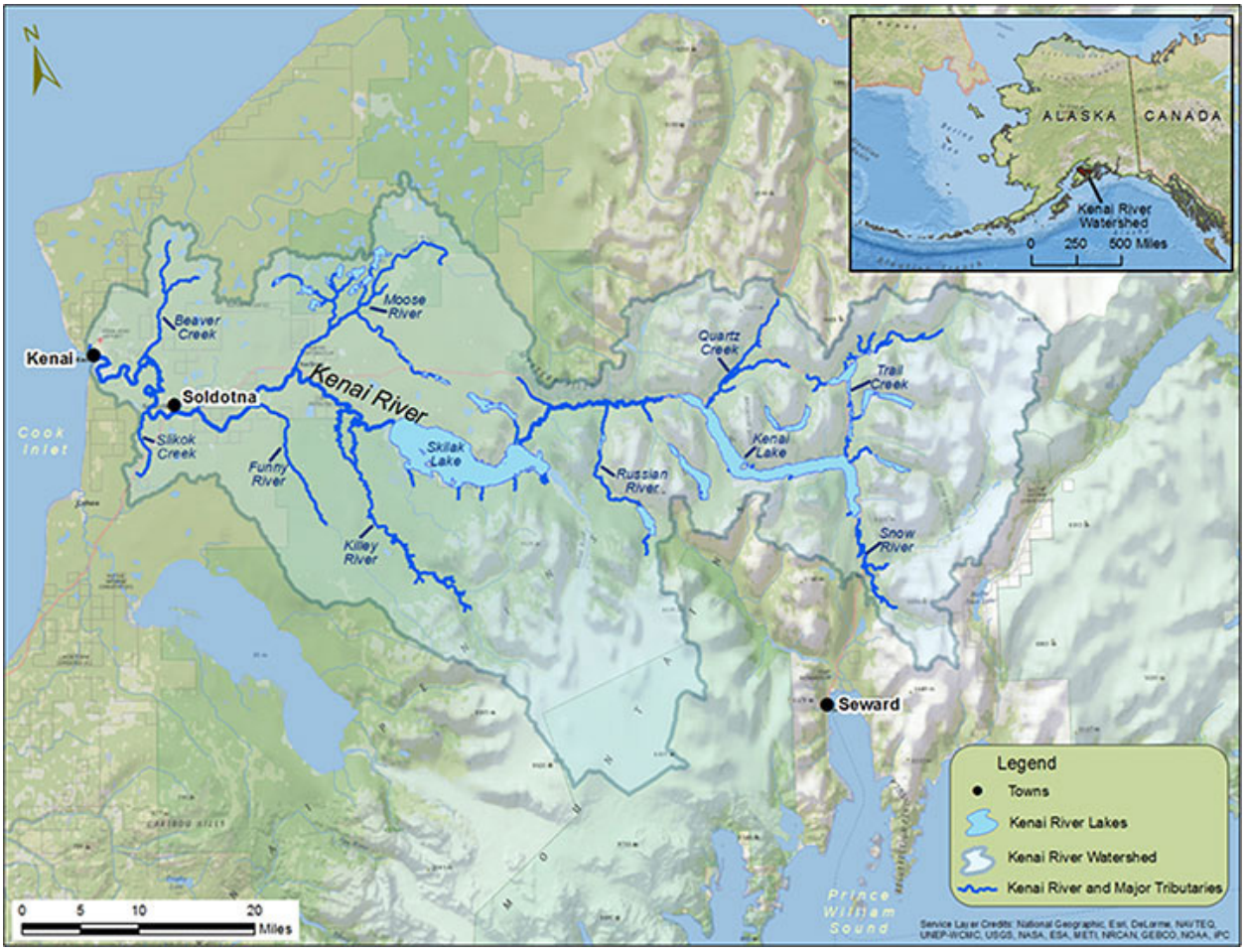

Figure 1-1.–Map of Kenai River watershed

The Kenai Peninsula is the location of 3 federal public land management units: Chugach National Forest, Kenai National Wildlife Refuge, and Kenai Fjords National Park. Approximately 54% of the Kenai River watershed is located in the Kenai Wildlife Refuge, 37% in the Chugach National Forest and the remaining on State of Alaska or private land (U. S. Fish and Wildlife Service Region 7 2010:1–14). As a result of special legislation, a part of the Kenai River has been designated as a "Kenai River Special Management Area" (KRSMA) since 1984. The KRSMA is a special unit of the state park system and managed by the Division of Parks and Outdoor Recreation of the Alaska Department of Natural Resources (from now on referred to as State Parks) (Kenai River Comprehensive Management Plan 1997:6). The KRSMA includes Kenai Lake, 17 miles of the Upper Kenai River, Skilak Lake, 29 miles of the Middle River, and 25 miles

of the Lower River ending approximately 4 miles from the mouth of the river in Cook Inlet (Whittaker and Shelby 2010:1).

Due to diverse regional land ownership and jurisdiction over management of these lands, multiple agencies or governmental organizations have management responsibilities, which sometimes overlap, in the Kenai River watershed. These include the State Parks, Alaska Department of Fish and Game (ADF&G), U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), Kenai Peninsula Borough, and the cities of Kenai and Soldotna. An initial Management Plan for the Kenai River was prepared by State Parks in 1986. A comprehensive revision of the plan was adopted in 1997 and published in November 1998. While the management plan is the basis for management of state lands and waters within the KRSMA as well as other state land within the planning boundaries of the management plan, it is intended as a multi-agency planning document to be used by local, state, and federal agencies as a basis for management of land under their jurisdiction (Alaska Department of Natural Resources, Division of Land, Division of Parks & Outdoor Recreation 1998:1).

Chinook Salmon in The Kenai River

The Kenai River is the most heavily-fished river in Alaska (Alaska Department of Fish and Game Division of Sport Fish [n.d.]). In addition to sockeye, coho, and pink salmon that return to the river to spawn according to their species specific character, the Kenai River also supports two distinct Chinook salmon runs. The early run typically enters the river in mid-May and peaks in mid-June. In recent years, the early run populations have fluctuated from as few as 8,100 to as many as 16,000 returning salmon (Alaska Department of Fish and Game Division of Sport Fish [n.d.]). The salmon returning during the early run primarily head for smaller Kenai River tributaries. The Kenai late-run Chinook salmon enter the river in early July, with the most inriver abundance found in mid- to late July. The late run usually yields more fish, with a total population averaging 56,000 salmon. The late run fish primarily spawn in the mainstem Kenai River (Alaska Department of Fish and Game Division of Sport Fish [n.d.]).

Inriver Kenai Chinook salmon runs are managed by the Division of Sport Fish under management plans established by the Alaska Board of Fisheries. The Division of Sport Fish uses two methods to estimate run strength in season: 1) an inriver sonar system at river mile 14; and 2) an inseason creel census—ADF&G staff interviewing Kenai anglers on the river about harvests. Based on these two methods, spawning escapement is estimated by subtracting the creel census figure from the number of Chinook salmon going through the sonar counter. In order to ensure the counts are accurate, additional measures of run strength, such as the harvest in commercial fisheries, offshore test fishing, test net catches in the river, and angler success rates are also taken into consideration.[2]

Sport Fisheries

Both guided and unguided sport fishing for Chinook salmon on Kenai River are popular activities for Alaskan residents and state nonresidents. All Kenai River sport fishing guides and charter companies must be registered with ADF&G, and a log of each sport fishing trip must be turned into the Division of Sport fish annually. Due to the popularity of the Kenai River as a sport fishing destination, there are special guiding regulations that Kenai river guides must follow.[3] Regulations for non-guided sport fishing can be found in the ADF&G annual sport fishing regulations booklet.

2. Alaska Department of Fish and Game Division of Sport Fish, "Alaska Fisheries Sonar—Kenai River King Salmon Sonar Transitions," Accessed January 18, 2017. http://www.adfg.alaska.gov/index.cfm?adfg=sonar.kenai

3. Alaska Department of Fish and Game Division of Sport Fish, "Kenai River Special Guiding regulations," Accessed January 18, 2017, http://www.adfg.alaska.gov/static/license/prolicenses/pdfs/SCkenaiGuides.pdf

Personal Use Salmon Fisheries

The BOF first established personal use salmon fisheries[4] in the Kenai River in 1981. At the time of Alaska statehood in 1959, opportunities were provided to harvest salmon for home uses with noncommercial set gillnets along various Cook Inlet beaches under subsistence regulations (Braund 1982rev.). In 1978, the new Alaska subsistence statute defined, for the first time, subsistence fishing as fishing for "customary and traditional" uses [AS 16.05.940(31, 33)]. In 1980, the BOF determined that only the noncommercial net fisheries in the Tyonek and Port Graham subdistricts met the criteria to qualify as customary and traditional subsistence fisheries. Therefore, the BOF created the "personal use" category of fishing with distinctive regulations to continue providing opportunities for Alaskans to harvest salmon for home use with nets in the areas of Cook Inlet that are generally accessible along the road system. In 1992, the state Joint Board of Fisheries and Game classified most of the Cook Inlet Area as a "nonsubsistence area," where subsistence fishing may not be permitted. Thus, in these areas, personal use fisheries are the primary means by which Alaska residents may obtain salmon for home uses using setnets or dip nets (Fall et al. 2004).

Due primarily to court decisions and legislation, personal use fishing regulations for Cook Inlet changed frequently in the 1980s and early 1990s. In 1981, the BOF created personal use dip net fisheries targeting sockeye salmon in the Kasilof and Kenai rivers. Until 1996, these fisheries opened only after achievement of escapement goals was projected. Since then, they have taken place within a fixed season.

Presently, personal use salmon fisheries in the Upper Cook Inlet Area are governed by the provisions of the *Upper Cook Inlet Personal Use Salmon Fishery Management Plan* (5 AAC 77.540). Participants must possess an Alaska resident sport fishing license and obtain an Upper Cook Inlet Personal Use Fishing Permit for their household. Permit holders and household members may participate in any of the Upper Cook Inlet personal use salmon fisheries—Kenai River dipnetting, Kasilof River dipnetting, Kasilof River set gillnetting, and Fish Creek dipnetting—(except that the Beluga River fishery is only open to Alaska residents 60 years of age or older and operated under a separate permit). For all the UCI fisheries combined, the annual limit is 25 salmon for the permit holder and 10 salmon for each additional household member. A household may take the entire limit from one fishery, or visit any other open Upper Cook Inlet personal use salmon fishery.[5] Permits must be returned to ADF&G at the end of the season with a record of the harvest (Fall et al. 2004).

The Kenai River Personal Use dip net fishery is a popular fishery which takes place from late June through July in the mouth of the Kenai River. Over the last decade Alaska residents harvested between 130,000 and 540,000 sockeye salmon annually in this fishery. This fishery is not directed to harvest Chinook salmon, though in some years participants are permitted to keep a netted Chinook salmon. The fishery open season begins July 10, ends July 31, and is open between the hours of 6:00 a.m. to 11:00 p.m.[6]

Educational Fisheries

Educational fisheries first began in UCI in 1989 with the federal court-ordered subsistence fishery for the Kenaitze Indian Tribe (Sweet et al. 2004). The fishery was labeled as a subsistence fishery due to differences in interpretations of subsistence. The Alaska Superior Court ordered ADF&G to issue an educational fishing permit for the Kenaitze Indian Tribe beginning with the 1993 fishing season. The objectives for educational fisheries are specified in 5 AAC 93.235 as "educating persons concerning historic, contemporary, or experimental methods for locating, harvesting, handling, or processing fishery resources." The

4. Harvest summaries for the personal use, sport, educational, and commercial fisheries of the Upper Cook Inlet (UCI) Management Area can be found in annual management reports prepared by the ADF&G divisions of Sport Fish and Commercial Fisheries.

5. Alaska Department of Fish and Game Division of Sport Fish, "Kenai River Salmon Fisheries Overview," Accessed January 19, 2017, http://www.adfg.alaska.gov/index.cfm?adfg=PersonalUsebyAreaSouthcentralkenaiSalmon.main

6. Unless an Emergency Order is issued. To see regulations visit : http://www.adfg.alaska.gov/index.cfm?adfg=PersonalUsebyAreaSouthcentralKenaiSalmon.regs

present standards for educational fisheries are established by the BOF under 5 AAC 93.200 and include the following: 1) instructors must be qualified to teach the subject matter; 2) there must be students enrolled in the fishery; 3) there are minimum attendance requirements; 4) procedures for testing a student's knowledge of the subject matter or the student's proficiency in performing learned tasks must be administered; and 5) standards for successful completion of the program must be set. For additional background on the regulatory history of this educational fishery, see Nelson et al. (1999:158–167).

The specific provisions for this fishery have varied over the years, but in each year the educational permit has allowed the tribe to operate a 10-fathom set gillnet in the Kenai River. According to the *2014 Upper Cook Inlet Commercial Fisheries Annual Management Report* in 2014, the Kenaitze Tribe harvested 2 Chinook, 6,115 sockeye, 399 coho, and 352 pink salmon, for a total of 6,868 salmon. From 1994 through 2013, the average annual harvest of all salmon by the Kenaitze Indian Tribe was 4,683 fish. The total fish harvest quota for this group is 8,000 fish (Shields and Dupuis 2015).

Commercial Fisheries

The Kenai River flows into the Upper Cook Inlet (UCI) management area—consisting of the portion of Cook Inlet north of the latitude of Anchor Point. The UCI management area is divided into two districts: Central and Northern. The Central District is comprised of 6 subdistricts while the Northern District includes 2 subdistricts. At present, all 5 species of Pacific salmon found in Alaska are subject to commercial harvest in UCI (Shields and Dupuis 2016:1). As of the 2015 season, Chinook salmon were commercially harvested in appreciable numbers in 2 fisheries: the set gillnet fisheries in the Northern District and in the Upper Subdistrict of the Central District.

The *Northern District King Salmon Management Plan* (5 AAC 21.366) was created by the BOF in 1986 and was most recently modified in 2014. This plan provides direction to ADF&G regarding management of Chinook salmon in the Northern District of UCI, with the stated purpose of managing the Chinook stocks to provide reasonable harvest opportunity to sport and guided sport users. Commercial harvest regulations are also included in the plan. Gear used for commercial salmon fishing in the Northern District is limited to set gillnet. The commercial fishing season opens in the Northern District on the first Monday on or after May 25 and remains open for all Mondays through June 24. Each permit holder is allowed to fish one 35-fathom set gillnet, with a minimum separation of 1,200 feet between nets, which is twice the normal separation between nets. The commercial fishery in the Northern District is also limited to an annual harvest not to exceed 12,500 Chinook salmon. Fishing periods are 12 hours per day, or from 7:00 AM to 7:00 PM. As a response to below-average Chinook salmon runs throughout northern Cook Inlet, beginning in 2012, ADF&G reduced all 12-hour commercial fishing periods to 6 hours in duration, and then from 2013 to 2015, the first fishing period of the year was also closed (Shields and Dupuis 2016).

Commercial salmon fishing in the Central District is governed primarily by the regulations under 5 AAC 21.310 and 21.353. The Central District's subdistrict waters immediately adjacent and downstream of the Kenai River are called the Upper Subdistrict. In the Central District's Upper Subdistrict, both set gillnet and drift gillnet are permitted, with use of drift gillnets restricted in certain areas close to the Kenai Peninsula shoreline and the mouths of the Kenai and Kasilof rivers. Commercial fishing in the Central District Upper Subdistrict normally opens in late June or early July depending on the section, and closes generally on August 15. Although Central District regulations provide protection for coho salmon en route to the Kenai River, no special provisions are made for management of Chinook salmon in these regulations.

Watershed Communities and Local Economy

The Kenai River watershed is located in the Kenai Peninsula Borough, which covers the Kenai Peninsula and stretches across the Cook Inlet to include communities of Beluga and Tyonek as well as a large unpopulated area northeast of the Alaska Peninsula. The population of the borough has been steadily growing for the past two decades with the majority of the 55,400 residents (85%) identifying as white in the 2010

Census[7,8]. Several communities of varying size are located in the area covered by the Kenai River watershed (Figure 1-2).

The largest of the population centers in the watershed area are the City of Kenai (pop. 7,167 in 2014), Sterling (pop. 5,869), and Soldotna (pop. 4,311). Additionally, the Kalifornsky Census Designated Place (CDP), which is located mostly southwest of the Kenai River watershed, has since 2005 had the largest estimated population in the borough. In 2014, the estimated population of the Kalifornsky CDP was 8,441 people.[9] For years 2009–2013, the median age of the borough population was 40.7 years of age, which is noticeably higher than the 33.6 years age for the state of Alaska.[10]

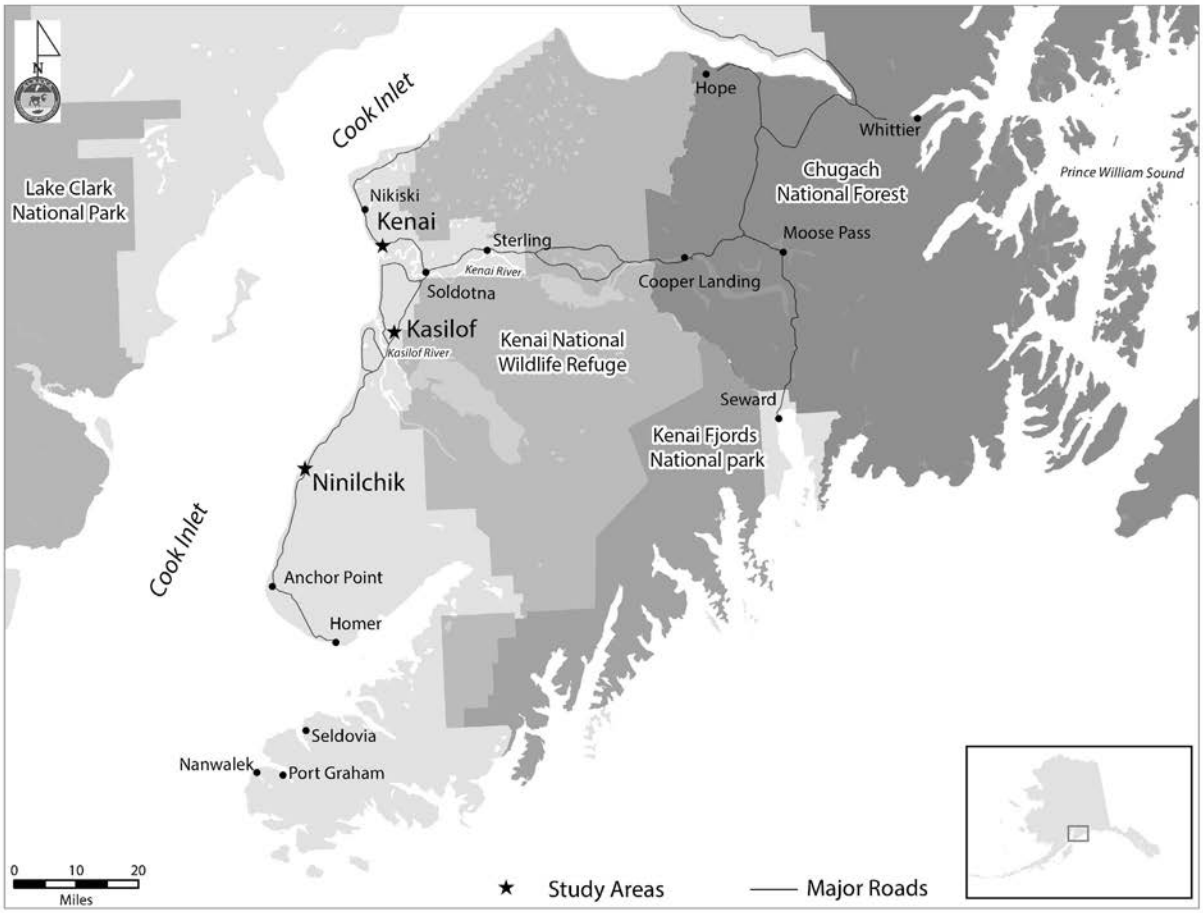

Figure 1-2.–Map of communities in the Kenai River watershed.

7. ADLWD (Alaska Department of Labor and Workforce Development) Research and Analysis Section, n.d., "Census and Geographic Information," Accessed March 31, 2015, http://live.laborstats.alaska.gov/cen/dparea.cfm.
8. Alaska Department of Commerce, Community, and Economic Development (ADCCED), "Alaska Community Database Online: Community Information," n.d., Alaska Department of Commerce, Community, and Economic Development, Department of Community and Regional Affairs Community Database Online, Accessed January 19, 2017, http://commerce.alaska.gov/cra/DCRAExternal/community.
9. ADLWD (Alaska Department of Labor and Workforce Development) Research and Analysis Section, n.d., "Census and Geographic Information," Accessed January 19, 2017, http://live.laborstats.alaska.gov/cen/dparea.cfm.
10. U. S. Census Bureau, "American FactFinder," Accessed January 19, 2017, https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

The economy of the Kenai Peninsula Borough revolves around government, oil and gas production and refinement, tourism, and fishing (Shanks and Rasmussen 2010). Residents of the communities in the Kenai River watershed are commonly employed in the 5 main industry sectors in the borough: local government, retail trade, leisure and hospitality, natural resources, and health care (ADLWFD; ALARI 2015).[11] The borough has a long history of commercial fishing and seafood processing, which continues to employ many residents. In 2013, a total of 1,428 borough residents held a commercial fishing license, most of which were for salmon. For year 2013, the estimated total earnings from commercial fisheries in the borough were over $136 million.[12] In 2013, the median income earned by borough residents aged 16 and over from aquaculture, forestry, fishing and hunting was nearly $40,000. In comparison, the median earnings of borough residents from mining, quarrying, and oil and gas extraction in 2013 were higher, over $77,000. Furthermore, the median income from employment in public administration was approximately $52,000 and from educational services, and health care and social assistance $32,000. Borough residents earned the smallest median income in 2013 from retail trade, which was approximately $25,000. The median household income for the Kenai Peninsula Borough in 2013 was $61,793.[13] Most of the jobs in the Kenai Peninsula are concentrated in the Kenai-Soldotna area, and many Kenai River watershed residents commute to work in these larger population centers. Seasonal employment in commercial fisheries, seafood processing, sport fish guiding, or in the tourism industry is also common.

11. ADLWD (Alaska Department of Labor and Workforce Development), "Alaska Local and Regional Information," Alaska Department of Labor and Workforce Development, Research and Analysis Section, n.d., Accessed January 19, 2017, http://live.laborstats.alaska.gov/alari/.
12. Alaska Commercial Fisheries Entry Commission (CFEC), "Fishery Statistics, 2013 Census Table Menu," Accessed January 19, 2017, https://www.cfec.state.ak.us/gpbycen/2013/MenuCenA.htm
13. U. S. Census Bureau, "American FactFinder," Accessed January 19, 2017, https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

2. RESEARCH METHODS AND DATA ANALYSIS

This project was guided by the research principles outlined in the *Alaska Federation of Natives Guidelines for Research*[1] and by the National Science Foundation, Office of Polar Programs in its *Principles for the Conduct of Research in the Arctic*[2], as well as the Alaska confidentiality statute (AS 16.05.815). These principles stress careful research designs, informed consent, and anonymity of study participants.

Public Meetings

The research documented in this report grew out of ADF&G's "Chinook Salmon Stock Assessment and Research Plan, 2013," and the plan's call for additional Local Traditional Knowledge (LTK) relating to Chinook salmon in the Kenai River, one of Alaska's 12 indicator stocks (ADF&G Chinook Salmon Research Team 2013). The plan recognized that scientists and managers can use the detailed, first-person observations of LTK to better understand the population biology and ecology of Chinook salmon. In advance of conducting the LTK interviews, Division of Subsistence researchers visited two communities located in the Kenai River watershed to inform area residents about the research project through public meetings. For this project, Kenai and Ninilchik were selected as places to hold public meetings due to their wealth of knowledgeable respondents and positioning in or near the Kenai River watershed. The Kenai meeting took place at the Kenai public library on October 29, 2013 and the Ninilchik meeting was held at the Ninilchik school library on October 30, 2013.

Prior to the meeting, researchers informed the Lower Cook Inlet, Northern Kenai Peninsula and Northern Cook Inlet Management Area ADF&G area biologists and the Cook Inlet Southcentral ADF&G Fish and Game Advisory Committees about the LTK focus of the research, and requested that they pass along information to area residents about the project and the upcoming community meetings.

During the meetings, Division of Subsistence staff introduced the project to the meeting participants. In addition, researchers asked the participants for their input on the project design and topics to be included in the semi-structured interview protocol. The meetings also served as an opportunity for project staff to document residents' issues of concern that could be addressed through this project. The researchers also used this opportunity to collect contact information for knowledgeable area residents to add to the key respondent sample list. The goal was to ensure that area residents understood why this project was occurring in this area and give residents the opportunity to be a part of the process. In addition to the two public meetings, project staff contacted and provided information about the project to the Kenaitze Indian Tribe, and was able to secure them as a collaborative partner for the project. The Ninilchik Traditional Council was also contacted and provided information about project but they declined to participate in the project.

Data Gathering Methods

LTK collected over the course of this research was intended to help meet the following research objectives:

1. Summarize the extent of variation in the location, abundance, fish size, and overall health of Chinook salmon stocks in the Kenai River and outline when/if changes are significant based on local and traditional knowledge.
2. Identify trends for the catalysts of change in location, abundance, fish size, and overall health of Chinook salmon in the Kenai River.

1. Alaska Federation of Natives, 2013, "Alaska Federation of Natives Guidelines for Research," Alaska Native Knowledge Network, Accessed January 19, 2017, http://www.ankn.uaf.edu/IKS/afnguide.html.
2. National Science Foundation Interagency Social Science Task Force, 2012, "Principles for the Conduct of Research in the Arctic," Accerssed January 19, 2017, http://www.nsf.gov/od/opp/arctic/conduct.jsp.

3. Document changes or fluctuations in the key Chinook salmon spawning and habitat areas and harvest locations through time. Document small scale, place-based spatial observations of overall Chinook salmon habitat health of the Kenai River.

The primary method of LTK data collection applied in this study were semi-structured key respondent interviews conducted with knowledgeable local residents with long-term experience of using and fishing for Chinook salmon in the Kenai River.

Summary of Research

The research was organized and carried out by the two principal investigators from the Division of Subsistence, Malla Kukkonen—Subsistence Resource Specialist II and Bronwyn Jones—Subsistence Resource Specialist I. In the course of the project, Kukkonen and Jones were also assisted by Cameron Welch, Ph.D.—volunteer with the Division of Subsistence, and Hannah Johnson and Emilee Springer—both graduate interns with the Division of Subsistence. Table 2-1 provides an overview of the research activities that occurred for this project.

Table 2-1.–Project timeline.

Location	Dates	Purpose	Staff
Kenai	10/29/2013	Community Meeting	Jones, Kukkonen, Springer
Ninilchik	10/30/2013	Community Meeting	Jones, Kukkonen, Springer
Kenai	3/6/2014–3/7/2014	Key Respondent Interviews	Jones
Kailof	3/8/202014	Key Respondent Interviews	Jones
Kenai	7/2014/2014–7/17/2014	Key Respondent Interviews	Jones, Johnson
Kenai	7/15/202014	Participant Observation	Jones, Johnson
Anchorage	7/22/202014	Key Respondent Interviews	Jones
Soldotna	7/23/2014–7/24/2014	Key Respondent Interviews	Jones
Kenai	7/30/2014–7/31/2014	Key Respondent Interviews	Jones
Kenai	8/27/2014–8/28/2014	Key Respondent Interviews	Kukkonen, Welch

Key Respondent Selection

The communities of Kenai, Kasilof, and Ninilchik were chosen as a starting point for this project; however, the selected key respondents in this study were not limited to residents of Kenai, Kasilof, or Ninilchik. To ensure that the study followed a systematic sampling method, researchers followed Davis and Ruddle's (2010) recommendations on how to identify expert informants for the key respondent interviews. These recommendations stress the importance of identifying expert informants through a systematic peer review process, which ensures that those considered most knowledgeable within a community or a social group will be identified and interviewed in depth. At the same time, the systematic approach assists in making sure that less knowledgeable local residents will not be mistaken for expert informants, and that local residents with possible vested interests will be screened out (Davis and Ruddle 2010).

Residents from Kenai, Kasilof, and Ninilchik were consulted to recommend knowledgeable residents with a long history of participating in the Kenai River Chinook fisheries from their resident community and from surrounding communities for potential key respondents. The project staff also consulted with Dr. Alan Boraas, who has been working in the Kenai Peninsula communities since the mid-1970s, for potential key respondents. A running list of suggested key respondents was developed opportunistically after researchers also consulted with local ADF&G and the U.S. Fish and Wildlife Service (USFWS) fishery biologists. The list of key respondent names was compiled as residents were recommended, and each time a name that already appeared on the list was repeated, a tally mark was placed next to the name. The intent was to conduct a total of 25 interviews. After adequate consultation was completed, the names on the key respondent list were ranked based on the number of times that each was recommended. The ranked list of suggested key

respondents was then stratified to ensure that a balanced number of individuals from each user group were represented in the sample. If multiple individuals existed in a category, the highest ranking individuals were sought to be interviewed first.

Interviews

Key respondent interviews were conducted using a semi-structured format. The interviews were guided by a list of open-ended questions themed around Chinook salmon fishing in the Kenai River watershed. A list of general questions was developed for all respondents pertaining to fishing experiences through time, habitats, Chinook salmon populations, and fishing locations (see Appendix A). The key respondent interview protocol also had four specialized sections to elicit specific information from respondents based on which fishery/fisheries they participated in. The four sections were 1) commercial fisheries; 2) sport fisheries; 3) educational fisheries; and 4) personal use fisheries. The interview protocol was designed to guide the interview process, but respondents had the opportunity to expand on related topics.

Interviews with key respondents were conducted in respondents' homes, local restaurants and coffee shops, the Kenaitze Tribal Office, the Kenai National Wildlife Refuge Office, and at the local ADF&G office. Locations were chosen for each interview based on the preference of the respondent. The interviews were conducted between March and August of 2014. All key respondents interviewed for this projected were offered an honorarium of $100 for taking time to contribute to this study. Not all of the participants accepted the honorarium. In total, 32 individuals were interviewed for this project. Of the 32 key respondents interviewed, 19 were men and 13 were women. All but two of the key respondents lived in the Kenai area during the project. Length of residency in the area varied from 7 years to 68 years. There was much overlap in how people identified themselves—generally 5 of the key respondents were members of the Kenaitze Tribe, 10 of the respondents were involved in the sport fishing industry, 2 were personal use fishery users, 9 were commercial fishers, and 6 respondents were professionals who work in an official capacity with king salmon or king salmon habitat in the Kenai River watershed.

With permission from the individual key respondents, all the interviews were recorded using an Apple iPad recording app. The audio files were then backed up on computers and transcribed after the interview. Research staff also took notes during the interviews. The transcriptions and typed notes were then coded using NVivo 10 software[3]. Coded interview data were then arranged thematically as a means of organizing the contributed LTK and to determine common themes across interviews.

Participant Observation

Participant observation for this project consisted of informal interviews and direct observation on the Kenai River. The researchers took part in 2 participant observation field research trips. During the participant observation, researchers had informal discussions about Chinook salmon and possible changes in their presence in the Kenai River with the local fishermen and biologists. Prior to these trips, researchers obtained permission from the participating fishermen and scientists to photograph and document the process of harvesting Chinook salmon, and the areas where the fishermen go fishing.

Data Analysis

Qualitative data collected during LTK interviews were coded and analyzed in order to provide answers to the research questions and to meet the three research objectives. Interviews were transcribed by project staff after each interview, and inductive codes were applied to portions of interview text to aid in compiling knowledge themes and information patterns (Bernard 2011). Coding was done using NVivo qualitative software, which then allowed researchers to systematically process the qualitative data and identify the trends and parallels which existed between the interviews. Researchers used a node-based coding system to organize themes found in the interviews. Identifying trends through the use of the NVivo software as-

3. Product names are given because they are established standards for the State of Alaska or for scientific completeness: they do not constitute product endorsement.

sisted researchers in identifying potential explanations for these emerging patterns and parallels. Following Bernard's (2011:337–341) recommendations for constant validity checking during the analysis process, researchers looked for consistencies and inconsistencies among respondents' answers to the semi-structured interview questions, and when possible, tried to discern the reasons behind the disagreements.

3. RESULTS

First experiences with Kenai River & Kenai Chinook Salmon

When asked to describe their first experience fishing on the Kenai River, most respondents who have been fishing on the river since at least the early 1970s used adjectives such as *peaceful, quiet, beautiful, natural, thrilling,* and *breathtaking.* The ratio of fish to people was referenced by many—citing that the Kenai River held more fish than there were people to fish them. First experiences with the Kenai River were described with fondness. As one respondent put it:

> I came up here to look for a job in the late summer of 1974. On the first day I was driving around, and I stopped on an overlook near Soldotna and looked down on the Kenai River, and it was love at first sight.

Another respondent described the Kenai River in the mid-1970s as:

> […] quiet, a peaceful river, fun to fish on. There was an abundant amount of fish and I could fish on the river for hours and never see another person.

Likewise another respondent said that their first memory of the river was:

> I remember the beauty, color of the water, just the sheer number of fish in the river.

Similarly to the way interviewees described the first experiences with the Kenai River itself, respondents spoke of their first experience catching a Kenai Chinook salmon with high regard. Many people referred to time spent with their families and friends while fishing for this salmon species, and others referred to how much fun it was to handle a large Chinook salmon.

> When I came to Alaska in 1975 for the first time, we'd gone fishing at Moose River in Sterling, and I hooked into a large, I thought it was a pretty large fish but had no idea what it was at the time. And it was a 45 pound king salmon, and I was really thrilled because I landed it on 15 pound test, and I thought that was pretty good going, you know [laughing]. But that was my first experience with freshwater salmon. We had trolled in the bay before for kings, in saltwater ocean; that's how we grew up salmon fishing—it was in the ocean. But that was my first experience with king salmon and I became an addict after that.

Some spoke of taking their first caught Chinook salmon from commercial nets to eat as a celebration of the start to fishing season. As one interviewee put it:

> We always got king salmon from daddy's net. Before he sold his fish to the cannery, he'd bring home a couple. At that time there were bazillion kings. And they were huge, they were monsters. I remember looking as a kid at them and getting scared because they were so big. And their teeth were so big. They looked like a shark. They were huge! They were half the size of this table. They were huge.

Role and Utilization of Chinook Salmon in Local Households

Historically, Chinook salmon harvested from the Kenai River were commonly used as a subsistence resource (Davis and Davis 1996). During interviews many respondents who have lived in the Kenai area since the 1970s recalled the use of Chinook salmon as a subsistence resource. Like many subsistence resources harvested in a modern context, respondents described catching Chinook salmon for home use using a variety different methods.

As one interviewee described:

> I remember whenever we would get a king salmon in our nets anywhere along here [pointing at the Kenai River] it was just like the fish came to us. It was really exciting. And then I had to learn how to take care of every bit of that fish—even our red [sockeye salmon]—we don't use as much of the reds as we do the kings, but when the king salmon came and we had fish head soup. The backbone—if we didn't dry it, it was fried. When we did have plentiful king salmon we would smoke them and make *balik*. The balik is cold smoked salmon so it gets hung in the smokehouse. We called it the 16 day cold smoke.

Another respondent described how important rod and reel fishing was for families trying to fill their freezers during the 1970s.

> I think one of the first memories was related to salmon fishing. In Soldotna in the early '70s it was, as everywhere, it was legal to snag fish. And, what is now Centennial Park, it might've been called Centennial Park then too, which is the closest little park to Soldotna. People would go down and it seemed like a lot of people then but it probably wasn't; 30–40 people coming and going. And they would use these big, heavy, lead sinker-things with a big treble hook attached to it, and a huge rod stand on the bank and fling it virtually 2/3 of the way across the river. And they would use a technique of sort of pulling and letting it go, pulling and letting it go, trying to snag a fish.
>
> They were probably snagging both kings and reds [sockeye salmon] whatever they could get. I don't think there was any distinction between them. But it probably was more for reds. It would be the 2nd run of kings. And it was quite legal. So what were they doing? It was frowned on by some people because it wasn't sport fishing. Because in sport fishing the tradition is you give the game a chance. You give the fish a chance. So you're not supposed to win all of the time. But they were obviously not trying to do that. They were meat fishing. They were trying to get food for the freezer and weren't hook and release fishing. That's another very important part of this. They were keeping what they caught, taking it home, cleaning it, and processing it. So that was an early memory because I had never seen anything like that. I'd never seen that style of fishing.

Another key respondent talked about how people would remove Chinook salmon from their commercial catch in order to ensure they had enough fish put away for the winter.

> … it was really common for people to take the fish from their commercial catch, or like you were saying to get it from their friends, and people, if you ask that's what they were using to live, so it's still subsistence even though it's not under that label.

Fishing on the Kenai River Over Time

Key respondents talked about the laid back nature of fishing for Chinook salmon in their descriptions of the Kenai River in the 1950s and 1960s. Many interviewees talk about fishing from shore, rather than from a boat during this time period.

> The first time I went sport fishing was when I met my husband because he was a sport fisherman. This was in Deep Creek in '54. Lots of king salmon in there. But we would hike in just before the village. Anyway, I caught a 55 pound king salmon the first time. I did not land it right away. Because I was being screamed at. … he finally jumped in; I was waist deep in water. That didn't bother him. I had king salmon! It took about 2 hours to land it. But anyway, that was the first king salmon I ever caught.

Another interviewee stated:

> There was very few people fishing king salmon with rod and reel on the Kenai back in the early and mid-'60s. I can tell you there were very few. We did because we lived close to the river and because my wife's father had a boat, net and that kind of stuff. And we fished a lot places like Morgan's Landing and that kind of stuff. But the knowledge of king salmon, from a rod and reel harvesting perspective, was real limited back in the '60s. You could sit there day after day for hours and you wouldn't see a boat go up that river.

The narratives of the 1970s describe fishing for Chinook salmon from the shore as a popular activity, and by the late 1970s interviewees explained that boating on the Kenai River became more common. One respondent interviewed for this project explained that he used a canoe to fish for Chinook salmon in the 1970s:

> Well when I started in out [in 1974] I used to fish from a canoe, there were no power boats. If you saw 10 boats all day long it was crowded.

Others talked about fishing for Chinook salmon on the banks of the Kenai River or its tributaries:

> I grew up out Funny River road so we would fish from shore at what's now the Funny River State Park I think. And then we'd often hike into a place called Bear Creek. We'd fish down there and catch large kings from the beach and hike all the way back up the hill to the road. And then we eventually got boats … but really for the first part we fished, you know, close to our house and then my grandparents started coming up every summer and they would take us to fish on the lower river. We certainly got a boat by 1980.

According to interviews, by the 1980s the river was "full of boats."

> I worked on the river; I was a game warden on the river from 1980 and my job was to patrol the Kenai River from Kenai up to Cooper Landing up to the Russian River. And back then it was any type of boat, any size of boat, we had jet boats; we ran jet boats and there were big Hamilton jet boats on the river, and I mean there's lot of boats. And the king fishing was good; the fishing was very good.

Development and Habitat

Changes in the utilization of the Kenai River Chinook salmon are closely tied to the overall development and growth of the Kenai-Soldotna area over several decades. According to an ADF&G report from 1972 (ADF&G (Alaska Department of Fish and Game) 1972:43), the use of Chinook salmon in Cook Inlet subsistence or personal use fisheries was extensive prior to 1960, particularly in the Alaska Native community of Tyonek, located on the west side of Cook Inlet, and among homesteaders of the Susitna Basin in northern Cook Inlet. The population residing in the Kenai Peninsula remained small: fewer than 10,000 people approximately until the early 1960s.[1] Project key respondents identified several historical events, such as the opening of homesteading on the Kenai Peninsula in 1947, the construction of the Sterling Highway in 1950, and discovery of oil in the Swanson River watershed in 1957 that initially led to increased numbers of people entering and settling in the Kenai River area. With the growing population and improved road access to the Kenai Peninsula, the competition over the region's wild resources increased substantially. To many long-term area residents this was a dramatic change that impacted their life in a negative way, as described by 2 key respondents:

> The road access and World War II kind of coincided. So suddenly there were many, many people, sport fishermen and hunters, arriving. And that made for a very com-

1. Alaska Department of Labor and Workforce Development, 2017, "Alaska Population Estimates by Borough, Census Area, City, and Census Designated Place (CDP)," Alaska Department of Labor and Workforce Development, Research and Analysis Section, http://live.laborstats.alaska.gov/pop/.

> petitive nature of hunting and fishing and trapping. It was life changing in a negative sense for my family.
>
> When we were young, there wasn't that much pressure on the river because of the population. And we would conserve more because there was plenty of fish. But as the homesteaders came in discharged from the service, a lot of people came in. And the highway came down. Once the highway came down, it brought down a bunch of new people.

However, not all respondents regarded development as negative: several people cited this era as an exciting time, bringing opportunities for new business and new people to the area. Several of the key respondents interviewed for this project explained that the development is what brought their families to the Kenai, and they ended up settling in the area.

New Fisheries

The Kenai River Chinook salmon, particularly the early run, have always been considered extremely valuable as a fresh food of the spring by Alaska Native people living near the Kenai River watershed. However, based on key respondent descriptions of fishing traditions, Kenai River Chinook salmon were not necessarily the preferred salmon species for non-Native local residents fishing in the river. The challenging terrain along the banks of the Kenai River combined with swift water and the large size of the Chinook salmon made them difficult to land if one was fishing from the river bank with a rod and reel, or with a hand held line with a hook. Against this background, it is easy to see why many local residents traditionally harvested their Chinook salmon from other locations, such as Deep Creek and the Anchor River, rather than the Kenai River. Also, as discussed earlier, many residents preferred to harvest other salmon species in larger quantities, such as sockeye salmon or coho salmon, which are available in the Kenai River later in the year than Chinook salmon are.

Guided hunting and fishing had provided income for some Kenai Peninsula residents since the late 1800s, but according to key respondents there were only a handful of local resident guides that took small numbers of people out on the Kenai River to fish for Chinook salmon through the 1950s and 1960s. While Chinook salmon were considered valuable, delicious food, the local non-Native interest in harvesting large Kenai River Chinook salmon on the Kenai River remained moderate until the late 1960s. In addition to the challenges of fishing for Chinook salmon from the banks of the Kenai River described above, 2 additional reasons likely played a role in the limited local interest in harvesting Kenai River Chinook: the small number of boats owned by local residents, and the limited knowledge about harvesting Chinook salmon with a rod and reel:

> … there weren't a lot of boats on the river. If you went fishing, you went snagging on the bank. That's my early recollection.
>
> In the early days there were virtually no boats fishing on the Kenai when I moved here. In '69 the majority of the fishing occurred from banks and the Big Eddy area, and what they call Falling In Hole.

Catch data for the Kenai River Chinook fishery are not available until 1966 when ADF&G initiated a punch card harvest reporting system for Chinook salmon harvest in Cook Inlet freshwater systems (ADF&G (Alaska Department of Fish and Game) 1972:54). Table 3-1, which represents total freshwater Chinook salmon harvest in the Cook Inlet area for years 1966–1972, reflects a small total harvest similar to observations offered by key respondents through the 1960s (ADF&G (Alaska Department of Fish and Game) 1972:52). Table 3-1 also shows that starting in 1970 the harvest of Chinook salmon on the Kenai River increased noticeably while the harvest of Chinook salmon in other freshwater locations on the Kenai Peninsula began to decrease. According to the *ADF&G Chinook Salmon Status* report (ADF&G (Alaska Department of Fish and Game) 1972), the harvest estimates in Table 3-1 are considered minimal. Unfortunately the report does not provide further information about the character of the anglers: specifically, if they were fishing with a guide or on their own.

Table 3-1.–Total freshwater Chinook salmon harvest, Cook Inlet, 1966–1972.

	1966	1967	1968	1969	1970	1971	1972
Kenai Peninsula							
Kenai River	11	7	4	18	237	545	341
Ninilchik River	218	118	206	131	275	137	156
Deep Creek	48	183	157	275	137	42	139
Anchor River	286	236	247	84	170	58	167
Total	**563**	**544**	**614**	**508**	**819**	**782**	**803**
Upper Cook Inlet							
Deshka River	205	234	324	310	579	434	275
Alexander Creek	28	20	71	21	286	15	79
Chunila Creek	4	1	0	0	5	14	43
Little Susitna River	No season					7	23
Willow Creek	No season					0	16
Lake Creek	26	60	3	8	1	2	14
Ship Creek	No season				0	7	11
Total	**263**	**315**	**398**	**339**	**871**	**479**	**461**
Total Cook Inlet harvest	**826**	**859**	**1,012**	**847**	**1,690**	**1,261**	**1,264**

Source ADF&G 1972

One of the primary catalysts identified by key respondents as a crucial point of interest in understanding the changes in the Kenai River Chinook salmon fishery over time was the arrival of the first out-of-state fishing guides from Oregon, Washington, and California on the Kenai River in the late 1960s. As explained by a few key respondents, the guided sport fisheries in these states were beginning to become more restricted due to concerns over the sustainability of fish stocks. The new opportunities opening up in Alaska were seen as an option for continuing to make a livelihood as a professional fishing guide as summarized by one key respondent:

> … but because it became so lucrative, and there was so much money to be made in the guide business, guides came from outside, they came from Washington, California, and the military …

On the Kenai River, the entry of a number of out-of-state guides gradually led to increased numbers of locally-owned boats entering the fishery, and the traditional method of fishing from the river bank with salmon eggs and a Spin-n-Glow[2] began to decline. Improved Kenai River Chinook salmon fishing techniques pioneered by the guides, and later on utilized by local fishermen and local guides, combined with fishing from boats increased local fishermen's success rate of landing large Kenai River Chinook salmon. This led to increased local interest in Chinook salmon fishing on the Kenai River:

> … there wasn't that much interest in kings. There wasn't whole much in…. Well, there weren't many people here then. They just weren't interested in kings. And that didn't develop until the guides, the west coast guides from Washington and Oregon really started showing people how to catch fish.

According to key respondents, by the 1970s, the number of guides, both out-of-state and local resident guides, fishing the Kenai River had increased substantially. According to 2 key respondents, Poachers Cove became a centralized location where the guides ran their operations. One key respondent described the early guided sport fishing on the Kenai River as following:

> Originally a lot them were, they call them back bouncers, which is a big chunk of lead and behind it trails the lure. Sometimes with [salmon] eggs, sometimes without eggs. And really what you do is, you find a good area, a drift or a hole, and you just jig the weight up and down. And you move slowly downstream. ... It's back bouncing.… And from there, they would start, they would spread out and just using basic plugs or flat face [plugs], something like that. And later, the guides got fairly lazy and they would just kind of sit in place under power and let the clients just trail the lures behind the boat. And they didn't really do anything but just sit there. And infrequently when they would hook a fish, the guide would gun the engine and set the hook. So it wasn't really a, well it didn't matter, it was just a technique in which you catch fish but it's not, you are not very proactive. For what you pay for. For what you do. But you do catch fish. Yeah. So that happened. And I can't recall the exact time period; it would have been sometime in the mid-70s.

After its initial start, the guided Kenai River Chinook salmon sport fishery gained attention through publicity brought on the fishery by the first guides. The most well-known of the early local guides was likely Mr. Spencer DeVito, who was the first licensed professional sport fishing guide on the Kenai River. Mr. DeVito was a very successful guide and several key respondents commented how photos of Mr. DeVito fishing, or holding large Kenai River Chinook salmon were seen in magazines and on airport billboards around the country during the 1970s. In an interview, Mr. DeVito described the impact of his successful guiding business on the fishery as following:

2. Spin-n-Glow is a registered trademark of the Yakima Bait company.

> …And because it had such a big impact, the fact that I established this thing, you know my picture was in magazines all over the country. It was in billboards in different airports. …*Alaska Magazine* had me in the front cover and in the back cover. And that picture drew, I know how much it drew because I still get mail. And I sign autographs for people that I don't even know and I don't know why. But it had a tremendous impact and I guess why I'm saying that is that this whole place just mushroomed. It just blew out of proportion. It was the fish that did that….

Mr. DeVito's success inspired many more guides to enter the business of guided sport fishing on the Kenai River during the 1970s. However, as Mr. DeVito pointed out, it was the fish, the large Kenai River Chinook salmon, that really began to attract more and more people to the fishery.

Alaska Department of Fish and Game did not monitor the recreational harvest of Chinook salmon on the Kenai River until 1974. In comparison, the commercial harvest of both early and late Chinook runs entering the Kenai River had been managed since statehood (Logan and Hammarstrom 1984). One key respondent summarized the changes in the Kenai River Chinook salmon fishery during the early 1970s:

> … there were no laws or regulations that said you could guide or you couldn't guide on the Kenai River. By about 1974 or 1975 it had mushroomed into something that was unbelievable. …Now what happened is from 1970 to about 1975, the fact that people were trying to catch fish for the frying pan, or the smokehouse, started to just disappear. Now it was the big bucks.…

The growing number of users interested in catching Kenai River Chinook salmon led to lasting changes in the gear and techniques used to catch them as well as increasing competition over productive fishing locations. According to Kenai River Division of Sport Fish biologists Richard Logan and Stephen Hammarstrom (1984), 1973 was the first year that recreational anglers began to use boats and drift down the Kenai River as an efficient method of hooking Chinook salmon. Three key respondents described the early boat fishing for Chinook salmon on the Kenai River as a drift fishery, which was different from the traditional bank fishing effort on the Kenai River but similar to the traditional fishing methods for salmon and steelhead trout in the Pacific Northwest:

> Basically there's three fish, as you probably well know, three species they pretty much catch out of this river. And king salmon, you use a boat. And you are going to fish a method of, you are back-bouncing, pulling a Flatfish,[3] or something of that nature, but you are under power all the time. Or you can drift. You can drift; a lot of drifting. Boats happened and there's been an evolution; people started drifting and then power boats came in more so. Drift boat got power on, but they just drift down the river. It's a fun way to fish, I enjoyed it. You just float down the river, like you are in a raft. But then when you get a power boat that's fishing under power, he is going to fish right where you might want to drift. And so pretty soon you'll be forced to fish like he is or she is, rather than just drift. So then there's that type of fishing for kings; that's pretty much exclusively the way they fish. […].
>
> On the Kenai River, it was primarily a drift fishery, which was great because you know everybody gets to go around, they drift down the river and they hook a fish and then maybe you'd go back. And there wasn't too much traffic.
>
> The method of fishing that they used back in those days, they used to call it drifting. But what they would do was power up to the top of the hole, and then position their boat sideways, and line up. And they'd all just drift and they'd get to the bottom and they'd come to the top and come back down. So for anybody that was attempting to bank fish there, of course it became a problem for them.…

3. Flatfish is a registered trademark of the Yakima Bait Company.

Regarding the changes in the fishing gear and techniques introduced by guides as well as newly arrived Kenai River watershed residents arriving from outside Alaska, 3 key respondents offered these observations:

> Most people would fish with a triple hook and they'd put [salmon] eggs on them. …But when the river got muddy, especially steelhead fishing, then we would revert to night crawlers or flashers; you know things that moved in the water. … And so things like, they had Spin-n-Glows but they weren't necessarily florescent or they weren't luminous, or they didn't… Yarn was another thing. Tying yarn because their teeth get tangled in the yarn, yarn flies. Pink, dayglow pink, dayglow orange; the bright colors. And/or we'd buy something that was called maline, which was like a real fine red netting but you could put your [fish] roe in and make like a little sack. Tie it off, slim it, and put it on your hook and again that keeps the little sculpins and the juveniles from pecking your bait away. And at the same time you get one rip and so. It was just stuff like that.…
>
> My recollection back then was that we did a lot more drift fishing with the, you know the weight and the Spin-n-Glos and eggs. And with the river getting so congested down here, there isn't as many places where people did that type of fishing. Everybody is back trolling now with the Kwikfish.[4] … And the Spin-n-Glo with no bait is fairly ineffective lure. Especially drifting, you know like that method was effective with bait, but I don't think that now with the no bait restriction made to go on for parts of the year now. I don't think a bare hook and a Spin-n-Glo is going to be effective for drifting. Drifting for kings like we did back then.
>
> A lot of the techniques we use here are used there and were developed there in California. But we have changed over the years. The technique we were using back then was eggs and Spin-n-Glows, which they still use today; Spin-n-Glows have been around for a long time. But we use different plugs now and we certainly use different techniques: jet planers. Back-bouncing has been around for forever. So in some ways, the fishery has evolved. It has certainly gotten more efficient. People learn about the fish, where they hang out, where they migrate through. The guiding industry is a very efficient tool to catch them.

Several key respondents, including retired and current Kenai River fishing guides, presented 2 important observations about the entry of guides and guided angler effort in the Kenai River Chinook salmon fishery. The first observation was that through the 1960s and 1970s there were no limits for guides; individuals could enter the business without any credentials or a license. The second was focused on the areas where the first guides initially started to fish; these were locally known Chinook salmon spawning holes:

> It took until about the mid- to late 1970s. By the late 1970s we were fishing a lot. There was energy; it was kind of like when the pipeline was going on. It was pretty wild.
>
> They guided people mainly in the part of the river that the big kings spawned in, which is mainly the section below the Soldotna bridge. There are some big holes in there, and in my opinion, they should be off limits. But there are some big holes in there and they are the ones that have led to the decimation of the Kenai River kings.
>
> In my day we never took anybody above the Soldotna Bridge. That was for our family. That was for us. We kept that so that was pretty quiet.

Between years 1974 and 1983, recreational Chinook salmon fishing on the Kenai River was closed by emergency order 3 times. The first closure took place in 1977 due to an unusually high harvest of Chinook

4. Kwikfish is a registered trademark of Rapala VMC Corporation.

salmon by the commercial drift gillnet fleet (3,400 salmon compared the historical annual mean of 400 salmon). The second closure happened in 1981 as the result of the terms dictated in the Kenai River late-run Chinook salmon management policy. The following year, the fishery was closed due to concerns about the lack of escapement distribution (Logan and Hammarstrom 1984). According to key respondents, the number of guides operating on the Kenai River continued to grow in spite of concerns expressed by local residents about the continuous growth of the guided sport fishing sector among the Kenai River Chinook salmon fishery users. One key respondent, who used to guide on the Kenai River, shared these memories from the late 1970s:

> There are particular people who came to try to take everything they could and run with it. So the numbers continued to escalate. "Too many guides," we always screamed: "Too many guides! Too many guides!"

The rapid development of the Kenai River Chinook sport fishery, particularly guided angler participation, led to increasing numbers of visitors arriving to the Kenai River watershed area and the tourism industry began to grow around it. The shift in fishing preferences from a shore-based Chinook salmon fishery taking place in the Anchor River, Deep Creek, and Ninilchik River to a boat-based Chinook fishery on the Kenai River began to manifest itself stronger and stronger in the late 1970s and early 1980s (Hammarstrom 1977). At the same time, the popularity of the Kenai River as Alaska's most attractive freshwater fishing destination continued to grow fast: as early as 1975 the sport angling effort for Kenai River Chinook salmon had made the fishery the largest in Alaska (Hammarstrom 1981).

Kenai River Special Management Area

The growth of the total Alaska population, the rising popularity of the Kenai River as the favorite freshwater sport fishing destination in the state, the emergence of the guided sport fishing industry, and the development of private, recreational, and commercial facilities along and within the Kenai River were factors that posed new ecological challenges to the Kenai River watershed (Alaska Department of Natural Resources, Division of Land, Division of Parks & Outdoor Recreation 1998:5–6; Bendock 1989). These public concerns were noted by state management agencies and in 1981 the Alaska Board of Fisheries for the first time required individuals providing sport fish guiding services on the Kenai River to register with ADF&G and record their harvest and effort in a log book. The requirement was implemented during the 1982 season (Bandirola et al. 1987). According to State Parks' records, there were 217 guides, of which 207 were fishing guides, operating on the Kenai River in 1982 (Begich et al. 2013:129).

The same year, Governor Jay Hammond ordered the departments of Fish and Game and Natural Resources to assemble a Kenai River Task Force to analyze the issues involving the Kenai River and make recommendations for corrective actions. The major recommendation from the task force was to formally designate the highest and best use of the Kenai River as the utilization of its fish and wildlife resources, with all other actions being evaluated relative to this priority use. In 1983, the Alaska Legislature passed a law that established the Kenai River Special Management Area (KRSMA). The KRSMA has been a special unit of the Alaska State Parks system since 1984. The first "Comprehensive Management Plan" for KRSMA was adopted in 1986. (Whittaker and Shelby 2010:6–7).

The establishment of the KRSMA brought new formal requirements for Kenai River sport fishing guides. They now needed to obtain a state-issued permit for acting as a guide on the Kenai River and operating a business in a park. However, many key respondents felt that these new requirements did not slow down the development of the emerging tourism industry that centered around the Kenai River through the 1980s and 1990s:

> In 1984, the Kenai River became a state park. And at that time, the guiding industry was just starting to open up if you will. But the thing that happened in '84 is State Parks was charged to regulate the guides and find a way to control their numbers without controlling them. You know realizing that the Department of Fish and Game had the ability to look at harvest and methods and means and had control

> over the fishery limitations. But there was really no way to limit the guides. And so we ended up doing permits for them.
>
> …But from ’80 it just built, built, built. People couldn’t wait to get in. The only thing that slowed them down a little bit was, oh, you had to have a license. You had to have a guide license. Well, they were giving them out like popcorn, you know. I mean to take the real Coast Guard six pack [operator’s] license you need to know buoys and you need to know a lot of stuff.

Seasonal bag limit restrictions for Kenai River Chinook salmon resulted in lower seasonal and yearly harvests beginning in the early 1980s. According to key respondents, the Kenai River Chinook salmon harvest limits had been very liberal throughout the 1970s. From the mid-1960s through the late 1970s, a punch card was used to enforce daily bag limits, seasonal bag limits, or both. Starting in 1981 bag limits for Chinook salmon were enforced by requiring anglers to record the harvest of each fish over 20 inches on the back of their sport fishing license or on a special card if an individual was not required to possess a fishing license (Hammarstrom et al. 1985). In 1980 the seasonal limit for Chinook salmon was still 5 fish (Hammarstrom and Larson 1982). In 1983, the seasonal bag limit for Kenai River Chinook salmon had been reduced to 2 fish (Bandirola et al. 1987). The same year, 1983, was the first time the BOF placed restrictions on the amount of fishing time open for late-run Chinook salmon on the Kenai: all Mondays in July, after July 4, were closed to fishing from boats and fishing from registered guide vessels was prohibited on all Sundays in July (Logan and Hammarstrom 1984). Further restrictions on fishing times, allowable fishing locations as well as total closures on in-river Kenai Chinook salmon fishing times have continued since then.

The new restrictions led to the development of a catch-and-release fishery for Kenai River Chinook salmon. The result of these changes was that the focus of the fishery now started concentrating on the harvest of larger sized Chinook salmon, often referred to as “trophy fish”, instead of fishermen taking any legal size Chinook salmon. In a 1987 ADF&G report, the new hook and release practices were described as “somewhat more prevalent among non-guided anglers” (Bandirola et al. 1987). Project key respondents offered these observations about the development of catch-and-release practices on the Kenai River Chinook salmon fishery:

> Back in ‘70s there wasn’t a lot of catch-and-release back then. There is certainly a lot more of that. And that is a concern.
>
> We didn’t start catch and releasing until late ‘80s. Maybe even mid-‘80s we started catch and release. ’85, ’86, ‘87 I can remember going on bait openers and catching and releasing, keeping one 35 pounder and letting four to five 50–60–70 pounders go. We were…. I remember one trip that we caught 17 kings on a bait opener between my brother, my sister, my mom and I. And we kept one. …You know, we certainly had an appreciation for the size of the fish, and we were already at the point where we didn’t want to see that go away and so we put value on the… We put value on the size of the fish and unless there were something monumentally special about it, it was just really fun to catch a big king and let it go. …But the meat was mushier, you know. …We didn’t want to fill the freezer up with a bunch of mushy king when other [inaudible] were coming in pretty soon and we’d have fresh [inaudible] for fish. For smoking and whatnot. Yeah, so it was a little bit of conservation and probably a higher degree of food preference.

The practice of catch-and-release in the Kenai Chinook salmon fishery has been controversial ever since its beginning. According Hammarstrom and Larson (1987), already in 1986 there were several proposals submitted to the BOF for consideration to prohibit hook and release fishing in the Kenai River Chinook fishery. The arguments presented by catch-and-release opponents in the late 1980s were focused on 2 key points: 1) catch-and-release causes physical injury to the fish and leads to higher mortality rates, and 2) the selective harvest of larger Chinook salmon will deplete the genes producing larger fish from the spawning population and eventually lead to declining average size of the Kenai River Chinook salmon (Bandirola et al. 1987).

Most key respondents expressed negative opinions about the continuing practice of catch-and-release in the Kenai River Chinook fishery along the same lines:

> Back then there was no research being done on what happens to a fish when they are caught-and-released. They fight them and they release them. That is a disrespect of a resource when we allow people to play with their food and then just let it die.…I can't put you on a string and make you run all over until you barely have any life left and just throw you back in the water where you are going to drown.
>
> ...and I think they need to quit absolutely targeting the biggest fish that are in the river. Because the ones that they are catching and releasing, they are killing them anyway. And I believe you should get what you catch. That's my feeling about it. I don't think that should be happening with salmon. There's other fish that you can catch and release that don't seem to bother them that much. But the salmon are at the end of their death cycle when they are in the river. That's the thing right there. …I've likened it to OK, let's take a 250 pound man and tie a rope around its waist and hook him up with a pick up and take him down the road. Once he drops, and you drag him for a while, you think when you untie him he is going to get up and run away? It's just nonsense.…
>
> Catch and release kills about 20% of the fish. Once they get a little bleed, they're not like humans; they have no coagulative abilities in their blood. You tear a little bit of their gill or an arterial bleed on them, it's not going to stop; they'll die. So that's how they get killed in catch and release, usually they injure the gills. Arteries, especially in the neck where people tend to reach down and grab them by the gills, when you do that you almost always injure them.
>
> …even after you think about it, the Fish and Game still has the bad policy of letting people be rewarded by allowing them to take the biggest of the kings they catch. They're really wiping out the master race. And that's why you have all of these little kings today, 20–30 pounds; you rarely catch a 50 pounder anymore because they have wiped out all of the broodstock that bred the really big kings. Maybe it's not too late to change it. There may be some coming back in August of the weight class, and if they play their cards right they can change it around again. They can fix it up to where you will again begin to see 70 and 80 pound kings in the river. But not until you do that.

A few respondents were in favor of catch-and-release as an idea:

> For some weird reason in Alaska we are all harvest orientated. They don't even like to catch and release them. It is done all over the world. We are not allowed to do it here. All over the world they credit catch-and-release with being able to utilize it. Here in Alaska we have very successful catch and release programs—like down at the Anchor River for steelhead.
>
> Interviewer: Have you, even before the major declines and stuff, were you always an advocate for catch and release?
>
> Respondent: Absolutely. The groups I had even, local [inaudible] they were all catch and release. I love it because I don't have to clean any fish.
>
> I'm certainly a proponent of catch-and-release. I think that there's some mortality associated with catch-and release, but it's fun. It's fun and people will give their appreciation for the fish.

Table 3-2.–Historical summary of the Kenai River recreational fishery for Chinook salmon, 1974–1986.

	Early run			Late run			**Total**		
Year	Harvest	Effort[a]	Catch/hour	Harvest	Effort[a]	Catch/hour	**Harvest**	**Effort[a]**	**Catch/hour**
1974	1,685	11,275	0.041	3,225	12,335	0.037	**4,910**	**23,610**	**0.038**
1975	615	15,047	0.011	2,355	14,943	0.044	**2,970**	**29,990**	**0.024**
1976	1,554	16,430	0.024	4,477	28,030	0.039	**6,031**	**44.460**	**0.033**
1977	2,173	35,479	0.019	5,148	47,539	0.036	**7,321**	**83,018**	**0.029**
1978	1,542	19,569	0.018	5,578	60,636	0.026	**7,120**	**80,205**	**0.024**
1979	3,661	39,665	0.022	4,634	58,895	0.022	**8,295**	**98,560**	**0.022**
1980	1,946	32,365	0.016	3,608	38,260	0.018	**5,554**	**10,625**	**0.017**
1981	4,525	28,335	0.031	528	29,906	0.032	**9,810**	**58,241**	**0.032**
1982	5,466	45.723	0.033	4,810	43,366	0.024	**10,276**	**89,089**	**0.030**
1983	6,360	42,716	0.037	9,174	56,295	0.036	**15,534**	**99,011**	**0.037**
1984	4,956	50,455	0.025	7,376	77,462	0.021	**12,332**	**127,917**	**0.022**
1985	7,971	47,394	0.043	8,055	13,615	0.027	**16,026**	**121,009**	**0.034**
1986	7,059	50,666	0.036	8,588	75,426	0.028	**15,647**	**126,092**	**0.031**
Mean 1974–1986	3,809	29,957	0.027	5,197	42,824	0.030	**9,371**	**72,878**	**0.029**

Source Bandirola et al. 1987

a. Angler days: "angler days" are a measure of fishing effort that indicates the time spent fishing by one person for any part of one day.

A New World Record

The next big catalysts identified by a number of key respondents were the harvest of the world record sport caught Chinook salmon (weighing 97 pounds and 4 ounces) on the Kenai River in May 1985, and the expanding publicity and international attention this record brought, and continues to bring, to the Kenai River.

One key respondent offered personal observations about the harvest of the world record Chinook salmon:

> … they pulled out this lunker of a king and drug it up through the mud and left it on the bank. And mom said, "I can't believe they're treating that fish like that." That was the record king salmon that Les Anderson. That was the day; we saw that fish. And they actually left it on the lawn for a couple of hours, so it probably lost a lot of water weight so it probably would have even been bigger. But then that was a huge change in the Kenai River because now we had a world record. And it just brought people from around the world.

Another key respondent commented on the effect of the harvest of the world record Chinook salmon:

> …the fishery just hadn't developed. It just gradually and all of a sudden it just took off when you start catching world record fish.

The Celebrated Kenai River Chinook Salmon

Table 3-2 is a summary of the historical Kenai River Chinook salmon recreational fishery for years 1974–1986. The table shows how the total sport harvest of Kenai River Chinook fluctuated from a low of 2,970 in 1975 to a high of 16,026 salmon in 1985. The table also shows that during 1974–1986, the mean sport harvest of Kenai River Chinook salmon was larger from the late run than the early run. According to ADF&G data, the sport harvest of Kenai River Chinook salmon has generally been larger from the late run throughout the years (Begich et al. 2013:99–101).

Table 32.–Historical summary of the Kenai River recreational fishery for Chinook salmon, 1974–1986.

Throughout the 1980s and early 1990s the Kenai River Chinook salmon runs were doing well and people wanted to catch the large Kenai salmon with the new, successful gear and techniques. According to Sonnichsen and Alexandersdottir (1991), between 1986 and 1990, the strength of the early Kenai Chinook salmon runs varied from 27,080 salmon in 1986 to 10,808 salmon in 1990. In comparison, the late run

Table 3-3.–Historical summary of harvest, effort, and catch per hour by guided vs non-guided anglers, Kenai River Chinook salmon fishery, 1981–1986.

		1981	1982	1983	1984	1985	Mean 1981–1985	1986
					Harvest			
Guided	Number	4,777	4,861	9,196	5,488	7,825	6,429	6,808
	Percent	48.7	47.3	59.2	44.5	48.8	49.7	43.5
Non-guided	Number	5,033	5,154	6,338	6,844	8,201	6,314	8,839
	Percent	51.3	52.7	40.8	55.5	51.2	50.3	56.5
					Effort			
Guided	Number	13,920	19,332	23,862	22,258	26,483	21,l71	26,102
	Percent	23.9	21.7	24.l	17.4	21.9	21.8	20.4
Non-guided	Number	44,321	69,757	75,149	105,659	94,525	77.882	101,924
	Percent	76.l	78.3	H.9	82.6	78.1	78.2	79.6
					Catch/hour			
Guided		0.070	0.058	0.080	0.058	0.075	0.068	0.067
Non-guided		0.022	0.025	0.017	0.015	0.022	0.020	0.022

Source Bandirola et al. 1987

varied from 79,837 Chinook salmon in 1986 to 39,656 Chinook salmon in 1990. For both the early and late runs, the 1981 and 1982 brood years were responsible for the strong Chinook salmon runs in the Kenai River in the mid-and late-1980s.

The popularity of the Kenai River as Alaska's most attractive freshwater fishing destination continued during the 1980s and 1990s. According to King and Hansen (2002) this was largely due to the fact that starting in mid-1980s anglers discovered that techniques previously used on the Russian River to catch sockeye salmon also worked on the Kenai River. On the Kenai River, sockeye salmon fishing is largely a shore based activity: anglers rarely fish from boats for this species, and growing numbers of anglers attempting to fish from the river bank has resulted in damage to the riparian habitat (King and Hansen 2002). On the Kenai River, this had been a major concern for Kenai River fishery managers, Kenai River property owners, and the general public since the popularity of the Kenai River as a fishing destination first began to grow in late 1970s.

The success of guided anglers in catching Kenai Chinook salmon was not left unnoticed by non-guided anglers, who quickly took note of the techniques, equipment, and productive fishing locations. One long-term Kenai River watershed resident described the rapid change in the fishery as following:

> …that led to kind of a jump in exploitation, if you will because the technology like rolled over night. It was like we were … probably within 4–5 years; the gear, the method of fishing, everything started to change. And I mean it's like going from your big box computer to your iPad. You know it was quick, it was portable, it was easy, it was efficient. And suddenly we saw sardine wrappers, and we saw the "F-16" Flatfish out here. …But over the years as we had more and more people participating because once the public started seeing how successful the guided anglers were being then, you know they were buying boats and the dealers were selling the same type of boats, you know everything was being mass marketed; the boats, the motors, the gear, the fishing poles.…

Table 3-3 presents the historical summary of harvest, effort and catch per hour by both guided and non-guided anglers in the Kenai River Chinook sport fishery for years 1981–1986. The table shows that while the number of guided anglers in most years was fewer than non-guided anglers during this time period, the catch per hour success rate for guided anglers remained noticeably higher when compared to non-guided anglers.

A few key respondents, who worked on the river doing enforcement during the 1980s and 1990s, described Chinook salmon fishing on the river as following:

> To put this in perspective, when I worked the river for king, everyone was catching kings. I mean there were so many big kings being caught on the river. There's so many kings that what I looked for was people doctoring their harvest reports. They would put like 7, 11, 87, whatever. And the 11 you could change to 7, 8, or 9 and they would do that so that they could catch more than their 2 kings. I mean there's so many kings. I mean it was… "Failure to record," we wrote a lot of tickets for people on "Failure to record" because they'd just want to catch more kings. And there were a lot of kings out there. And they were big kings back then too.
>
> …it seemed like there was more interest generated in the river because in the mid-'80s, probably all the way through '92, '94, there were big fish. They were getting 60s [pound] and 80s [pound], and it wasn't uncommon to, because I was out on the river working too, it wasn't uncommon to see more than one 70–80 pound fish a day coming out of the river. Of course in a day of patrol you'd go from mile 21 here all the way down and all the way back. And so you are hitting right through all those great, where all the big, heavy hitters are, you know. And so you see that all the ocean fresh fish coming in.

According to key respondent observations, the majority of the early guided Chinook salmon fishing effort took place over the 11 mile stretch below the Soldotna Bridge (at river mile 21) and Beaver Creek at river mile 10. Contemporary ADF&G reports (Hammarstrom et al. 1985; Hammarstrom and Larson 1983) describing the development of the Kenai River Chinook salmon fishery provide similar observations made by department staff working on the river. According to a recent ADF&G report (Begich et al. 2013:93), the area from Cook Inlet to the Soldotna Bridge continues to be the most popular sport fishing section of the Kenai River. In terms of total harvest, the peak year in the Kenai River Chinook sport fishery was 1988 when nearly 35,000 Chinook salmon were harvested (Begich et al. 2013:94). In comparison, 1987 was the year of the largest total Chinook salmon harvest with nearly 39,500 salmon harvested in the upper Cook Inlet commercial fishery (Shields and Dupuis 2015:156–157).

The increasing presence and success of guided anglers on the Kenai River Chinook salmon fishery began to cause tensions between the different user groups fishing the river for Chinook salmon. According to several key respondents, the behavior of some of the guides (both local and nonlocal)—for example, fishing for Chinook salmon on known spawning beds, always wanting to take the biggest fish, and blocking fishing opportunities from bank fishermen—was considered disrespectful and offensive by many long-term area residents:

> A lot of the people that live up in the upper river, in this Kenai Keys and Dow Island, they were seeing a lot more boating traffic and commercial effort. And there was concern by these people about the Killey River kings. The fish that go up in the Killey, all the tributary spawners were being targeted because they are up there and they are big, and they are red. And when they are trophy fishing for a fish size, they are not really fishing for dinner, the clients don't care about the shape of the meat. And so those were the kind of things that aggravated people because we had a lot of people that lived in this area that had been there a long time.
>
> I see these guides with their clients on board and they got this big fish, and it's red as your shirt. I mean, this is a spawned out salmon or a salmon near spawning, it is not good to eat. I don't know. Killing that kind of fish when it is so close to spawning or in the spawning mode, to me, it doesn't make any sense at all.
>
> The guide boats used to start up here like I said and then they would drift this whole area and the bow [of] the boat would be pointed to the bank and all the lines

> would be dragging. And I used to walk from Morgan's [Landing] down here and there's this big rock, it's about 50 feet away, there's a big hole behind it. And the fish would lay in that hole. So you could go out and you could cast and just let your bait bounce along. And I wouldn't try to anchor it there because there's too much current there. And you could hook the fish there. But there was always interference by these guides; you couldn't sit there and bank fish because they figure they own the river. They come down and they reel in, just one after the other, you know all day long and so that's what kind of led to these closures by the state because there were people complaining about, and the guides complaining about the bank fishermen.

At the same time, several key respondents also pointed out that there have always also been very good guides:

> There are some wonderful guides, there are some terrific guides. And they are making choices that are good. And there is no doubt in my mind, and I know some of them. There are also those who just take and run and reap this place and are ruthless on the river, and that is why they have a bad reputation.
>
> We had a lot of individual businesses out there and so there was competition for fishing in these better areas. But there were also people that were coming up from Washington and Oregon, and they are coming from a more regulated atmosphere so they are accustomed to laws and they are accustomed to rules. And my experience with most of the nonlocal resident guides is they've been very professional and very good at what they do.
>
> I have a lot of friends that are guides and I understand that they have to make a living, and I have friends that have actually converted to completely catch-and-release before Fish and Game imposed the restrictions. I have guides that have actually gone to catch-and-release on kings so I, you know, I know some guides that are, have very strong conservation minded, and they want to protect the kings for, you know their children's opportunities to do that. But there is a lot of, you know, there is a big portion of the guide industry that wants to make the money now while it is available.

In a response to the increasing complaints from both guided and non-guided anglers in the early 1980s, ADF&G and USFWS began either restricting or closing certain areas for bank fishing, or making areas open only to fly fishing. At the same time, restrictions for guided angler fishing time began to increase as well. The result of the amplified interest in fishing the Kenai River led to crowding and the need for both guided and non-guided anglers to explore new fishing locations on the river. Over time, the number of areas with limited or restricted fishing access either from the river bank or from a boat has grown as a result of conservation concerns for salmon habitat in different parts of the river.

The Beginning of the Kenai Chinook Salmon Decline

With the increased number of people and motorized boats on the river, additional challenges for the fishery began to emerge despite of early attempts to restrict fishing areas and allowable catches. Based on ADF&G harvest data and observations provided by project key respondents, the Kenai Chinook salmon fishery kept growing approximately until the mid- to late 1990s. One key respondent explained:

> I would say the peak was probably…Well, there have been a couple of peaks, between 1980 and 1990 it really peaked. And then between…about up to about '95 probably.…

Many key respondents particularly commented on how the increased inriver motor traffic has resulted in habitat changes, including river bank erosion, increased noise pollution, and pollution of the water. Some

also commented on how the increased turbidity must have negatively impacted Chinook salmon spawning grounds, as well as their spawning behavior:

> In that space in time, in the last 25 years, there has been an increase in motor boats and a lot of it is the charters. Sometimes we fished about milepost 33 and we would go down and there would be so many boats. You can't stand in the water because of the wake. I think, right now, it has changed the course of the river. It changed the mouth of the river. Now there is a huge, huge sand bar that is on the south side of the river that never used to be there.
>
> Okay, the increase usage of the motor boats—it not only changed the course of the river, it not only changed the spawning grounds of the kings—it churned up the water so bad sometimes it is cloudy. The river used to be beautiful and clear. Now it is not. It has churned up a lot of the silt in the water. And I think it ruined the spawning grounds of the kings. And there are so many of the charters—there are so many of them on the river. I mean I am not surprised that we don't have any kings in the river because they have taken out so much.
>
> …they've got noise, distraction, you know you got spawning holes, and I guess they're like any other areas. It's hard to do your thing when you got motors roaring overhead …It has to have a disconcerting effect on the spawners. And also the motors knock a lot of silt and sand into the water, washing away the bank—the big wake. Now they've increased it to 50 horse[power], and they have boatloads of people running up and down the river making a big wake. And they say it's supposed to make smaller wakes, but it doesn't; it makes bigger wakes than 35 [horsepower] ever did. I don't know who sold them that idea.…

Perceived Changes to the Size of Kenai Chinook Salmon

In addition to changes in run strength, many of the project key respondents described other noticeable changes occurring to Chinook salmon in the Kenai River. Some of the trends identified include: changes in size of Chinook salmon and the presence of more "jacks"[5] caught during commercial and sport harvests. Of the 27 key respondents interviewed for this project 23 (or 85%) stated that the size of Chinook salmon has been decreasing. At the time of this study, most respondents indicated that beginning in the late 1990s and into the early 2000s, they began to notice Chinook salmon entering the Kenai River appeared to generally be smaller than previous years. Regarding the size of the Kenai River Chinook salmon, one key respondent offered these observations:

> …we start getting into the '97–'98 the end, things started radically, radically changing. You know the river has always been very good at putting up 40 pound fish; I call them the "Kenai River factory fish." It's just like the Ford Motor plant you know: boom, boom. They are not hard to get, that kind of a fish. But nowadays, it seems like that is becoming the norm than the 60 [lb] or the 50 [lb], the bigger fish.

Another respondent commented:

> You might just as well fish for silvers [coho salmon] now. They are about same size as a 25 pound king. But it was remarkable how during the last two years we fished the number of small kings that were out there. We'd go look for them in the fish finder and we would say: "Those are either small feeder fish that are running

5. "Jacks" are small Chinook salmon that mature after spending only one winter in the ocean and are typically male. See Alaska Department of Fish and Game, "Chinook Salmon (*Oncorhynchus tshawytscha*) Species Profile: Description, Life History," Accessed January 23, 2017, http://www.adfg.alaska.gov/index.cfm?adfg=chinook.main.

> around down there or really small kings down there. Either way, we are not running a line for them."

Echoing a similar sentiment, one key respondent, who had lived along the Kenai River for thirty years, and who had also targeted Chinook salmon each summer, explained that he did not bother fishing for Chinook salmon anymore.

> I think it's been four years since I last fished out there for kings. The fish were definitely smaller, way fewer, harder to find and we just went, "We are not going to go all the way down there to catch 15 or 20 pound kings," or less, and feel like you need to put it back in the water anyway because there are so few kings.

Several respondents explained that the presence of "jacks" has increased recently.

> In the past it [the Chinook salmon run] was a fairly healthy composition; you'd always have some jacks, it's healthy to have jacks in the system but the amount of jacks and smaller kings has definitely gone up here over the last 10–12 years.

> The size definitely got smaller, there is no question. And a lot of jacks; a lot of jack kings. We never used to catch jack kings, ever. And then it started to where we would catch three or four jacks for every king we caught that was normal size.

Conflicting Interests

Key respondents participating in this study generally fell into one of two user-group categories: sport fishers and commercial fishers. Based on their individual experiences, unique observations, and often-negative views of other users, interviewees provided opinions to explain the Chinook salmon decline, frequently placing blame on the user group to which they did not belong. The exchange of blame between sport fishing and commercial fishing interests is important for understanding the entirety of the Kenai River Chinook salmon story. This phenomenon transpires in many different arenas, such as in BOF proposals and BOF meetings, in the media, in daily conversations, during the Alaska legislative session, through funding agencies, and for this project through the interviews that were conducted.

Some key respondents for this research project were aware and acknowledged that they were "pointing fingers" at the opposite user group. For example this sport guide suggested:

> Some say that we [sport guides] only take the big ones, whereas commercial guys just kill them all. But I do think there are fewer fish and fewer big fish. There is something weird going on that way right now to be seeing so many of these immature fish coming back, but I don't think they should place all the blame on us.

Other respondents did not acknowledge their predispositions: take, for example the following statements made first by a commercial fisherman and the second made by a sport fishing guide:

> I attribute a lot of the smaller fish and poor returns to sport fishing, there are so many more people fishing on the river now, and what are they aiming for…the biggest spawning fish, and they fish all day, throwing back the small ones, until they get the trophy fish.

> Probably the largest impact has been the commercial fishery. They've got a non-stop, non-stop fishery in the Kasilof River, in the Kasilof district. They've got 400 setnet sites in the Kenai district, and it's a little difficult, those bigger fish get caught in those nets and some of the smaller jacks are making it through.

Respondent Views on the Future of the Kenai River Chinook Salmon Fishery

People have mixed reactions when asked about the future of the Chinook salmon fishery and what has been done to preserve it for future generations. People who had fished the river for generations discussed not going upstream near the spawning beds to fish as a way of preserving the runs.

> That spawning area, you leave it alone. But the tidal area where the tide comes in, like maybe a mile up the river, that's about as far as you'd go. Anything above that, if you come down to the village with red fish, they'd know you were up the river. There was no one there to administrate rules and regulations.
>
> These fish are running, they're running up to their spawning holes, and if you catch them, you catch them. But keep them out of the nests, out of the spawning holes. Once these fish have made it up to their spawning holes, that should be the sanctuary. They should be allowed to propagate and die.
>
> I was born in 1946, so that was a long time ago. We could walk down over the hill and go fishing; we never had problems with Fish and Game that I can remember. I don't remember any different with the fish because I was fairly young at the time. But, my brother did a lot of the fishing. I don't ever recall myself having to have a license or anything. You know it's what Creator gave us and Creator gave it to all of us, for subsistence not for one to tell another group they could not have it. That came much later.

George Jackinsky (2014) later published an editorial in the Peninsula Clarion reflecting these aspects of traditional knowledge:

> I was born in the village of Ninilchik in 1927. When I was about 10–12 years old, in order to outdo the other boys, I worked my way about a mile or more up the Ninilchik River. The kings were thick in the fish hole I found. I baited up my hook with fresh salmon eggs and on my first drift I hooked into a 20–25 pound king. With joy and excitement I struggled dragging it home, showing it off as I made my way.
>
> But then I met Grandpa! I was grinning with excitement until I saw Grandpa's face. His eyes squinted ... his big bushy eyebrows came together and right there, without hesitation, he turned me over his knee. I got a spanking, I still remember, 75 years ago. After I stopped crying, and regained some composure and had his full attention, he explained.
>
> Never, never, never harvest a fish that is ready or getting ready to spawn. This fish has been in the river for some time, you see, look, it's turning red. It's like a mother chicken getting ready to set ... to hatch her young, to raise a brood of chicks. You just killed a bunch of new young fish. When this spawning fish has reached its nesting ground, leave it alone. That way we will always have fish.

Interviewees discussed that historically, the people that lived along the Kenai River and its tributaries took only as much as they needed and did not fish much upstream. During the territorial time, fishery management (although loosely regulated by the federal government) was the responsibility of individuals and the community. Several respondents felt this was not the case today. A number of respondents voiced concerns about modern pressures on the Chinook salmon fishery. Some felt the Kenai River Chinook salmon stock's future is more dependent on agency regulations rather than on individual fishers as it was in the past. Many directly stated that individuals left to their own devices were a source of run decline rather than a means of protecting it like it was in the past. A way to combat this is stricter and more aggressively enforced regula-

tions. Several respondents offered the following thoughts on the perceived abuse of the Kenai River salmon in general, in the past as well as more recently:

> People had to see this coming with the numbers of boats out there and the numbers of fish they were catching in the '80s. I never believed what Fish and Game said that [only] so many kings were caught…because of what we saw at the river; there were people hedging on their fishing licenses and their harvest reports. They were catching more than two fish. Another trick that they used was, "I lost my license." And so they'd get a duplicate, and they'd start all over again. And we caught people with several duplicates…The fishing was so good, they were catching so many fish, they didn't want to stop.

> People are either keeping more than their limit or snag fish and keep fish that are snagged or are drunk and obnoxious and don't give a damn about the rules anyway. Those guys that are really significant violators, I would guess are really less than one percent of the population. But in this area we'll sometime see… between these two places we will see on a busy year we might see as many as 150,000 visitors to the ferry and the Russian River campground. That doesn't count all the people walking in, all the boaters coming in. So if you think, let's just say there are 200,000; there are probably more like 400,000 people use this area in a year. If one percent of those guys are significant violators, you are talking about a large number of people. That is 4,000 people who are deliberately snagging fish, dragging them up on the bank, keeping fish they shouldn't. There are a number of guys.[6]

> There are some states that don't allow you take any fish out of state. And here you can take 10,000 pounds out! And we know for a fact that, and I know a Fish and Game guy that actually spent his own time and money watching this person he knew was selling sport fish in the states. Had it dead to rights and basically the judge let him go. Personally, I mean it's illegal to sell sport-caught fish. Period. And when you've got some guy going out of here with three 31 cubic foot freezers full, or 50 cases of king salmon and he is in a flea market selling fish, that person should never be allowed to have a hunting or sport fishing license in Alaska ever again.

> Well, I think … mostly it comes through Fish and Game and their restrictions on what we can do with sport-caught fish here. People in general probably would take more fish than they should because king salmon are anomalies, and it would be hard for them not to take them, so it is really going to have to be regulation driven. I think there are ethical people and I think there are people who just don't want to take smaller fish and people who don't want to take smaller populations of fish, but if you told everybody that they could take all the fish that they'll… You know that they could take one king salmon out of the Kenai River a day without any restrictions; they… would be gone in a couple of years. So it really comes down to, I think government agencies to have to regulate it, like Fish and Wildlife Service and Fish and Game.

> [It's really] every man for himself, [most people] don't worry about the future.

> People get caught up in the moment, and if there is opportunity [for overharvesting] people tend to take it. Not always, that's a huge generalization, but enough that it can make a big impact.

6. The Chugach National Forest's Russian River Campground and Sportsman's Landing/Russian River Ferry are popular sites for fishing the upper Kenai River sockeye and coho salmon runs. Targeting or harvesting Chinook salmon in these waters is prohibited by regulation.

During the interviews several respondents expressed frustration with the many different political narratives surrounding the Kenai River Chinook salmon fishing and decline. This set of interviewees believed arguments detracted from the efforts and successes that have been made on the Kenai River.

> There have been a lot of positive things done to try to mitigate, or to reduce given all this use that we've been talking about, and change through time, the river has stayed, you know shoreline. If some kind of a big thing like that was to come, or suddenly became advantageous or essential to dam it up for hydro-electric; it very well might happen. And change all those things. But do I think; we've done a pretty good job down there so far in trying to protect. We argue who gets to catch and who is responsible for this decline, but we've done a pretty good job in terms of maintaining.

Although most people felt that there had not been an adequate effort by people to ensure the continued return of Chinook salmon, several respondents were optimistic that the runs were resilient enough to endure and return if pressures were eased.

> The one really positive thing that has happened—what's going on right now is probably the most positive thing that has happened. Because I am convinced that the runs will come back. This is weeding out the people here. But we need a plan in place so that when it does come back it doesn't go right back to where it was with no commercial restrictions, 500 fishing guides and 800 non-fishing guides out there every day, fishing day after day after day catching everything they can. We need to plan and look at this as a good thing. In my opinion, now is the best time—I am not a big fan of regulation, but it is the only thing that is going to make it work—because if we don't do those things the fish will come back; so will everybody else. And it will only take that long [snaps finger]. This salmon culture—the Congo drums beating—that's why people aren't out fishing because they know the fishing isn't good. As soon as the fishing gets good the next day down to Mexico people will know the Kenai is on its knees. So like I say, I really think we can view this as a good thing if we had some proactive help. We need limits on guides and better management plans. Somehow we need to get some of the politics out of this Board of Fisheries process. That is a tough one. It is an open process so it is really cool. But then it is really stupid because you have what I call these 'vendetta proposals." When people get this big old proposal book they don't look at the proposal; they look at who wrote it. That is what has happened. That is where we are at with this thing.

Respondent Recommendations for Management

A number of key respondents mentioned that it was ultimately not the responsibility of individuals to assure that there were enough Chinook salmon in the river: in their view it was the job of fishery management. According to this view, any failure to maintain enough Chinook salmon in the ecosystem was the result of the failure of management. According to one interview respondent, education—both on part of the managers and public—was an important way to bridge differences in the views held by fishery users and managers.

> Well, people are kind of mindless; they don't care as long as they get their fish which is why I keep coming back to Fish and Game. They need to tell people through policies what can be done and what can't be done. I think philosophically, we all want the kings to go on forever, but we're not willing [to] curtail our take, and that's just the inevitability of the human psyche of self-interest.
>
> The Department of Fish and Game's Sport Fish Division appears to be more concerned about the politics—and I understand its money. The Sport Fish Division is an economic engine driven by license revenues and Dingle-Johnson Wallop-Breaux

> funds. They receive no general fund money for managing their department. So they are very aware of the licenses they sell. They are very aware of where their money comes from; I think to the detriment of the fishery or to the resource. Those are fairly harsh and I am sure inflammatory words to some of these people. But that is what I see; it is just the way it is. There is damn little that I have been able to do to change that. And I understand. They don't have budget, they can't do projects. They don't have the money to do juvenile Chinook studies. This money that is basically coming out of the air that you guys are talking about—the money that state has been given to advance Chinook studies. I have been kicking them in the shins to do this stuff for years and now they have a little bit of money, and I am still kicking them in the shins to have to do water and juvenile studies. But it sounds to me like they are moving. The Department has indicated to me that they are going to do juvenile studies. As far as doing water studies—I just keep hoping that the watershed forum is going to figure out something they can do to contribute to this, because right now they are not.

Despite people's opinion on the success or lack of success by the regulating agencies, almost all felt that the fate of Chinook salmon in the Kenai River is dependent on regulatory oversight. Many discussed the need for more restrictive harvest management for salmon until the runs have more adequately recovered. But as one fisheries biologist noted, a complete ban was a difficult thing to achieve, because this fishery "Was people's livelihoods, it's their lives."

The most common issue that people felt need to be addressed with the current management structure was what they saw as the politicization of the BOF system and the BOF's perceived disregard for scientific data in favor of "crony capitalism" when making management decisions.

> It's like the biologist, they say one thing but the Fish and Game, and the Fish Board, ignores it all. Why don't they listen to the biologist? 'Cause that's their specific goal, knowledge of the fish.
>
> The fishery managers are supposed to manage for maximum sustained yields. So we have management principles in place, but then Board of Fisheries seems like they don't actually follow.
>
> Ultimately, it is not their job [the BOF]. It is up to the Department to properly manage the resource without regard to the political and economic implications.

4. CONCLUSION

This study documented the historical and contemporary observations of many different stakeholders who utilize the various salmon fisheries in the Kenai River watershed of Alaska. There were several important themes which emerged from the local ecological knowledge and perceptions offered by respondents in this study. According to interview respondents:

- Chinook salmon have been and are important components of the Kenai Peninsula economy.
- The overall trend in local Chinook salmon stocks has been downward over time but has fluctuated from decade to decade over the past century.
- Some of the trends identified by key respondents regarding changes to Chinook salmon over the past 20 years include: changes in size of Chinook salmon, large fluctuations in run timing, and the presence of more jacks caught during commercial and sport harvests.
- Climate change and associated ocean acidification, warming, and changes in currents are affecting Chinook salmon migration patterns. Some respondents suggested more scientific information is needed on Chinook salmon life history at sea.
- Historical fishery practices and gear types were extremely detrimental to Chinook salmon, especially commercial fish traps prior to Alaska statehood.
- Advances in gear efficiency have caused local commercial fisheries to have a greater impact on Chinook salmon over the past century.
- Some speculate that a portion of nonlocal dip net fishers exceed harvest limits and sometimes sell their catch illegally.
- While Kenai Peninsula residents generally understand the dip net fisheries are necessary for state residents and acknowledged the economic importance of these, many believe that increasing waste on the beaches from these fisheries is harming the ecosystem.
- Some local sport fishermen and guides have shifting their fishing efforts on the Kenai to coho salmon over the last decade as a result of lower Chinook salmon abundance.

In addition, respondents offered several suggestions for the management of Kenai Chinook salmon stocks:

- Many respondents who live in the Kenai and Kasilof area indicated support for increased oversight and enforcement of dip net fisheries.
- Several respondents indicated a need for more inseason Kenai River enforcement, such as adding more State Troopers to monitor fishing on the river.

Lastly, project respondents offered ideas for further research that could help address questions about Kenai Chinook salmon:

- Several respondents indicated support for increased funding of studies to refine knowledge of Chinook salmon life history at sea.
- Several respondents indicated that more research is necessary to better understand the decline of Kenai Chinook salmon stocks over time and what can be done to restore these stocks in the future.
- Some respondents suggested research involving Kenai water quality as a way to address more localized concerns.

Key respondent interviews and participant observation conducted in communities near the Kenai River highlighted the central role Kenai River Chinook salmon play in this region. The data collected yielded a large range of information from topics pertaining to local residents' first memories of fishing in the Kenai River to the life history and habitats of Chinook salmon. These data may be used alongside biological data to better understand factors that have influenced trends in the productivity and abundance of local Chinook salmon populations, as well as the concerns and perceptions of local stakeholder groups.

The information reported here has substantially increased the availability of local and traditional knowledge (LTK) that can be used to enhance stock assessment programs for the Kenai River Region. This knowledge was derived from local users of the resource, who have interacted with salmon in the region for decades, often depending on Chinook salmon as a critically important economic species. By documenting this knowledge, managers will be able to better access local observations and also better address the needs and concerns of Alaskan residents.

In addition to documenting knowledge and perceptions of Chinook salmon stocks and associated management, this project has successfully archived an extensive oral history collected from resource users of the Kenai River. This critical historical and contemporary knowledge is consistently in jeopardy of being lost if it is not recorded and properly archived.

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APPENDIX A:
SURVEY INSTRUMENT

LOCAL AND TRADITIONAL KNOWLEDGE OF ABUNDANCE OF CHINOOK SALMON IN THE KENAI RIVER

SEMI-STRUCTURED INTERVIEW GUIDE

Today we are going to discuss your knowledge and experience with the Kenai River Chinook salmon fishery. The information areas we will touch on include your earliest experiences with fishing, your observations about the abundance and overall health of Chinook salmon in the Kenai River over time, your experience as an adult subsistence/personal use and/or commercial fisher, the locations and gear types you use for fishing, your experience with and understanding of regulations, and finally, your thoughts on/for management.

Name:_____ Birthplace: _____

Community of Residence:_____ Birth date: _____

Early adulthood experiences

- What are your first memories of the Kenai River, the surrounding environment and the fishing locations in which you learned to fish and when was this?

  -> (MAP areas and times when used)

- How about of Chinook salmon in the Kenai River and its tributaries such as Beaver Creek, Slikok Creek, Soldotna Creek and Funny River?

- When did you start fishing independently as an adult (year), and what type of gear did you use?

  - How was the abundance of Chinook salmon during this time period?

- What kind of regulations were in place when you started fishing on the Kenai River?

- Where did you fish; was it different from where you grew up fishing?

-> (MAP areas and times when used)

Commercial

- How have your patterns of commercial fishing (timing of harvest, harvest amount, gear) changed throughout your fishing career?

- Are there particular times that you can remember when the harvest was significantly lower than you expected, or times when the harvest was above your expectations?

- What were the fish like (size, color etc.) at those times?

- Where do you commercial fish now? Has it changed from the past?
  -> (MAP areas and times when used)

- Sport

- Generally, where on the Kenai River and its tributaries have you fished for Chinook salmon throughout your sport fishing career?
  -> (MAP areas and times used)

- Have you noticed any changes in Chinook salmon abundance in the Kenai River and its tributaries?

  -> (MAP areas where changes have been notes and estimated times of observations)

  - What do you think are the reasons for changes in the number of fish can be attributed to?

- Have you noticed any changes in, or surrounding the Chinook salmon habitat of the Kenai River and its tributaries throughout your life time?

Subsistence/ Personal use

In 1981, the BOF established 'Personal use fishing' as a new fisheries category in the Cook Inlet area to provide fishing opportunities for the personal consumptive use of fish for Alaska residents who no longer were able to meet their needs in other Cook Inlet salmon fisheries.

- Do/did you have expectations of harvest amounts when you participate(d) in Subsistence/ Personal use Chinook salmon fisheries? How have these expectations changed over the years?

- Are you fishing as much as you used to?

- Are the runs better or worse?

- Has the number of salmon you harvest changed from past years?

- Is the quality of the salmon different?

- Do you keep all the fish that you catch? How do you choose?

- Is it hard to find a place to put your nets?

- Do you have any difficulties getting enough Chinook salmon?

- Has the amount of time to reach your harvest goals changed throughout the years?
- In what way:
- Are/Were there enough people helping to get the salmon?
- Did work schedules make it difficult to fish?
- Are/Were salmon abundant and accessible?

- Generally, where on the Kenai River and its tributaries have you participate in the Subsistence/ Personal use fisheries? Why did you choose this/ these location(s)?
  -> (MAP areas and times when used)

- Are there areas that elders in your community or your ancestors used to use for subsistence Chinook salmon fishing that are no longer used?
  - If so why are they no longer in use?

- (Ninilchik only) The Federal government began to manage subsistence hunting, trapping, and some fisheries on Federal public lands in Alaska on July 1st, 1990. The harvest of salmon by the residents of Cooper Landing, Hope, and Ninilchik were now allowed in federally designated rural waters.

  - Did this event have any effects on your fishing patterns and locations?

General / Interview summary questions

- How have the Chinook salmon runs fluctuated in the course of your lifetime?

  - What do you think are some of the reasons for the fluctuations?

- Have you noticed any major changes in Chinook salmon habitat, particularly in Beaver Creek, Slikok Creek, Soldotna Creek, or Funny River during your lifetime?

- Throughout your lifetime, how have people made sure that there will be enough Chinook salmon for the future?

- Do fishing locations change from year to year, or have there been any noticeable trends to fishing spots availability?

-> (MAP used areas and times when used)

- What are your thoughts and observations on the effectiveness of the management strategies of Chinook salmon stocks in the Kenai River?