

Report to the Alaska Board of Fisheries

Chuitna River, and Theodore River King Salmon Stock Status and Action Plan, 2020

By

Cook Inlet Staff

January 2020

Alaska Department of Fish and Game



Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the *Système International d'Unités* (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition. All others must be defined in the text at first mention, as well as in the titles or footnotes of tables and in figures or figure captions.

Weights and measures (metric)		General		Mathematics, statistics, fisheries	
Centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H_A
deciliter	dL	All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.	base of natural logarithm	e
gram	g	And	&	catch per unit effort	CPUE
hectare	ha	At	@	coefficient of variation	CV
kilogram	kg	Compass directions:		common test statistics	F, t, χ^2 , etc.
kilometer	km	east	E	confidence interval	C.I.
liter	L	north	N	correlation coefficient	R (multiple)
meter	m	south	S	correlation coefficient	r (simple)
metric ton	mt	west	W	covariance	cov
milliliter	ml	Copyright	©	degree (angular or temperature)	°
millimeter	mm	Corporate suffixes:		degrees of freedom	df
Weights and measures (English)		Company	Co.	divided by	÷ or / (in equations)
cubic feet per second	ft ³ /s	Corporation	Corp.	equals	=
foot	ft	Incorporated	Inc.	expected value	E
gallon	gal	Limited	Ltd.	fork length	FL
inch	in	et alii (and other people)	et al.	greater than	>
mile	mi	et cetera (and so forth)	etc.	greater than or equal to	≥
ounce	oz	exempli gratia (for example)	e.g.,	harvest per unit effort	HPUE
pound	lb	id est (that is)	i.e.,	less than	<
quart	qt	latitude or longitude	lat. or long.	less than or equal to	≤
yard	yd	monetary symbols (U.S.)	\$, ¢	logarithm (natural)	ln
Spell out acre and ton.		months (tables and figures): first three letters	Jan, ..., Dec	logarithm (base 10)	log
Time and temperature		number (before a number)	# (e.g., #10)	logarithm (specify base)	log ₂ , etc.
day	d	pounds (after a number)	# (e.g., 10#)	mideye-to-fork	MEF
degrees Celsius	°C	registered trademark	®	minute (angular)	'
degrees Fahrenheit	°F	Trademark	™	multiplied by	x
hour (spell out for 24-hour clock)	h	United States (adjective)	U.S.	not significant	NS
minute	min	United States of America (noun)	USA	null hypothesis	H_0
second	s	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	percent	%
Spell out year, month, and week.				probability	P
Physics and chemistry				probability of a type I error (rejection of the null hypothesis when true)	α
all atomic symbols				probability of a type II error (acceptance of the null hypothesis when false)	β
alternating current	AC			second (angular)	"
ampere	A			standard deviation	SD
calorie	Cal			standard error	SE
direct current	DC			standard length	SL
hertz	Hz			total length	TL
horsepower	hp			variance	Var
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

REPORT TO THE ALASKA BOARD OF FISHERIES

**CHUITNA RIVER, AND THEODORE RIVER KING SALMON STOCK
STATUS AND ACTION PLAN, 2020**

by

Cook Inlet Staff
Alaska Department of Fish and Game
Divisions of Sport Fish, Commercial Fisheries, and Subsistence

January 2020

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INTRODUCTION

The *Policy for Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) directs the Alaska Department of Fish and Game (department) to provide the Alaska Board of Fisheries (board) with reports on the status of salmon stocks and identify any salmon stocks that present a concern related to yield, management, or conservation during regularly-scheduled board meetings. This action plan provides the department's assessment of Chuitna and Theodore rivers king salmon as a stock of management concern, summarizes historical assessments of annual run sizes, and describes the existing regulations and emergency order (EO) authority that the department follows to manage Chuitna and Theodore rivers king salmon. Options are then presented for potential management actions for the commercial, sport, and subsistence fisheries, and research projects for these king salmon stocks.

In October 2010, the department recommended that the board designate Chuitna, Theodore, and Lewis rivers king salmon as a stock of management concern at the regulatory board meeting for the West Cook Inlet (WCI) Management Area in February of 2011¹. This recommendation was based on guidelines established in the *Policy for Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222). The SSFP states that a "management concern means a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds of the SEG, BEG, OEG, or other specific management objectives for the fishery..." Chronic inability is further defined in the SSFP as "...the continuing or anticipated inability to meet escapement thresholds over a four to five-year period..." based on the generation time of most salmon species.

The department updates the board on the status of stocks of concern and recommends changes to the Action Plans when appropriate. This document repeals and replaces the previous *Chuitna River, Theodore River, and Lewis River King salmon stock status and action plan, 2011*. As presented to the board at the October 2019 work session, the department's UCI escapement goal review committee is recommending that the escapement goal be discontinued for Lewis River king salmon, as its connection with Cook Inlet is intermittent at best. For the same reasons, the department is recommending that the stock of management concern designation for Lewis River king salmon be discontinued since by definition a stock of concern designation requires a stock to have an escapement goal.

STOCK ASSESSMENT BACKGROUND

The department has conducted annual single aerial surveys on the Chuitna and Theodore rivers (Figure 1) since 1979 to index spawning escapement of king salmon. These surveys are conducted from helicopters at slower speeds than traditional fixed-wing aircraft surveys.

Chuitna and Theodore rivers king salmon are harvested in the nearby subsistence fishery that occurs in the Tyonek Subdistrict marine waters adjacent to the community of Tyonek, and in the Northern District commercial set gillnet king salmon fishery. Prior to the closure of sport fisheries in these rivers, sport harvests have been estimated from the Statewide Harvest Survey for each

¹ Unpublished memorandum from J. Hilsinger and C. Swanton, ADF&G, to Board of Fisheries, September 30, 2010.

river (Table 1; Figure 2). No estimates of harvest for the two king salmon stocks to the commercial and subsistence fisheries are available because the stock contribution of these fisheries has never been fully determined.

Chuitna River

Escapement

The average escapement in the Chuitna River from 1979–2018 was 1,671 fish (Table 1; Figure 3). A more recent average (2014–2018) is approximately 1,128 fish. Despite restrictive action since the mid-1990s, closure of the sport fishery in 2010, restrictions to time and area in the commercial fishery, and time restrictions to the subsistence fishery (2019 season), the sustainable escapement goal (SEG) has only been achieved five of the previous nine years (2011-2019).

Harvest

The subsistence fishery occurs in the Tyonek Subdistrict marine waters adjacent to the community of Tyonek in WCI (Figure 4). The subdistrict includes the area from one mile south of the mouth of the Chuitna River south to the easternmost tip of Granite Point, and from the mean point of high tide to the mean point of low tide. The Tyonek Subsistence average annual harvest from 2001-2010 (10 yrs prior to SOC) was 1,369. From 2011-2018 the average annual harvest was 1,114 king salmon.

Prior to 2002, the Northern District commercial set gillnet king salmon fishing season was the month of June. Fishing was allowed for six hours each Monday (i.e., three 6-hour periods) unless a cap of 12,500 king salmon harvested was achieved or until the regular season opened on June 25. The Northern District commercial fishery was liberalized by the board from six hours per period to 12 hours per period in 2005 and from three periods per season to four or five periods per season in 2008. Commercial harvest of king salmon in all of the Northern District averaged 1,626 from 2013–2017; the fishery was closed entirely in 2018 and 2019. From 1993–2019, the average annual king salmon commercial harvest in the Northern District was 1,990 fish.

The sport fishery includes the whole river; however, retention of king salmon is limited to the area downstream of an old cable crossing (a distance of about seven miles). From 1977–2001, this system experienced up to 4,500 angler-days of sport fishing effort (Figure 2). Sport harvest of king salmon from this system was as high as 1,185 fish (1983); however, in 2009, only 109 fish were harvested (Table 1; Figure 2) and in 2010, the king salmon sport fishery was closed pre-season by EO.

Theodore River

Escapement

The recent average (2009–2018) escapement is approximately 238 fish (Table 1; Figure 3). The Theodore River has failed to meet the SEG since 2006 despite a catch-and-release sport fishery for king salmon from 1999- 2009 and closure in 2010.

Harvest

Theodore River king salmon are harvested by two user groups: the Northern District king salmon commercial fishery and the Tyonek subsistence fishery. See “Chuitna River” above for an explanation of the subsistence and commercial fisheries.

Sport fishing effort was relatively high from 1984–1994, with a peak of more than 6,000 angler days of sport fishing effort in 1987 (Figure 2). Sport harvest of king salmon from this system was as high as 1,400 fish (1986), and decreased to 183 fish prior to regulatory changes that closed the sport fishery in 1996 and then restricted sport fishing to catch-and-release in 1999 (Table 1; Figure 2). The sport fishery has been closed since 2010.

ESCAPEMENT GOAL EVALUATION

ESCAPEMENT GOAL HISTORY

The *Salmon Escapement Goal Policy*, adopted by the department in 1992, established the formal process for setting escapement goals and required publication of the goals (Fried 1994). The escapement goals for these systems were adopted in 1993 and were set as point biological escapement goals representing the escapement that produced the greatest yield. The goals were calculated as 66% of the average escapement index. The escapement index for each river is a single, aerial survey conducted by rotary-wing aircraft. A percentage of the average was used because biologists felt that the escapements used in calculating the average were generally above the level needed to sustain high average long-term production. The escapement estimates used in the averages occurred during 1979–1992, except for various years when conditions were too poor at particular rivers.

SPAWNER DATA AND SEG ANALYSIS

Per the *Policy for Statewide Salmon Escapement Goals* adopted in 2001 (5 AAC 39.223), spawner and return data were reviewed in 2001 to determine the type (BEG or SEG) of escapement goal and recommend an escapement goal range for Chuitna, and Theodore rivers king salmon. King salmon harvest data are available for these systems for the sport fishery only (Table 1). Some marine harvest of these stocks is likely in the adjacent Tyonek subsistence and Northern District setnet king salmon fisheries, but the stock contributions of these fisheries have never been fully determined. In addition, escapements are indexed via rotary-wing aerial survey rather than estimated (e.g., weir count, sonar, mark-recapture), so total annual returns cannot be estimated. No age composition data are available from harvests or escapements. Based on the limitations of these data, the escapement goal policy indicates that a SEG be set based on 5 AAC 39.223 (a)(3): “establish sustainable escapement goals (SEG) for salmon stocks for which the department can reliably estimate escapement levels when there is not sufficient information to enumerate total annual returns and the range of escapements that are used to develop BEGs.”

Chuitna River

Twenty years of spawner index counts between 1979 and 2000 were inspected and found to have fair data quality, with a high contrast of 8.4 (ratio of highest escapement to lowest escapement)

and a moderate level of exploitation. This indicated that the SEG range should be set from the 25th and 75th percentiles of the escapement data and rounded to the nearest 100 fish. The 25th percentile was 1,225 fish and the 75th percentile was 2,890, for an SEG range of 1,200 to 2,900 fish (Bue and Hasbrouck *Unpublished*). The goal has not changed since 2003.

Theodore River

Twenty-one years of spawner index counts between 1979 and 2000 were inspected and found to have fair data quality, with a medium contrast of 6.0. This indicated that the SEG range should be set from the 15th and 85th percentiles of the escapement data. The 15th percentile was 535 fish and the 85th percentile was 1,607, for an SEG range of 500 to 1,700 fish (Bue and Hasbrouck *Unpublished*). The goal has not changed since 2003.

ESCAPEMENT GOAL RECOMMENDATION

For the 2019-2020 review of the Chuitna River king salmon SEG, the committee updated the escapement time series only through 2015; aerial counts in the last three years are very low and we have not seen returns from them yet; therefore, we do not have information on whether they produce sustained yields. The percentile approach (Clark et al. 2014) was applied to the data set, and the committee recommends the SEG for Chuitna River king salmon be updated to 1,000–1,500. For the 2019-2020 review of the Theodore River king salmon SEG, the committee updated the escapement time series only through 2014; aerial counts in the last four years are very low and we have not seen returns from them yet; therefore, we do not have information on whether they produce sustained yields. The percentile approach (Clark et al. 2014) was applied to the data set, and the committee recommends the SEG for Theodore River king salmon be updated to 500–1,000.

STOCK OF CONCERN RECOMMENDATION

The Chuitna River has made its king salmon escapement goal in 5 of the past 7 years. Theodore River missed the goal in all 7 of 7 years. Escapements of king salmon to these rivers were compared to the current SEG range for each system as follows: Chuitna River—1,200 to 2,900 fish, and Theodore River—500 to 1,700 fish. Regulatory changes adopted in the 1995–1996 board meeting cycle and the most recent inseason management actions taken during the 2010 fishing season to correct this trend have proven to be insufficient to achieve the current SEG. Therefore, in October 2010, the department recommended that the board designate Chuitna, Theodore, and Lewis rivers king salmon as stocks of management concern at the regulatory board meeting for Upper Cook Inlet in February 2011.

OUTLOOK

The department does not develop a formal forecast of northern-bound king salmon stocks, but based upon recent run performance, king salmon abundance is likely to be below the long-term average.

HABITAT ASSESSMENT

Activities affecting fish habitat in WCI between the Beluga and Susitna rivers have been relatively minor and related primarily to access road maintenance of gas production facilities in the Beluga area. Recent projects included stabilizing the banks of the Theodore River directly upstream of the bridges and clearing debris from bridge supports. These activities likely have had minimal impact to area fish stocks. There are no known upcoming projects that would have significant impacts on Chuitna, and Theodore rivers.

Proposed coal mining on the upper Chuitna River drainage could negatively affect fish habitat. The proposed coal mine would directly impact about half of one tributary's watershed, including about 11 miles of spawning and rearing habitat, and potentially impact two adjacent tributaries, all associated with king salmon spawning. Potential impacts affecting king salmon include: increased sediment input and water temperature downstream of the project, reduction of marine- and terrestrial-derived nutrient input into the system, changes in water chemistry and to ground and surface waters, and wastewater discharges from mine and camp facilities. The development is in the pre-permitting phase and no permit applications have been submitted to date. Environmental baseline studies are ongoing and potential impacts have not been thoroughly evaluated.

FISHERIES MANAGEMENT OVERVIEW AND BACKGROUND

SPORT FISHERIES

The Chuitna River is the most productive king salmon river flowing into the West Cook Inlet Management Area (WCIMA). This river system is a small- to medium-sized clearwater system initiating in the foothills of the Alaska Range, generally flowing in a southeasterly direction and emptying into WCIMA near the community of Tyonek. There are two sport fish lodge operations that target Chuitna River king salmon, as well as several sport fish guide operations.

The Theodore River is a small clearwater systems initiating in the foothills of Little Mount Susitna, flowing into WCIMA. This system is pristine, with almost no human disturbances or development, and access is limited to aircraft or boat because there is no road link to the Southcentral Alaska road system. Historically, these systems were a popular sport fishing destination for king salmon anglers, with the Theodore River being the second-most productive king salmon system in WCIMA.

Past Sport Fisheries Management Actions

The commissioner may, by EO, change bag and possession limits and annual limits, and alter methods and means in sport fisheries (5 AAC 75.003). These changes may not reduce the allocation of harvest among other user groups. An EO may not supersede provisions for increasing or decreasing bag and possession limits or change methods and means specified in regulatory management plans established by the board.

In the 1990s, escapement goals were not met for some streams (Figure 3). Reduced abundance of spawning king salmon in WCIMA in the early 1990s was probably due to elevated sport harvest and flood-related mortality of eggs and juveniles in 1986. Inspection of coastal streams after an October 1986 flood revealed substantial streambed scouring and channelization. In association

with flooding, there was severe erosion, landslides, and subsequent deposition of earth and debris into the streams. Beginning in the early 1990s, various EOs and regulatory changes were issued limiting the sport harvest of king salmon. Below is an outline of significant changes to sport fisheries that affected harvest and escapement of king salmon to the Chuitna, Theodore, and Lewis rivers:

1984:

- Opened to king salmon fishing.

1992:

- Annual limit of five king salmon established.
- Guides prohibited from fishing while engaged in guiding activities for king salmon.

1993:

- King salmon sport fishing season reduced by 13 days to end on June 30.
- Bag and possession limit was reduced from one per day/two in possession to one per day/one in possession.
- Designated specific upstream areas in Chuitna, Theodore, and Lewis rivers where king salmon could not be retained and use of bait prohibited.

1995:

- EO prohibiting the use of bait during king salmon season and allowing sport fishing only between the hours of 6:00 a.m. and 11:00 p.m.

1996:

- Lewis River closed to sport fishing, including catch-and-release, for king salmon.

1997:

- Theodore River closed to sport fishing, including catch-and-release, for king salmon.
- In all fresh waters of WCI, after taking a king salmon 16 inches or greater in length, a person was prohibited from fishing for king salmon during that same day.

1999:

- Anglers allowed to continue fishing for king salmon after they harvested their limit.
- Opened lower Theodore River to catch-and-release fishing for king salmon from January 1 through June 30, only single-hook artificial lures allowed. Bait is prohibited.
- Fishing allowed only between the hours of 6:00 a.m. and 11:00 p.m.

2002:

- Theodore and Lewis rivers were opened in their entirety to catch-and-release fishing for king salmon. No bait, single hook only.

2010:

- EO closed sport fishing, including catch-and-release, for king salmon on Chuitna, and Theodore, and Lewis rivers.

2011–2019: Chuitna, Theodore, and Lewis rivers closed to fishing for king salmon by regulation.

COMMERCIAL FISHERIES

Some marine harvest of Chuitna, Theodore, and Lewis river king salmon stocks is likely in the adjacent Northern District setnet king salmon fishery, but the stock contribution of this fishery has never been fully determined. The current management plans pertinent to king salmon returning to these rivers are:

5 AAC 21.363. *Upper Cook Inlet Salmon Management Plan.*

5 AAC 21.366. *Northern District King Salmon Management Plan.*

The Northern District king salmon fishery opens for commercial fishing beginning on the first Monday on or after May 25, continuing through June 24, unless closed earlier by EO. Fishing periods are from 7:00 a.m. to 7:00 p.m. on Mondays. Set gillnets may not exceed 35 fathoms in length and six inches in mesh size, and no set gillnet may be set or operated within 1,200 feet of another set gillnet (twice the normal 600 feet in the Northern District sockeye salmon fishery). The most productive waters for commercial harvest of king salmon are found from one mile south of the Theodore River to the mouth of the Susitna River; however, this area is open to fishing for the second regular Monday period only (Figure 5). The harvest may not exceed 12,500 king salmon.

If the Theodore, Lewis, or Ivan rivers are closed to sport fishing, the area from an ADF&G regulatory marker located one mile south of the Theodore River to the Susitna River shall be closed to commercial king salmon fishing for the remainder of the directed king salmon fishery. If the Deshka River is closed to sport fishing, the commercial king salmon fishery throughout the Northern District shall be closed for the remainder of the directed king salmon fishery. If the Chuitna River is closed to sport fishing, the area from the wood chip dock (located approximately 2 miles south of Tyonek) to the Susitna River shall be closed to commercial king salmon fishing for the remainder of the directed king salmon fishery.

Past Commercial Fisheries Management Actions

The *Northern District King Salmon Management Plan* was first adopted in 1986 and has been changed at various board meetings. In the early 1990s, various EOs and regulatory changes were issued limiting the commercial harvest of king salmon. Prior to 2002, the Northern District commercial king salmon fishing season was the month of June, and fishing was allowed for six hours each Monday unless 12,500 king salmon were harvested or until the season closed on June 24. In 2005, fishing time was increased from six to twelve hours due in part to fewer registered users and a trend of increasing king salmon runs.

Below is an outline of significant changes to commercial fisheries that may have affected harvest and escapement of king salmon returning to the Chuitna, Theodore, and Lewis rivers:

1994

- Closed final commercial fishing period by EO.

1995

- Commercial fishing limited by EO to only one period.

1996

- Commercial fishing limited by EO to only one period.

1997

- Season closure of Northern District commercial salmon fishery from one mile south of Theodore River to the mouth of Susitna River.
- Commercial fishing in remainder of Northern District limited by EO to only one period.

1998

- Season closure of Northern District commercial salmon fishery from one mile south of Theodore River to the mouth of Susitna River.
- Commercial fishing in remainder of Northern District limited by EO to two periods.

1999

- Northern District commercial king salmon season opened June 1 through June 24.
- The area from one mile south of the Theodore River to the Susitna River opened the first Monday in June only.

2002

- Northern District commercial king salmon fishery opened on or after May 25, but not to exceed three fishing periods.
- The area from one mile south of the Theodore River to the Susitna River opened on the second fishing period only.

2005

- Increased commercial fishing periods from six hours to twelve hours.

2008

- Increased commercial fishing periods from three periods to four or five periods by extending the season through June 24.
- Closed fifth commercial fishing period by EO.

2009

- Reduced first two fishing periods from 12 hours to 6 hours by board emergency regulation.
- Closed fourth and fifth commercial fishing period by EO.

2010

- Closure of Northern District commercial salmon fishery from one mile south of Chuitna River to the mouth of Susitna River by EO.
- Third commercial fishing period reduced from 12 hours to 6 hours.

2011

- Closed that portion of the General Subdistrict of the Northern District from a point at the wood chip dock located approximately three miles south of Tyonek to the Susitna River.

2012:

- Reduced fishing time in all areas of the Northern District commercial king salmon fishery from 12 to 6 hours per open period.
- Closed that portion of the General Subdistrict of the Northern District from a point at the wood chip dock located approximately three miles south of Tyonek to the Susitna River.
- Closed Northern District commercial king salmon fishing period of June 25.

2013:

- Closed all of Northern District commercial king salmon fishery for May 27.
- Reduced fishing time in all areas of the Northern District commercial king salmon fishery from 12 to 6 hours per open period.
- Closed that portion of the General Subdistrict of the Northern District from a point at the wood chip dock located approximately three miles south of Tyonek to the Susitna River.

2014:

- Closed all of Northern District commercial king salmon fishery for May 26.
- Reduced fishing time in all areas of the Northern District commercial king salmon fishery from 12 to 6 hours per open period.
- Closed that portion of the General Subdistrict of the Northern District from a point at the wood chip dock located approximately three miles south of Tyonek to the Susitna River.

2015:

- Closed all of Northern District commercial king salmon fishery for May 25.
- Reduced fishing time in all areas of the Northern District commercial king salmon fishery from 12 to 6 hours per open period.
- Closed that portion of the General Subdistrict of the Northern District from a point at the wood chip dock located approximately three miles south of Tyonek to the Susitna River.
- Restored Northern District commercial king salmon fishery to 12 hours for June 15 and 22; not including area from wood chip dock to the Susitna River.

2016:

- Reduced fishing time in all areas of the Northern District commercial king salmon fishery from 12 to 6 hours per open period.
- Closed that portion of the General Subdistrict of the Northern District from a point at the wood chip dock located approximately three miles south of Tyonek to the Susitna River.

2017:

- Closed that portion of the General Subdistrict of the Northern District from a point at the wood chip dock located approximately three miles south of Tyonek to the Susitna River.
- Reduced fishing time in all areas of the Northern District commercial king salmon fishery from 12 to 6 hours per open period on June 19.

2018:

- Closed all of Northern District commercial king salmon fishery
- Closed Northern District commercial king salmon fishing period on June 25.

2019:

- Closed all of Northern District commercial king salmon fishery.

SUBSISTENCE FISHERIES

In 1981, the board made a positive customary and traditional use finding for salmon in the Tyonek Subdistrict (5 AAC 01.566 (a)(1)(A)) and set an amount necessary for subsistence at 850–3,600 salmon (ADF&G 1995:33). In an administrative finding made in November 1992, the board established the following amounts as reasonably necessary for subsistence for this fishery: 750–2,750 king salmon, 100–275 sockeye salmon, 50–100 chum salmon, 50–100 pink salmon, and 100–375

coho salmon. In 2011, the board specified the amounts of salmon reasonably necessary for subsistence in the Tyonek Subdistrict as 700–2,700 king salmon and 150–500 other salmon. Subsistence fishing is allowed only in the Tyonek Subdistrict of the Northern District, which includes salt waters adjacent to the community of Tyonek on WCI. Subsistence fishing is open during two seasons per year. The early season, which runs from May 15 through June 15, is open for three periods per week—Tuesdays, Thursdays, and Fridays—and for 16 hours per period, from 4:00 a.m. through 8:00 p.m. The late season, which runs from June 16 through October 15, is open for one period per week—Saturday—and for 12 hours, from 6:00 a.m. to 6:00 p.m.

A subsistence fishing permit is required and there are separate permits for each season of the fishery. The permit is a household permit. The total annual possession limit for each permit is 25 salmon per head of household and 10 salmon for each dependent of the household member. In addition, the holder of a Tyonek permit may take 70 additional king salmon.

Past Subsistence Fishery Management Actions

There have been no restrictions prior to 2019 to the subsistence fishing season or methods taken on this fishery since regulations were adopted in 1980. In 2019 the fishery was restricted by closing one (Tuesdays) of the three open days per week.

MANAGEMENT ACTION PLAN OPTIONS FOR ADDRESSING STOCK OF CONCERN

ACTION PLAN GOAL

To rebuild the Chuitna and Theodore rivers king salmon runs back to levels that achieve the current SEG range.

ACTION PLAN ALTERNATIVES

Potential management actions described below, other than status quo, are allocative and do not necessarily reflect endorsement by the department. The benefits and detriments described below are intended to reflect only those related to the goal of rebuilding king salmon to levels that achieve the current SEG range for Chuitna and Theodore rivers.

ACTION #1 – SPORT FISHERY

Objective: Reduce harvest and catch-and-release mortality of sport-caught king salmon.

Background: Prior to 2011, the Chuitna River was open to king salmon harvest downstream of the old cable crossing from January 1 through June 30. Waters upstream of the old cable crossing were open to catch-and-release only for king salmon. The king salmon bag limit was one per day, one in possession for fish 20 inches or greater in length; ten per day, ten in possession for fish less than 20 inches in length; and there was a five fish annual limit for fish 20 inches or greater in

length. The Chuitna, Theodore, and Lewis rivers have been closed to sport fishing, including catch-and-release, for king salmon by regulation since 2011.

Option A. – Status Quo

Continue to keep sport fisheries closed by regulation to rebuild these stocks from the extended period of low productivity.

Specific Action to Implement the Object None.

Benefits: Provides regulatory clarity and maximum protection for west Cook Inlet king salmon stocks.

Detriments: Eliminating harvest may not be enough to restore a stock to historical production levels if harvest is not the only factor limiting escapement. Environmental factors that play a role in salmon production may be outside the scope of this plan.

ACTION #2 – COMMERCIAL FISHERY

Objective: Reduce commercial harvest of king salmon.

Background: The Northern District king salmon fishery opens for commercial fishing beginning on the first Monday on or after May 25, continuing through June 24, unless closed earlier by EO. There are four or five fishing periods annually, depending on the calendar year. Fishing periods are from 7:00 a.m. to 7:00 p.m. The commercial fishery is managed to not exceed a harvest limit of 12,500 king salmon. The recent Northern District directed king salmon commercial fishery average harvest is 1,309 fish (2012-2018) with a long-term average harvest of 2,067 fish (1993-2018) with a range of 0 to 3,855 fish. It is unknown what proportion of these fish are from the Chuitna and Theodore rivers. In 2018 and 2019 the entire Northern District directed king salmon commercial fishery was closed by EO.

The *Northern District King Salmon Management Plan* (5 AAC 21.366) contains three provisions closing waters of the northern district by EO contingent on closures to sport fisheries:

- If the Theodore, Lewis, or Ivan rivers are closed to sport fishing, the area from an ADF&G regulatory marker located one mile south of the Theodore River to the Susitna River shall close to commercial king salmon fishing for the remainder of the directed king salmon fishery.
- If the Dëshka River is closed to sport fishing, the Northern District shall close commercial king salmon fishing for the remainder of the directed king salmon fishery.
- If the Chuitna River is closed to sport fishing, the area from an ADF&G regulatory marker located one mile south of the Chuitna River (Wood Chip Dock) to the

Susitna River shall close to commercial king salmon fishing for the remainder of the directed king salmon fishery.

Option A. – Status Quo

The Division of Commercial Fisheries will continue to manage this fishery as directed in the *Northern District King Salmon Management Plan*. Commercial fishing closures on northern-bound stocks would be dependent on sport fishing management actions and previous seasons' index counts and general regionwide trends, and EO authority would be used to close the Northern District commercial salmon fishery from one mile south of Chuitna River to the mouth of Susitna River when sport fishing is closed for king salmon on the Chuitna or Theodore rivers.

Specific Action to Implement the Object: Use EO authority to close Northern District commercial salmon fishery in designated areas when sport fishing is closed for king salmon on the Chuitna or Theodore rivers.

Benefits: The benefit of providing the department the flexibility to manage Northern District directed king salmon fisheries with EO authority is retaining the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting.

Detriments: Emergency order actions are reactive to actions taken in the sport fishery. Emergency orders need to be taken preseason annually because the sport fisheries are closed in regulation.

Option B. – Close Designated Areas of Northern District Commercial Fishery in Regulation When Sport Fishing is Closed for King Salmon on the Chuitna, Theodore, Lewis, or Ivan Rivers

Northern District King Salmon Management Plan directs the department to close waters of the Northern District commercial salmon fishery when sport fishing is closed for king salmon on the Chuitna, Theodore, Lewis, or Ivan rivers. Regulatory action is required based on restrictions to the sport fishery, but the department enacts those restrictions by EO.

Specific Action to Implement the Object: Board action to the *Northern District King Salmon Management Plan* to close the Northern District commercial salmon fishery in designated areas when sport fishing is closed for king salmon rather than requiring the department to issue an EO.

Benefits: The benefit of providing clarity for an action already in regulation.

Detriments: None

Option B. – Reduce Hours of Commercial Fishing Periods

Current fishing periods are from 7:00 a.m. to 7:00 p.m.

Specific Action to Implement the Object: Take board action to reduce commercial fishing periods to less than twelve hours in length.

Benefits: Reducing the Northern District king salmon commercial fishing time would increase king salmon escapements in the Chuitna and Theodore rivers by an unknown amount.

Detriments: The harvest of king salmon of these stock origins would still occur and may not be lower than historical harvest ranges.

Option C. – Reduce Number of Directed Commercial Fishing Periods

Current directed fishing periods are four or five periods per year, depending on the calendar year.

Specific Action to Implement the Object: Take board action to reduce commercial fishing periods to fewer than four or five directed periods annually.

Benefits: Reducing the Northern District king salmon commercial fishing time would increase king salmon escapements in the Chuitna and Theodore rivers by an unknown amount.

Detriments: The harvest of king salmon of these stock origins would still occur and may not be lower than historical harvest ranges.

Option D. – Close Specific Fishing Areas

Past commercial fishing management actions have focused on closing areas near the Chuitna, Theodore, or Lewis rivers.

Specific Action to Implement the Object: Take board action to reduce areas open to commercial king salmon fishing.

Benefits: Reducing the area open to commercial fishing would increase king salmon escapements the Chuitna and Theodore rivers by an unknown amount.

Detriments: The harvest of king salmon of these stock origins would still occur and may not be lower than historical harvest ranges.

Option E. – Close All Directed King Salmon Commercial Fishing in the Northern District

The entire Northern District would be closed until the start of the sockeye salmon season on June 25.

Specific Action to Implement the Object: Take board action to close commercial fishing in the Northern District until June 25.

Benefits: This could result in a harvest savings of 1,100 to 3,900 Northern District king salmon and an unknown increase in escapement to the Chuitna, Theodore, or Lewis rivers because the contribution of this stock to commercial fisheries has never been fully determined.

Detriments: If harvest is not the only factor limiting escapement, then this action is not a long-term solution. Closing the ND fishery may still not result in achieving escapement goals.

ACTION #3 – SUBSISTENCE FISHERY

Objective: Reduce subsistence harvest of king salmon.

Background: The subsistence fishing season operates in two parts. The first part, which focuses on king salmon, is open from 4:00 a.m. through 8:00 p.m. on Tuesdays, Thursdays, and Fridays from May 15–June 15. The second part is open from 6:00 a.m. through 6:00 p.m. on Saturdays from June 16–October 15. Allowable gear is one 10-fathom (60 ft) gillnet with mesh size no greater than six inches and 45 meshes in depth.

The board has determined that the current three day per week fishing period from May 15 through June 15 provides a reasonable opportunity for subsistence in the Tyonek Subdistrict subsistence fishery.

Option A. – Reduce Hours of Subsistence Fishing Periods

Current fishing periods are from 4:00 a.m. through 8:00 p.m.

Specific Action to Implement the Object: Take board action to reduce subsistence fishing periods to fewer than 15 hours in length.

Benefits: Reducing the subsistence fishing time would increase king salmon escapements in the Chuitna and Theodore rivers by an unknown amount.

Detriments: The harvest of king salmon of these stock origins will still occur and may not be lower than historical harvest ranges. Restricting area or time in the subsistence fishery may not provide a reasonable opportunity for subsistence.

Option B. – Reduce Number of Subsistence Fishing Periods

Current fishing periods are 3 days per week from May 15–June 15, for a total of 13–15 periods depending on the calendar year.

Specific Action to Implement the Object: Take board action to reduce subsistence fishing periods to fewer than 13–15 periods.

Benefits: Reducing subsistence fishing time would increase king salmon escapements in the Chuitna and Theodore rivers by an unknown amount.

Detriments: The harvest of king salmon of these stock origins will still occur and may not be lower than historical harvest ranges. Restricting area or time in the subsistence fishery may not provide a reasonable opportunity for subsistence.

2020 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING CHUITNA, AND THEODORE RIVERS

- Proposal 80- Prohibit retention of king salmon greater than 36” in the Upper Cook Inlet commercial gillnet fisheries
- Proposal 199- Amend the *Northern District King Salmon Management Plan*
- Proposal 200- Close the Northern District commercial king salmon fishery when the sport fishery in the Susitna or Knik Arm drainages are restricted
- Proposal 201- Amend paired restrictions in the Deshka River king salmon sport and commercial fisheries
- Proposal 202- Amend the *Northern District King Salmon Management Plan* to allow operation of one set gillnet per permit
- Proposal 203- Provide additional fishing periods in the Northern District king salmon commercial fishery when the Deshka River king salmon sport fishery is liberalized
- Proposal 205- Clarify the definition of “minimize” in the *Northern District Salmon Management Plan*
- Proposal 206- Amend the *Northern District Salmon Management Plan* to allow for regular amounts of set gillnet gear in the Northern District commercial sockeye salmon fishery during times of reduced effort in the Central District
- Proposal 207- Remove the Eastern Subdistrict gear restrictions in the *Northern District Salmon Management Plan*

RESEARCH PLAN

To date there has been little research directed at king salmon in the Chuitna and Theodore rivers. Aside from the current aerial survey program, estimates of harvest by user group, and ancillary information collected from king salmon during other projects, there has been no research to estimate the total abundance of king salmon or age composition information needed to better determine productivity parameters of this stock.

CURRENT RESEARCH PROJECTS

The following research programs have been and are being conducted to gather detailed information about king salmon stocks in the WCIMA:

1. West Cook Inlet King Salmon Genetic Baseline: From 2008 to the present the department has developed and refined a genetic baseline for king salmon in Alaska. As part of this program, Chuitna, Theodore, and Lewis rivers king salmon were identified as stocks to be

included in the genetic baseline. Recent published results from the department show that king salmon from WCI are distinguishable from many other Pacific Rim stocks, including other stocks within and outside Cook Inlet, using genetic stock identification methods (Barclay et al. 2019).

2. Aerial Surveys: The department plans to continue the single annual aerial surveys (helicopter) at the Chuitna and Theodore rivers to monitor trends in king salmon abundance.
3. King Salmon Weirs: The department obtained a project award from the Alaska Sustainable Salmon Fund (AKSSF) to conduct a 3-year study to obtain estimates of king salmon escapements by age/sex/length (ASL) 2012–2014. Secondly, this project was used to make comparisons with single aerial surveys. Floating weirs were placed in the Lewis and Theodore rivers to enumerate and collect biological data from Chinook and coho salmon. Although the weirs were inoperable for part of the project period due to high water and shifting substrate, Chinook salmon escapement counts were produced in 2012 for the Lewis River and 2012–2013 for the Theodore River.

Marine Harvest Sampling: The department received grant funding from AKSSF and the Pacific States Marine Fishery Commission to conduct a genetic stock identification project of Chinook salmon harvested in northern Cook Inlet marine waters. The Northern District commercial and Tyonek subsistence set gillnet fisheries were sampled for genetic tissue and ASL 2014–2017. Stock composition estimates were produced by area and reporting group for each year. In 2014 and 2015, the West Cook Inlet reporting group included the Yentna River due to technical genetic limitations (St. Saviour et al. 2019). For 2016 and 2017, new genetic techniques allowed for separation of Yentna from the West Cook Inlet reporting group and more informative results (St. Saviour et al. *in prep.*).

CONDITIONS FOR REDUCING MANAGEMENT RESTRICTIONS OR DELISTING A STOCK OF CONCERN

1. If the lower bound of the biological escapement goal range is met or exceeded in at least 3 consecutive years or is met in at least 4 out of 6 consecutive years, the department may recommend removing Chuitna and Theodore river king salmon as a stock of management concern at the first Upper Cook Inlet board meeting after this condition is met.
2. Management measures could be relaxed in specific areas if updated stock composition and harvest data indicates areas where restrictions are no longer needed to ensure the escapement goal is met.
3. In the event that two consecutive years of escapements are near the upper bound of the escapement goal range or above the range, management restrictions may be relaxed or set aside using EO authority.

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Table 1. West Cook Inlet Management Unit king salmon escapement index counts, 1979-2018.

Year	Chuitna River		Theodore River	
	Escapement	Harvest	Escapement	Harvest
1979	1,246	78	512	20
1980		^a 17		17
1981	1,362	115	535	77
1982	3,438	105	1,368	42
1983	4,043	1,185	1,519	0
1984	2,845	723	1,251	1,110
1985	1,600	734	1,458	1,195
1986	3,946	960	1,281	1,418
1987		^a 146	1,548	1,146
1988	3,024	312	1,906	1,137
1989	990	581	1,026	1,317
1990	480	1,064	642	748
1991	537	377	508	369
1992	1,337	516	1,053	522
1993	2,085	893	1,110	527
1994	1,012	530	577	581
1995	1,162	201	694	360
1996	1,343	844	368	183
1997	2,232	728	1,607	0
1998	1,869	551	1,807	0
1999	3,721	561	2,221	0
2000	1,456	513	1,271	0
2001	1,501	457	1,237	21
2002	1,394	629	934	0
2003	2,339	592	1,059	13
2004	2,938	333	491	0
2005	1,307	294	478	0
2006	1,911	445	958	0
2007	1,180	984	486	0
2008	586	46	345	0
2009	1,040	109	352	0
2010	735	0	202	0
2011	719	0	327	0
2012	502	0	179	0
2013	1690	0	476	0
2014	1398	0	312	0
2015	1965	0	426	0
2016	1372	0	68	0
2017	235	0	21	0
2018	939	0	18	0
<u>Averages</u>				
1979–2018	1,671	391	837	270
2009–2018	1,060	11	238	0
2014–2018	1,128	0	133	0
SEG ^b	1,200-2,900		500-1,700	

^a No count conducted, turbid water.

^b SEG = sustainable escapement goal.

Table 2.—Tyonek subsistence gillnet salmon harvest, 1980-2018.

Year	Permits		Estimated salmon harvests					Total
	Issued	Returned	King	Sockeye	Coho	Chum	Pink	
1980	67	67	1,936	262	0	0	0	2,198
1981	70	70	2,002	269	64	32	15	2,382
1982	69	69	1,590	310	113	4	14	2,031
1983	73	73	2,755	251	78	6	0	3,090
1984	70	70	2,364	310	66	23	3	2,766
1985 ^a	176	ND	1,967	163	91	10	0	2,231
1986 ^a	101	ND	1,674	198	210	44	45	2,171
1987	64	61	1,689	174	156	25	10	2,055
1988	47	42	1,776	102	283	13	9	2,183
1989	49	47	1,303	89	120	1	0	1,513
1990	42	37	886	75	400	14	23	1,397
1991	57	54	925	20	69	0	0	1,014
1992	57	44	1,170	96	294	24	9	1,594
1993	62	54	1,566	68	88	25	23	1,769
1994	58	49	905	101	122	27	0	1,154
1995	70	55	1,632	54	186	18	0	1,891
1996	73	49	1,615	88	177	9	27	1,917
1997	70	42	1,051	200	241	13	0	1,505
1998	74	49	1,430	251	97	3	2	1,783
1999	77	54	1,620	247	175	20	66	2,127
2000	60	47	1,461	78	103	0	8	1,649
2001	84	58	1,450	254	72	9	6	1,790
2002	101	71	1,609	314	162	6	14	2,106
2003	87	74	1,384	136	54	12	9	1,595
2004	97	75	1,751	121	168	0	0	2,040
2005	78	67	1,183	65	159	2	0	1,409
2006	82	55	1,366	32	23	1	0	1,422
2007	84	67	1,526	249	164	3	4	1,946
2008	94	77	1,492	146	227	11	16	1,892
2009	89	69	817	229	320	2	1	1,369
2010	105	77	1,116	281	223	3	3	1,626
2011	114	63	851	202	34	10	10	1,107
2012	89	69	1,102	223	174	3	5	1,507
2013	82	48	1,352	278	311	0	32	1,973
2014	92	73	896	487	575	15	5	1,978
2015	83	72	1,070	505	568	16	6	2,165
2016	74	64	1,030	188	225	8	12	1,462
2017	74	49	1,304	442	306	31	6	2,089
2018	65	27	1,308	188	136	10	7	1,649
5-year average (2014–2018)	78	57	1,122	362	362	16	7	1,869
10-year average (2009–2018)	87	61	1,085	302	287	10	9	1,693
Historical average (1981–2018)	79	59	1,421	197	185	12	10	1,825

Source ADF&G Division of Subsistence, ASFDB 2018 (ADF&G 2019).

a Harvests were not expanded due to unknown permit returns.

ND = no data

Table 3. Northern District commercial king salmon directed harvest by statistical area, 2002–2019.

Year	Date	247-10	247-20	247-30	24-741	247-42	247-43	247-70	247-80	247-90	Total
2002	27-May	95			13	60	4	37	56	5	270
	3-Jun	223	136	85	87	57	16	64	70	72	810
	10-Jun	159	131		34	104	3	63	115	58	667
	Totals	477	267	85	134	221	23	164	241	135	1747
2003	26-May	18		36	37	45		24		19	179
	2-Jun	5	101	4	45	43	54	74	17	6	349
	9-Jun	47	396	67	53	49	2	33	9	1	657
	Totals	70	497	107	135	137	56	131	26	26	1185
2004	31-May	74	33	17	30	43	40	108		9	354
	7-Jun	62	285	147	266	101	82	100		23	1066
	14-Jun		137	47	46	56	38	59		16	399
	Totals	136	455	211	342	200	160	267		48	1819
2005	30-May	166	320		224	203	85	160		5	1163
	6-Jun	103	430	290	97	60	69	65	18	31	1163
	13-Jun	26	391		98	113	129	33	34		824
	Totals	295	1141	290	419	376	283	258	52	36	3150
2006	29-May	174	133	20	76	47	78	80	19	13	640
	5-Jun	322	312	150	247	108	74	127	23	13	1376
	12-Jun	335	489	212	165	116	232	204	79	39	1871
	Totals	831	934	382	488	271	384	411	121	65	3887
2007	28-May	178	99	21	15	42	7	78	28	30	498
	4-Jun	237	162	228	131	94	124	240	36	18	1270
	11-Jun	94	366	126	120	87	181	346	24	20	1364
	Totals	509	627	375	266	223	312	664	88	68	3132
2008	26-May	39	272	42	33	16	27	35	24	11	499
	2-Jun	110	165	49	72	50	37	96	7	11	597
	9-Jun	103	535	143	275	208	153	168	72	31	1688
	16-Jun	118	282	138	162	81	110	132	33	15	1071
	Totals	370	1254	372	542	355	327	431	136	68	3855
2009	25-May		28	14	6	3	1	24	3		79
	1-Jun	111	147	36	12	24	15	68	32	10	455
	8-Jun	148	181	94	64	101	56	77	3	8	732
	Totals	259	356	144	82	128	72	169	38	18	1266
2010	31-May	141	102		43	48	42	32	5	20	433
	7-Jun	180	302		71	63	71	74	22	19	802
	14-Jun		61		8	54	25	19	8	5	180
	21-Jun	17	147		2	23	39	20	7	4	259
	Totals	338	612		124	188	177	145	42	48	1674

Table 3. Continued

2011	30-May	118	85	57	73	129	55	29	6	552
	6-Jun	305	192	51	53	112	64	19	25	821
	13-Jun	132	208	31	60	72	66	18	13	600
	20-Jun	27	83	18	20	32	22	3	9	214
	Totals	582	568	157	206	345	207	69	53	2187
2012	28-May	129	20	7	5	2	32	9	8	212
	4-Jun	35	27	36	26	44	40		6	214
	11-Jun	252	101	16	29	11	58	19	5	491
	18-Jun	10	34	12	14	16	20		7	113
	Totals	426	182	71	74	73	150	28	26	1030
2013	3-Jun	117		91	75	51	24	9		367
	10-Jun	179		52	74	51	87	14	12	469
	17-Jun	121		16	13	15	55	8	4	232
	24-Jun	44		3	13				6	66
	Totals	461		162	175	117	166	31	22	1134
2014	2-Jun	125	38	39	40	43	92	74	30	481
	9-Jun	263		37	45	71	22	10	3	451
	16-Jun	103		15	39	32	48	14	6	257
	23-Jun	41	95	8	23	5	10	3	3	188
	Totals	532	133	99	147	151	172	101	42	1377
2015	1-Jun	83	38	52	38	93	39	25	9	377
	8-Jun	92	76	48	27	85	72	41	22	463
	15-Jun	93	80	58	80	75	38	5	7	436
	22-Jun	86	29	34	33	51	37	10	4	284
	Totals	354	223	192	178	304	186	81	42	1560
2016	30-May	315	170	39	5	45	131	23	23	751
	6-Jun	43	177	1	46	19	76		6	368
	13-Jun	152	74	32	52	101	173		16	600
	20-Jun	42	93	11	37	55	71	1	1	311
	Totals	552	514	83	140	220	451	24	46	2030
2017	29-May	36	81	4	23	62	35	13	3	257
	5-Jun	291	97	7	80	111	151	25	4	766
	12-Jun	160	287	28	33	99	88	24	17	736
	19-Jun	37	107	14	37	43	27	3	4	272
	Totals	524	572	0	53	173	315	301	65	28
2018	Closed									
2019	Closed									

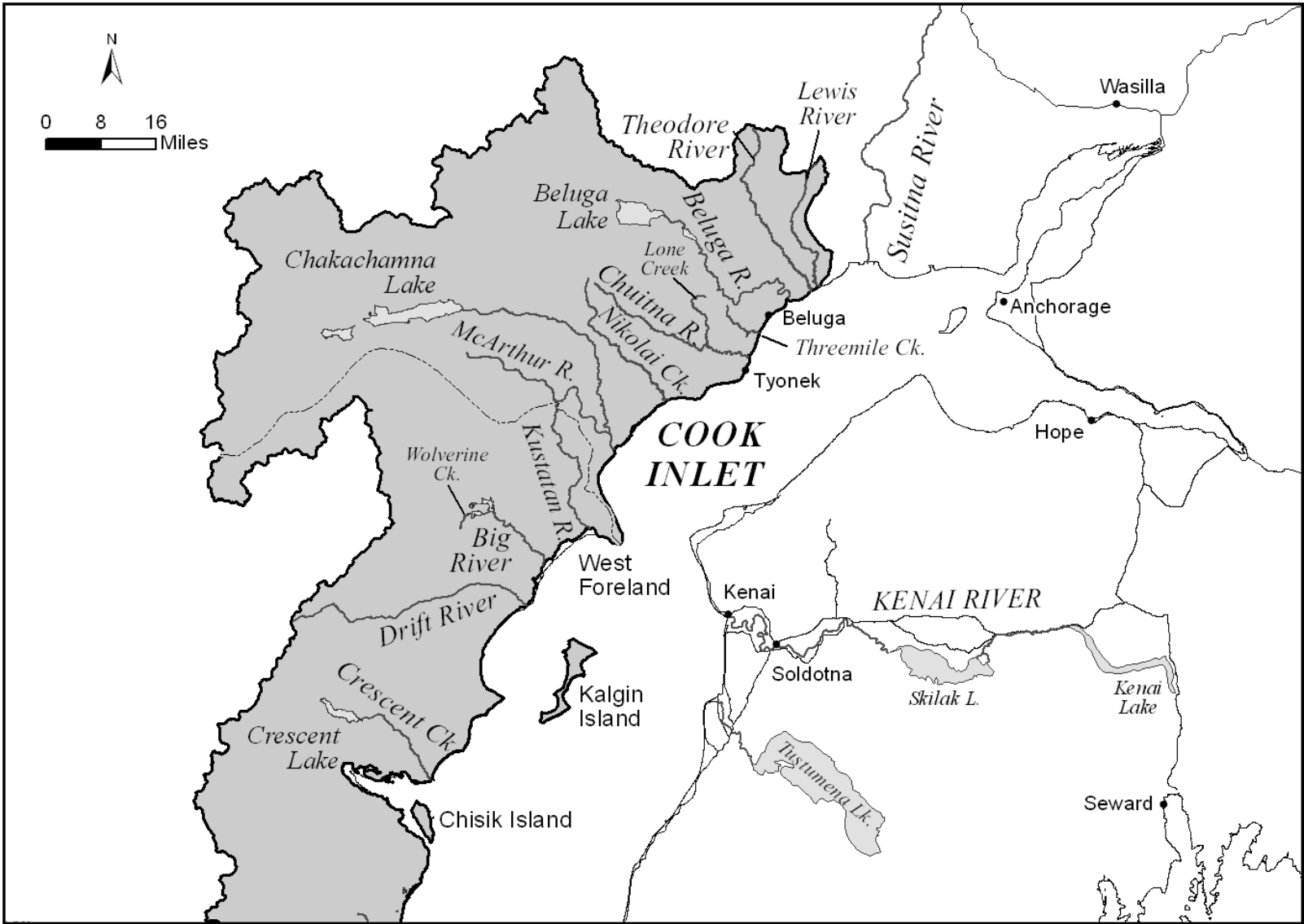


Figure 1. Map depicting West Cook Inlet king salmon streams.

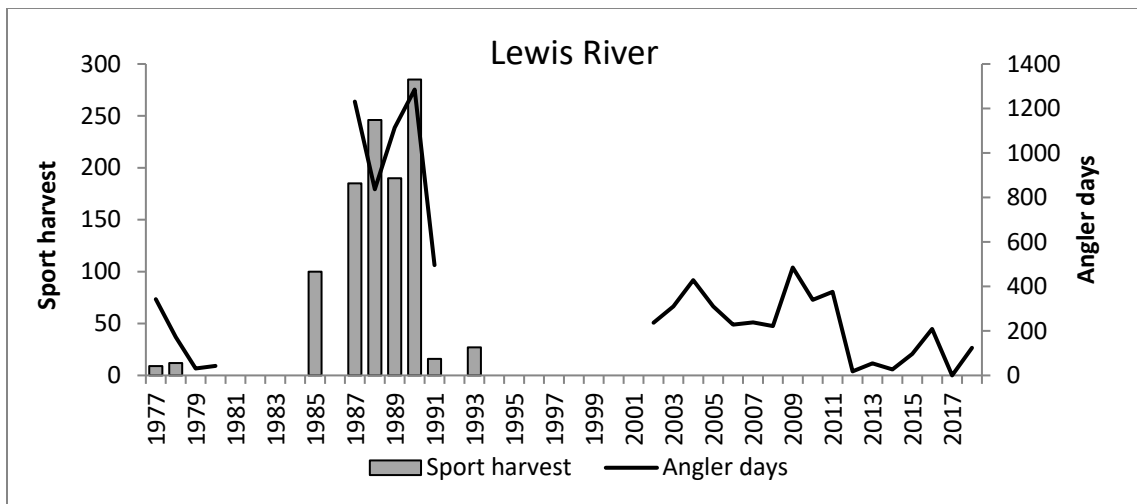
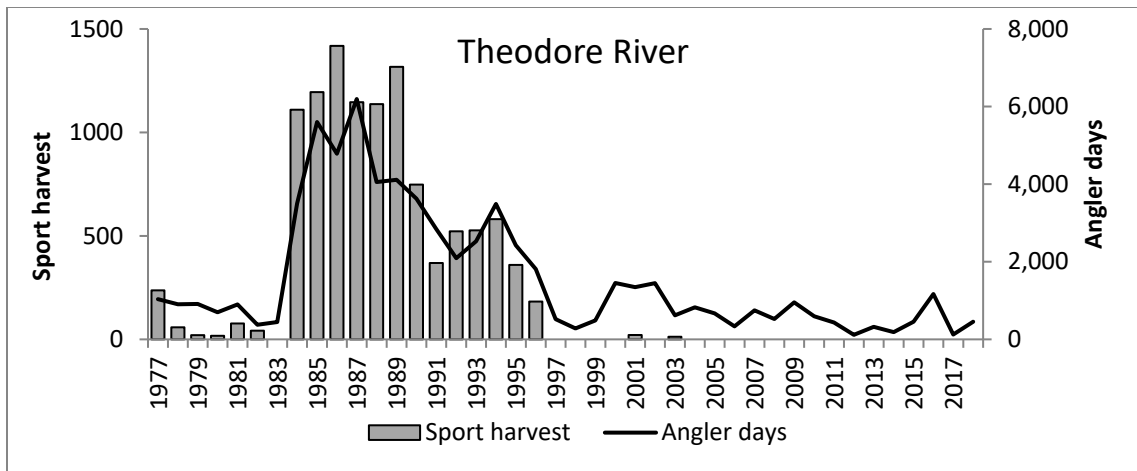
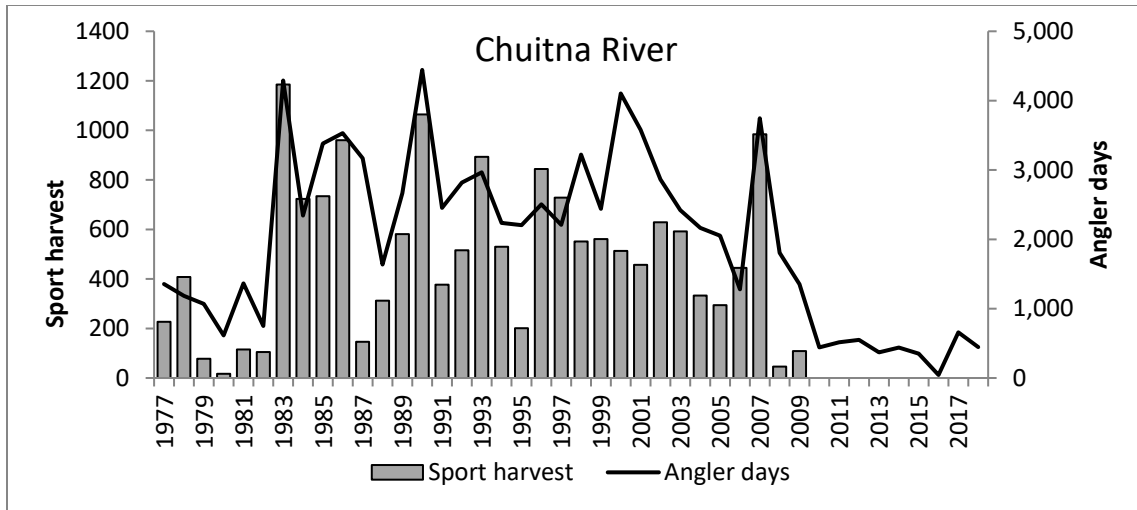


Figure 2. Sport harvest and angler effort estimates for Chuitna, Theodore, and Lewis rivers king salmon, 1977–2017.

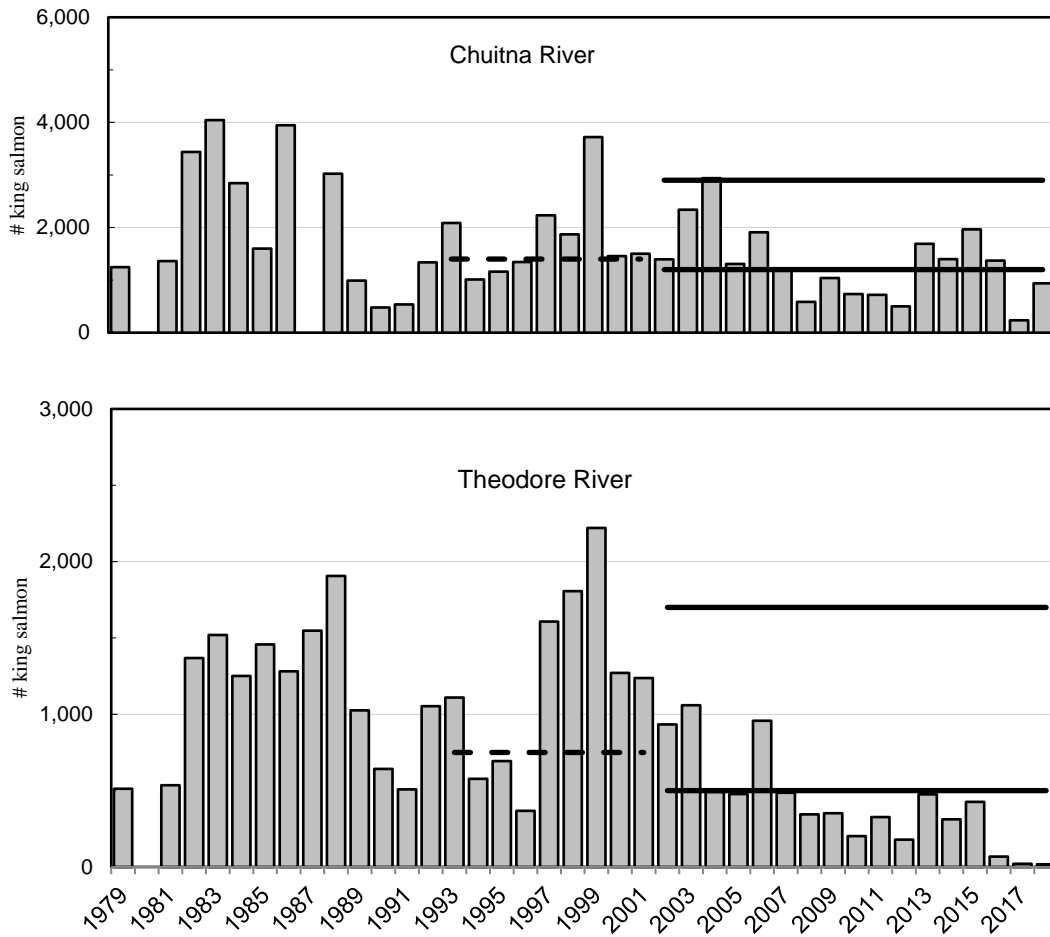


Figure 3.—King salmon escapements at major West Cook Inlet freshwater drainages, 1979-2018. y-axis = King salmon escapement (in number of fish). Dashed line = biological escapement goal. *Solid line* = sustainable escapement goal.

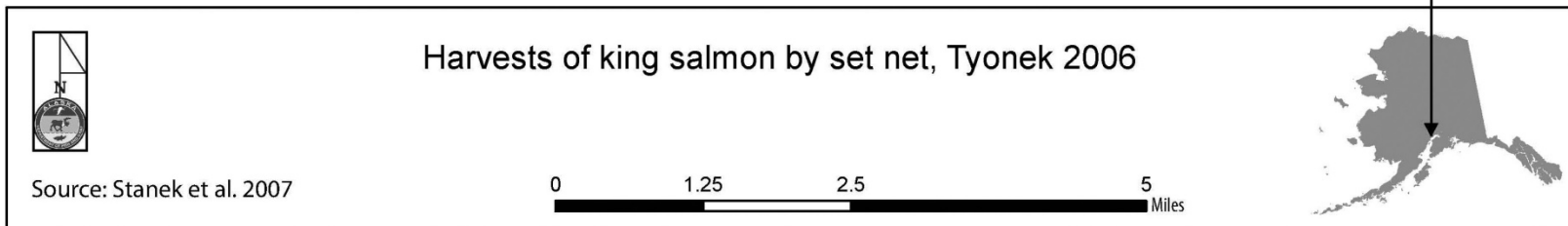


Figure 4. Map showing harvest locations of king salmon by set gillnet, Tyonek Subdistrict subsistence salmon fishery, 2006.

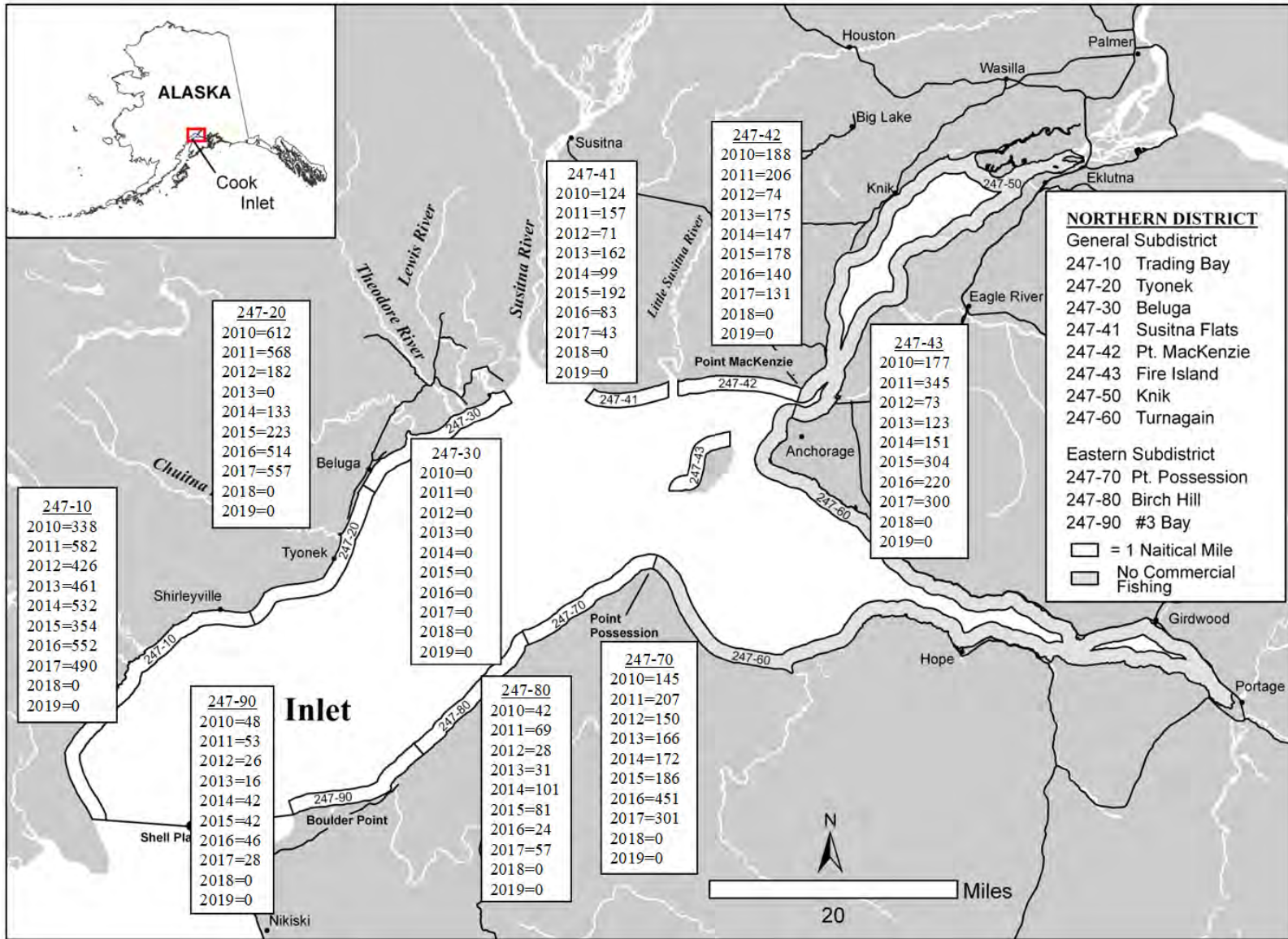


Figure 5. Northern District statistical harvest reporting areas and commercial directed king salmon harvest, 2010–2019.