

# Report to the Alaska Board of Fisheries

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## Sheep Creek and Goose Creek King Salmon Stock Status and Action Plan, 2014

By

Cook Inlet Staff

January 2014

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Alaska Department of Fish and Game



## Symbols and Abbreviations

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<b>Weights and measures (metric)</b>		<b>General</b>		<b>Mathematics, statistics, fisheries</b>	
Centimeter	cm	All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.	alternate hypothesis	H <sub>A</sub>
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, $\chi^2$ , 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
		Company	Co.	divided by	÷ or / (in equations)
<b>Weights and measures (English)</b>		Corporation	Corp.	equals	=
cubic feet per second	ft <sup>3</sup> /s	Incorporated	Inc.	expected value	E
foot	ft	Limited	Ltd.	fork length	FL
gallon	gal	et alii (and other people)	et al.	greater than	>
inch	in	et cetera (and so forth)	etc.	greater than or equal to	≥
mile	mi	exempli gratia (for example)	e.g.,	harvest per unit effort	HPUE
ounce	oz	id est (that is)	i.e.,	less than	<
pound	lb	latitude or longitude	lat. or long.	less than or equal to	≤
quart	qt	monetary symbols (U.S.)	\$, ¢	logarithm (natural)	ln
yard	yd	months (tables and figures): first three letters	Jan, ..., Dec	logarithm (base 10)	log
Spell out acre and ton.		number (before a number)	# (e.g., #10)	logarithm (specify base)	log <sub>2</sub> , etc.
		pounds (after a number)	# (e.g., 10#)	mid-eye-to-fork	MEF
<b>Time and temperature</b>		registered trademark	®	minute (angular)	'
day	d	Trademark	™	multiplied by	x
degrees Celsius	°C	United States (adjective)	U.S.	not significant	NS
degrees Fahrenheit	°F	United States of America (noun)	USA	null hypothesis	H <sub>0</sub>
hour (spell out for 24-hour clock)	h	U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)	percent	%
minute	min			probability	P
second	s			probability of a type I error (rejection of the null hypothesis when true)	$\alpha$
Spell out year, month, and week.				probability of a type II error (acceptance of the null hypothesis when false)	$\beta$
<b>Physics and chemistry</b>				second (angular)	"
all atomic symbols				standard deviation	SD
alternating current	AC			standard error	SE
ampere	A			standard length	SL
calorie	Cal			total length	TL
direct current	DC			variance	Var
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

***REPORT TO THE ALASKA BOARD OF FISHERIES***

**SHEEP CREEK AND GOOSE CREEK KING SALMON STOCK STATUS  
AND ACTION PLAN, 2014**

by

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

January 2014

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# TABLE OF CONTENTS

	<b>Page</b>
LIST OF TABLES.....	V
LIST OF FIGURES.....	V
INTRODUCTION.....	1
STOCK ASSESSMENT BACKGROUND.....	1
SHEEP CREEK .....	2
GOOSE CREEK .....	3
ESCAPEMENT GOAL EVALUATION .....	3
ESCAPEMENT GOAL HISTORY.....	3
ESCAPEMENT DATA AND SEG ANALYSIS.....	4
ESCAPEMENT GOAL RECOMMENDATION.....	4
STOCK OF CONCERN RECOMMENDATION.....	4
HABITAT ASSESSMENT .....	5
FISHERIES MANAGEMENT OVERVIEW AND BACKGROUND.....	5
SPORT FISHERIES .....	5
Past Sport Fisheries Management Actions.....	6
COMMERCIAL FISHERIES .....	8
Past Commercial Fisheries Management Actions.....	8
SUBSISTENCE FISHERY .....	10
Past Subsistence Fishery Management Actions .....	11
MANAGEMENT OPTIONS FOR ADDRESSING STOCK OF CONCERN.....	12
ACTION #1 – SPORT FISHERY.....	12
Option A. – Status Quo .....	12
Option B. – Restrict to Nonretention .....	13
Option C. – Reduce the King Salmon Sport Fishing Season .....	13
Option D. – Reduce the Annual Harvest Limit .....	13
Option E. – Close Sport Fisheries .....	13
ACTION #2 – COMMERCIAL FISHERY.....	14
Option A. – Status Quo .....	14
Option B. – Reduce Hours of Commercial Fishing Periods .....	15
Option C. – Reduce Number of Commercial Fishing Periods .....	15
Option D. – Close Specific Fishing Areas .....	15
Option E. – Close All Commercial Fishing in the Northern District .....	16
ACTION #3 – SUBSISTENCE FISHERY .....	16
Option A. – Reduce Hours of Subsistence Fishing Periods .....	16
Option B. – Reduce Number of Subsistence Fishing Periods .....	16
2014 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING SHEEP CREEK AND GOOSE CREEK.....	18
RESEARCH PLAN.....	18
CURRENT RESEARCH PROJECTS.....	18
LITERATURE CITED.....	20

## LIST OF TABLES

<b>Table</b>		<b>Page</b>
1.	Index counts of king salmon escapement, and angler effort and king salmon sport harvest for Sheep and Goose creeks, 1979–2013.....	21
2.	Northern District commercial king salmon directed harvest by statistical area, 2004–2013.....	22
3.	Subsistence salmon harvests, Tyonek Subdistrict, 1980–2012.....	23

## LIST OF FIGURES

<b>Figure</b>		<b>Page</b>
1.	Map depicting Susitna River drainages.....	24
2.	Goose Creek king salmon aerial escapement survey index area.....	25
3.	Angler effort and king salmon sport harvest for Sheep and Goose creeks, 1986–2012.....	26
4.	Sheep Creek and Goose Creek king salmon escapement index counts, 1979-2013.....	27
5.	Map showing harvest locations of king salmon by set gillnet, Tyonek Subdistrict subsistence salmon fishery, 2006.....	28
6.	Northern District statistical harvest reporting areas and commercial king salmon harvest, 2010–2013.....	29

## 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. In 2011 the board designated three king salmon stocks of concern in the Susitna drainage; Alexander Creek king salmon was identified as a stock of management concern and Willow and Goose creeks king salmon were identified as stocks of yield concern.

In October 2013, the department recommended that the board designate Sheep Creek and Goose Creek king salmon as stocks of management concern at the regulatory board meeting for the Northern Cook Inlet (NCI) Management Area in February of 2014<sup>1</sup>. This recommendation was based on guidelines established in the SSFP. 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 specified 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 which is approximately the generation time of most salmon species.”

This action plan provides the department’s assessment of Sheep Creek and Goose Creek 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 exercises to manage Sheep Creek and Goose Creek 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.

## STOCK ASSESSMENT BACKGROUND

The Susitna River drainage originates in the Alaska and Talkeetna mountain ranges and flows south to Cook Inlet (Figure 1). The Susitna supports numerous king salmon sport fisheries; 16 king salmon stocks have sustainable escapement goals (SEGs). Tributaries flowing into the Susitna from the west generally originate in the Alaska Range with relatively low gradient and velocity, and access only by boat or airplane. Tributaries flowing into the Susitna from the east mostly drain from the Talkeetna Mountains with relatively high gradient and velocity, and easy access from the Parks Highway. Eastside tributaries between Willow and Talkeetna – including Sheep, Goose and Willow creeks – support moderate sized runs of king salmon, much sport fishing angler effort due to ease of access, and close proximity with each other.

The department has conducted single aerial surveys on Sheep Creek and Goose Creek (Figure 1) since 1979 to index spawning escapement of king salmon. These surveys are conducted post-season from rotary-wing aircraft (i.e., helicopter) at slower speeds than traditional fixed-wing aircraft surveys.

Sheep and Goose creeks share a common channel (Figure 2) created in 1971 by a flood that caused a breach in the Sheep Creek channel. Despite efforts to prevent Sheep Creek water flowing into this channel, it persists and is part of the Goose Creek aerial survey index area.

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<sup>1</sup> Unpublished memorandum from J. Regnart and C. Swanton, ADF&G, to Board of Fisheries, October, 2013.

Beavers progressively colonized this channel and, since 2009, a multigenerational beaver dam blocks fish passage some years upstream of the confluence of this channel with Goose Creek.

Sheep Creek and Goose Creek king salmon are harvested primarily in inriver sport fisheries. Sport harvests from 1977–2012 have been estimated from the Statewide Harvest Survey for each creek (Table 1; Figure 3). These stocks may also be harvested in the Northern District commercial set gillnet king salmon fishery, and a subsistence fishery that occurs in the Tyonek Subdistrict marine waters adjacent to the community of Tyonek. No estimates of harvest for Sheep Creek and Goose Creek king salmon stocks to the marine fisheries are available because the stock contribution of these fisheries has never been fully determined.

## **SHEEP CREEK**

### **Escapement**

The average escapement index from 1979–2012 was approximately 800 fish (Table 1; Figure 4). A more recent average (2008–2012) is approximately 400 king salmon. Despite cautious incremental development of regulation since 1980; inseason emergency order (EO) closures of the sport fishery in 2009, 2010 and 2012; and regulatory and preseason EO actions since 2011 to restrict harvest of king salmon in both sport and commercial fisheries, the sustainable escapement goal (SEG) was likely not achieved in at least 7 of the past 8 years.

Indexing Sheep Creek king salmon escapement is challenging some years because the creek is semi glacial, which makes sighting and counting spawners difficult. Escapement survey counts were not possible in 3 of the past 8 years due to poor survey conditions, including 2013 (Table 1); therefore, it is unknown whether the Sheep Creek SEG was attained in 2013. Though technically Sheep Creek king salmon are not a stock of concern as defined in the SSFP, given that the majority of other streams adjacent to Sheep Creek did not achieve their respective SEGs during two years, and a count was not possible on Sheep Creek (2008 and 2010), it is likely the SEG of Sheep Creek king salmon was similarly not met. The exception is 2013 when a survey count was not possible on Sheep Creek and many nearby streams did achieve their respective SEGs.

### **Harvest**

From 1979–2012, Sheep Creek experienced up to 18,700 angler days of sport fishing effort per year (Table 1; Figure 3) and averaged approximately 10,000 angler days. In 2012, approximately 3,800 angler days were expended. Sport harvest of king salmon from this system was as high as 2,600 fish (1992); however, in 2012, no king salmon were harvested (Table 1; Figure 3).

Prior to 2002, the Northern District commercial set gillnet king salmon fishing season occurred during June. Fishing was allowed for six hours each Monday (i.e., three 6-hour periods) until a quota of 12,500 king salmon was harvested or until the regular season opened on June 25. The Northern District commercial fishery was liberalized by the board in 2005 from six hours per period to 12 hours per period, and in 2008 from three periods per season to four or five periods per season. Beginning in 2011, as a result of several king salmon stocks receiving a stock of concern designation, the board prohibited commercial fishing in marine waters from the wood chip dock (located near Tyonek) to the Susitna River. In 2012, the department reduced all fishing periods from 12 hours to 6 hours, and closed the first regular fishing period of the year on June 25 for king salmon conservation. In 2013, the first commercial period of the king salmon-



directed fishery was closed and all remaining periods were again reduced to 6 hours. Commercial harvest of king salmon in the Northern District averaged about 2,200 fish from 1993-2013 and approximately 1,460 fish the past five years (Table 2).

The subsistence fishery occurs in the Tyonek Subdistrict marine waters adjacent to the community of Tyonek in West Cook Inlet (Figure 5). The subdistrict includes the area from one mile south of the mouth of the Chuitna River south to the easternmost part of Granite Point, and from the mean point of high tide to the mean point of low tide. The average harvest of king salmon in the subsistence fishery from 1980–2012, based on returned permits, was 1,237 fish (Table 3). The average number of permits issued during the same time period was 75, and the number of returned permits was 58 (77%). In the past five years (2008–2012), the subsistence king salmon harvest, based on returned permits, ranged from 595 to 1,178 fish.

## **GOOSE CREEK**

### **Escapement**

The average escapement index from 1979–2012 was approximately 375 fish (Table 1; Figure 4). A more recent average (2008–2012) is approximately 80 fish. Despite cautious incremental development of regulation since 1980, inseason EO closures of the sport fishery in 2009 and 2010, closure of the sport fishery by regulation since 2011, and restrictions to the Northern District commercial set gillnet king salmon fishery since 2011, the SEG was not achieved the past seven consecutive years. During the aerial survey in 2009 and 2010, a beaver dam appeared to block adult fish passage to the upper reaches of the index area, and this same area had poor visibility in 2013 (Figure 2). The beaver dam likely reduced the number of spawning salmon above this location by an unknown amount, but surveyors typically observe the majority of spawning king salmon below the location of the dam.

### **Harvest**

Sport fishing effort at Goose Creek from 1979–2012 averaged approximately 2,400 angler days per year (Table 1; Figure 3). Between 2008 and 2012, angler effort ranged from 1,895 angler days to 717 angler days. Sport harvest of king salmon from this system was as high as 1,033 fish (1992), but has not exceeded 150 king salmon since 2004.

See “Sheep Creek” above for an explanation of the subsistence and commercial fisheries.

## **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 index that produced the greatest yield. The goals were calculated as 66% of the average escapement index. A percentage of the average was used because biologists felt that the escapement indexes used in calculating the average were generally above the level needed to sustain high long-term production. The escapement indexes used in the averages occurred during 1979–1992 for Sheep Creek, and 1981–1992 for Goose Creek, except for years when conditions were too poor to conduct a survey. The resulting king salmon escapement goals for Sheep Creek and Goose Creek were 650 and 350 fish, respectively.

## **ESCAPEMENT DATA AND SEG ANALYSIS**

In 2001, based on the *Policy for Statewide Salmon Escapement Goals* (5 AAC 39.223) adopted that year, escapement and return data were reviewed to determine the type of escapement goal (BEG or SEG) and recommend an escapement goal range for Sheep Creek and Goose Creek king salmon. Because escapements are indexed via rotary-wing aerial survey rather than estimated (e.g., weir count, sonar, mark-recapture), total annual returns cannot be estimated. Some age composition data are available for Sheep Creek escapements and harvest. However, harvest data may not be stock specific because the majority of harvest occurs at the confluence of Sheep Creek and the Susitna River. No age composition data are available from harvests or escapements of Goose Creek king salmon. 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.”

### **Sheep Creek**

During the escapement goal review in 2001, twenty-one years of aerial escapement index counts between 1979 and 2000 were inspected and found to have fair data quality, with a high contrast of 10.6 (ratio of highest escapement to lowest escapement) and moderate exploitation. This indicated that the SEG range should be set from the 25<sup>th</sup> and 75<sup>th</sup> percentiles of the escapement data and rounded to the nearest 100 fish. The 25<sup>th</sup> percentile was 634 fish and the 75<sup>th</sup> percentile was 1,160, for a SEG range of 600 to 1,200 fish (Bue and Hasbrouck *Unpublished*).

### **Goose Creek**

Nineteen years of aerial escapement index counts between 1981 and 2000 were inspected and found to have fair data quality, with a medium contrast of 7.7. This indicated that the SEG range should be set from the 15<sup>th</sup> and 85<sup>th</sup> percentiles of the escapement data and rounded to the nearest 50 fish. The 15<sup>th</sup> percentile was 266 fish and the 85<sup>th</sup> percentile was 637, for a SEG range of 250 to 650 fish (Bue and Hasbrouck *Unpublished*).

## **ESCAPEMENT GOAL RECOMMENDATION**

Since 2001 the department has reviewed escapement goals of Upper Cook Inlet salmon stocks every three years (Hasbrouck and Edmundson 2007; Fair et al. 2007, 2010). The department recently reviewed these escapement goals in 2013 and recommends no change to the escapement goals (Fair et al. 2013) developed in 2001.

## **STOCK OF CONCERN RECOMMENDATION**

Escapement indexes of king salmon have been below the current SEG for Goose Creek in each of the past seven years and likely below the SEG for Sheep Creek during the same time period. Escapement indexes of king salmon to these creeks were compared to the current SEG for Sheep Creek (600 to 1,200 fish) and Goose Creek (250 to 650 fish). In 2013 the aerial escapement survey was not conducted at Sheep Creek and the survey conducted at Goose Creek was incomplete, in both cases due to poor water visibility. It is possible the SEG of Sheep Creek king salmon was attained in 2013. Sheep Creek and nearby streams had similar levels of fishing success in catch-and-release fisheries and anecdotal observations of king salmon abundance; in addition, these nearby streams met their respective SEGs.

Goose Creek king salmon were designated a stock of yield concern in 2011. Completed Sheep Creek king salmon escapement indexes have not met the SEG since 2006. Inseason management actions taken by EO since 2009 and board action taken in 2011 to correct this trend were insufficient to achieve the current SEGs. Therefore, in October 2013, the department recommended that the board designate Sheep Creek king salmon as, and change the status of Goose Creek king salmon to, stock of management concern at the board meeting for Upper Cook Inlet in February 2014.

## **OUTLOOK**

The department does not develop a formal forecast of Northern Cook Inlet king salmon stocks. Based upon king salmon trends the last 5-6 seasons, runs to Goose and Sheep Creek in 2014 will likely remain below the long-term average.

## **HABITAT ASSESSMENT**

Human activities potentially impacting fish habitat on the Sheep Creek and Goose Creek drainages have remained relatively minor. There were several bridge/culvert repair projects conducted after the 2006 floods. Activity levels have subsided somewhat over the past several years, and projects have been limited to minor bridge and culvert maintenance, and water withdrawals that have little or no direct impacts to salmon production. Land development in the area continues, but no large development projects have been proposed within the watershed of these two creeks. Recreational suction dredging and small-scale commercial placer mining activities have been ongoing, mostly in the headwaters of the Sheep Creek system. This type of mining activity has increased somewhat due to increased gold prices, but has likely had little direct impact on salmon production because of its location and how it is conducted.

Since 2009 a beaver dam has blocked fish passage of a channel that connects Goose Creek to Sheep Creek during some years. This may have reduced the amount of spawning habitat, though historically the majority of spawning in Goose Creek occurred below the dam. It is unknown what effect the dam has had on juvenile rearing habitat.

A document entitled “A Comprehensive Inventory of Impaired Anadromous Fish Habitats in the Matanuska-Susitna Basin, with Recommendations for Restoration, 2013” prepared by department staff is available online. This document contains information on potential habitat projects that could help identify whether any restorative or proactive actions relative to habitat be taken within Goose or Sheep creeks.

## **FISHERIES MANAGEMENT OVERVIEW AND BACKGROUND**

### **SPORT FISHERIES**

All streams crossing the Parks Highway between Willow and Talkeetna (Figure 1) are within the Unit 2 management area of the Susitna River. These streams provide ease of access to fishing and small to moderate runs of king salmon. Because access to these streams is primarily from the road system, they receive relatively high sport angling effort and are managed conservatively. Popular king salmon sport fisheries within Unit 2 include Willow, Little Willow, Caswell, Sheep, Goose, Greys, Montana, and Sunshine creeks, and the Kashwitna River.

Since these streams share similar high angling effort, easy access, and are geographically close together, they are managed collectively as a unit under the same regulatory structure. An EO to

restrict (or liberalize) one fishery typically includes all other streams in the unit as well because a closure on one stream would result in intensified pressure on adjacent streams, and possible increased harvest on those streams. Sheep Creek is the third largest of nine king salmon fisheries within Unit 2 largely because of a state maintained angler access site that is capable of accommodating a high level of traffic.

Unit 2 streams are open to sport fishing January 1; only specified waters of Unit 2 are open to king salmon fishing. King salmon fishing, in general, is limited to the first few miles of Unit 2 streams which in most cases equates to waters downstream of the Parks Highway. In waters open to king salmon fishing, fishing is allowed only from 6:00 a.m. to 11:00 p.m. from May 15 to July 13. After the third Monday in June, king salmon fishing is allowed only for the following two consecutive weekends (Saturday–Monday) to control harvest rates through the average peak of the runs to these streams.

The board restricted all Unit 2 streams in 2011 after designating Willow and Goose creeks as stocks of yield concern. Goose Creek was closed to fishing for king salmon and fishing time on other Unit 2 streams (including Sheep Creek) was reduced to 6:00 a.m. to 11:00 p.m. and a third three-day weekend, added by the board in 2005, was removed from regulation.

### **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 amongst 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.

Sport fisheries for king salmon in Susitna River Unit 2 streams began to open following a period when sport fisheries were closed to fishing for king salmon through most of the 1970s. Cautious incremental expansion of fishing opportunity occurred from 1980 through 2005, followed by reductions in opportunity since then. Below is an outline of significant changes to sport fisheries that affected harvest and escapement of king salmon to Unit 2 streams:

1977:

- NCI king salmon greater than 20 inches in length closed to sport harvest.

1979:

- King salmon sport fishing open on Saturdays and Sundays for four consecutive weekends on Willow, Montana, and Caswell creeks.
- Bag and possession limit of one king salmon 20 inches or greater in length.
- Annual limit of five king salmon established.

1980:

- Bag and possession limit changed to two per day greater than 20 inches, but only one could be greater than 28 inches.

1981:

- Bag and possession limit changed to one per day and two in possession greater than 20 inches.

1986:

- Bag and possession limit changed to one per day and two in possession greater than 16 inches.
- Goose, Sheep, Little Willow, Sunshine, and Birch creeks added to list of weekend only fisheries.

1987:

- King salmon sport fishing open on Saturdays, Sundays, and Mondays for four consecutive weekends.

1990:

- No seasonal limit.

1992:

- Seasonal limit of five king salmon greater than 16 inches.
- Guides prohibited from fishing while engaged in guiding activities for king salmon.

1995:

- Bag and possession limit changed to one per day and one in possession greater than 16 inches.
- The use of bait was prohibited during king salmon season and allowing sport fishing.

1997:

- A person may not fish for king salmon during the same day after taking a king salmon 16 inches or greater in length.

1999–2003:

- King salmon sport fishing season extended by EO.

2005:

- King salmon season extended by regulation for an additional three-day weekend.

2009:

- King salmon sport fishing, including catch and release, closed by EO on Parks Highway streams during final weekend.

2010:

- King salmon sport fishing, including catch and release, closed by EO on Parks Highway streams during final two weekends.

2011:

- Goose and Willow creeks designated as stocks of yield concern.
- Goose Creek closed to fishing for king salmon.
- In Unit 2 of the Susitna River, fishing time reduced to 6:00 a.m. to 11:00 p.m. and last three-day weekend removed from regulation.

2012:

- In Unit 2 of the Susitna River other than Goose Creek, preseason EO allowed harvest through the second Monday in June, instead of the third Monday used in regulation, then catch-and-release only for the following three, three-day weekends.
- King salmon sport fishing, including catch and release, closed by EO on Parks Highway streams during final weekend.

2013:

- In Unit 2 of the Susitna River other than Goose Creek, preseason EO allowed only catch-and-release fishing to occur during the days and times specified in regulation during which Parks Highway fisheries are normally prosecuted.

## **COMMERCIAL FISHERIES**

Some marine harvest of Sheep Creek and Goose Creek king salmon stocks may occur in the adjacent Northern District set gillnet 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, and continues 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 minimum distance 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 6). 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 a point at the wood chip dock (located approximately three 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 until a quota of 12,500 king salmon was 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. Each participant was allowed one 35-fathom gillnet and a minimum distance of 1,200 feet had to be maintained between nets.

Below is an outline of significant changes to commercial fisheries that may have affected harvest and escapement of king salmon returning to the Sheep Creek and Goose Creek:

1994:

- Final commercial fishing period closed 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:

- Commercial fishing periods increased from six hours to twelve hours.

2008:

- Commercial fishing periods increased from three periods to four or five periods by extending the season through June 24.
- Fifth commercial fishing period closed by EO.

2009:

- First two fishing periods reduced from 12 hours to 6 hours by board emergency regulation.
- Fourth and fifth commercial fishing periods closed by EO.

2010:

- Northern District commercial salmon fishery closed 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:

- Northern District commercial king salmon fishery closed for the season by regulation from wood chip dock (about three miles south of Tyonek) to the Susitna River.

2012:

- All fishing periods reduced from 12 hours to 6 hours (7:00 a.m. to 1:00 p.m.) by EO.
- First regular fishing period of the general salmon season (June 25) closed in all of the Northern District by EO.

2013:

- All fishing periods reduced from 12 hours to 6 hours (7:00 a.m. to 1:00 p.m.) by EO.
- First regular fishing period of the directed king salmon fishing season (May 27) closed in all of the Northern District by EO.

## **SUBSISTENCE FISHERY**

Regulations for the Tyonek Subdistrict subsistence set gillnet fishery were established by court order in 1980 and adopted by the board in 1981 following a positive customary and traditional use (C&T) finding. In an administrative finding made in November 1992, the board established the following amounts as reasonably necessary for subsistence (ANS) 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 (Holen and Fall 2011). At the 2011 UCI meeting the board confirmed the C&T use of salmon in the Tyonek Subdistrict and set the amounts reasonably necessary for subsistence in regulation: 700 – 2,700 king salmon and 150 – 500 salmon other than king salmon (5 AAC 01.566 (a)(1)(f)). Subsistence fishing is allowed only in the Tyonek Subdistrict of the Northern District in salt waters adjacent to the community of Tyonek. 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 (Tuesday, Thursday, and Friday) 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. Few king salmon are harvested during the second fishing period. Between 2002 and 2011 the average harvest of king salmon was 999 during the early fishing period and 8 during the second period.

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 70 king salmon and 25 salmon other than king salmon for the head of household with 10 additional other salmon for each dependent of the head of household.



Prior to 2011 no more than 4,200 king salmon could be harvested from May through June 30. If 4,200 king salmon were harvested in the early season, the early season closed by EO and the late season would not open until July 1. The cap of 4,200 king salmon was removed in 2011 when the ANS finding was implemented in regulation.

### **Past Subsistence Fishery Management Actions**

There have been no restrictions to the subsistence fishing season or on methods since regulations were adopted in 1980.

## MANAGEMENT OPTIONS FOR ADDRESSING STOCK OF CONCERN

The goal of this action plan is to rebuild the Sheep Creek and Goose Creek king salmon stocks to levels that achieve the SEG and provide sustainable harvest opportunity.

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 Sheep Creek and Goose Creek.

### ACTION #1 – SPORT FISHERY

**Objective: Reduce harvest of sport-caught king salmon.**

**Background:** Goose Creek was closed by board action in 2011 after being designated a stock of yield concern. Sheep Creek is open to king salmon fishing downstream of the Parks Highway from January 1 through the third Monday in June and for the following two consecutive three-day weekends (Saturday-Monday). From May 15 to July 13 fishing is allowed only from 6:00 a.m. to 11:00 p.m. in waters open to king salmon fishing. The king salmon bag limit is one per day, one in possession for fish 20 inches or greater in length, and only unbaited, artificial lures are allowed June 1–July 13. There is a five fish annual limit for king salmon 20 inches or greater in length.

The sport fishery was not restricted by EO during the 2011 season following the regulatory changes made during the 2011 board meeting. The commissioner’s EO authority was used preseason in 2012 to further restrict harvest opportunity for the majority of the season, and in 2013 to allow only catch-and-release fishing during the entire season. In 2012 the fishery was closed by EO on June 25 but in 2013 remained open to catch-and-release fishing throughout the season. The EOs applied to all Unit 2 streams because these road-accessible streams are managed collectively. In addition, management of other Susitna River streams were taken into consideration because of concerns about possible shifts (increased) in angler effort and harvest.

#### **Option A. – Status Quo**

Continue to use department EO authority. Goose Creek would remain closed. Preseason and inseason EOs restricting Unit 2 king salmon fisheries (including Sheep Creek) during 2012 resulted in a harvest savings of about 90%, which was insufficient to meet the goal. In 2013, a preseason EO restriction to nonretention (catch-and-release) provided 100% harvest savings and may have led to achievement of the SEG; however, the escapement survey could not be conducted due to poor survey conditions (i.e., poor water clarity). The nonretention strategy employed during part of 2012 and all of 2013 was the most restrictive management action that could be implemented without total closure. EO authority will continue to be used to manage Sheep Creek and other Susitna River king salmon stocks to achieve their respective escapement goals and rebuild these stocks from the recent period of low productivity.

**Specific Action:** Use EO authority to restrict Unit 2 king salmon sport fisheries to nonretention and/or close the fisheries as needed, preseason and/or inseason. Goose Creek would remain closed. Absent board action, the department anticipates restricting all other Unit 2 streams, including Sheep Creek, by EO to nonretention in 2014. Action may also be taken in other Susitna River management units to account for shifting of anglers.

**Benefits:** Benefits of continuing to manage Unit 2 streams with EO authority include keeping regulations consistent while retaining the ability to return to more normal fisheries if king salmon runs rebuild prior to the next board meeting. If king salmon abundance appears sufficient to achieve escapement goals, the EO may be rescinded and sport fishing could resume prior to the end of the season.

**Detriments:** Average and below average runs are difficult to detect so EO actions would be reacting to previous seasons' index counts, general regionwide trends, staff surveys of angling success, and inseason aerial monitoring of escapements which can't occur until later in the season.

### **Option B. – Restrict to Nonretention**

**Specific Action:** Board action to restrict all Unit 2 king salmon fisheries to nonretention. Goose Creek would remain closed.

**Benefits:** Sport fishing harvest would be nearly zero and release mortality would be very low. In Sheep Creek, harvest savings would likely range from 400 fish during a weak year to 1,000 fish on a strong run year.

**Detriments:** If harvest is not the only factor limiting escapement, then this action is not a long-term solution.

### **Option C. – Reduce the King Salmon Sport Fishing Season**

**Specific Action:** Board action to allow only one three-day weekend or reduce days per weekend to fishing for king salmon on all Unit 2 streams. Goose Creek would remain closed.

**Benefits:** Reducing fishing days would increase king salmon escapement by an unknown amount. The season could be extended by EO during years of large runs as was done prior to 2005.

**Detriments:** This action may not reduce harvest enough during periods of poor productivity unless timely EOs reducing harvest earlier in the season accompanies this action.

### **Option D. – Reduce the Annual Harvest Limit**

Sheep Creek and Goose Creek are a part of the Cook Inlet freshwater annual limit of five king salmon.

**Specific Action:** Board action to reduce the annual limit for king salmon greater than 20 inches harvested from Sheep Creek to less than five annually. Goose Creek would remain closed.

**Benefits:** Reducing the annual limit would increase king salmon escapement by an unknown amount.

**Detriments:** Reducing the annual limit for only Sheep Creek would add complexity to the regulations, and may cause shifting of effort to other Susitna streams and result in unintended consequences to those systems.

### **Option E. – Close Sport Fisheries**

Sheep Creek and/or all Unit 2 streams would be closed to sport fishing for king salmon, including nonretention.

**Specific Action:** Board action to close only Sheep Creek to fishing for king salmon, close all Unit 2 streams to fishing for king salmon, close Sheep Creek to all sport fishing during the king salmon season, or close all Unit 2 streams to all sport fishing during the king salmon season.

**Benefits:** In Sheep Creek, there could be a harvest savings of 400 fish during a weak year to 1,000 fish on a strong run year.

**Detriments:** There would be no opportunity to fish for king salmon in Unit 2. This may be too restrictive given the king salmon SEG was attained in all other Unit 2 streams in 2013.

## **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.

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 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 a point at the wood chip dock (located approximately 3 miles south of Tyonek) to the Susitna River shall close to commercial king salmon fishing for the remainder of the directed king salmon fishery.

The commercial fishery was not restricted by EO during the 2011 season following the regulatory changes made during the 2011 board meeting. The commissioner's EO authority was used in 2012 to reduce fishing periods to six hours and close the first period of the general salmon fishing season. In 2013 the department used EO authority to reduce fishing periods to six hours and close the first period of the directed Northern District king salmon commercial fishery.

### **Option A. – Status Quo**

The fishery will continue to be managed 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 EO authority would be used to close the Northern District commercial salmon fishery in marine waters from areas along the westside of Cook Inlet specified in the management plan to the mouth of the Susitna River when sport fishing is closed for king salmon on the Chuitna, Theodore or Lewis rivers.

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

**Benefits:** The benefit of providing the department flexibility to manage Sheep Creek and Goose Creek king salmon stocks inseason with EO authority is the potential to liberalize commercial

fisheries if king salmon runs to those systems rebuild prior to the next board meeting. These benefits would likely apply to Sheep Creek and Goose Creek king salmon runs as well.

**Detriments:** Emergency order actions are reactive to actions taken in the sport fishery. Emergency orders need to be taken preseason because stock assessment activities occur well after the fishing season. No formal forecast can be made, so actions would be in response to previous season's index counts for Chuitna, Theodore, and Lewis rivers and general regionwide trends. These trends may not necessarily reflect trends in Sheep and Goose creeks.

### **Option B. – Reduce Hours of Commercial Fishing Periods**

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

**Specific Action:** Board action to reduce commercial fishing periods to fewer than twelve hours in length.

**Benefits:** Reducing the Northern District king salmon commercial fishing time would increase king salmon escapements in Sheep and Goose creeks by an unknown amount. This may limit harvesting potential yield during years of larger runs.

**Detriments:** Harvest of king salmon would continue and may not be lower than historical harvest ranges. Reduction in harvest of king salmon bound for Sheep and Goose creeks would be unknown.

### **Option C. – Reduce Number of Commercial Fishing Periods**

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

**Specific Action:** Board action to reduce commercial fishing periods to fewer than four or five periods.

**Benefits:** Reducing the Northern District king salmon commercial fishing time would increase king salmon escapements in Sheep and Goose creeks by an unknown amount. This may limit harvesting potential yield during years of larger runs.

**Detriments:** Harvest of king salmon would continue and may not be lower than historical harvest ranges. Reduction in harvest of king salmon bound for Sheep and Goose creeks would be unknown.

### **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:** Board action to reduce areas open to commercial king salmon fishing.

**Benefits:** Reducing the area open to commercial fishing would increase king salmon escapements in Sheep and Goose creeks by an unknown amount. This may limit harvesting potential yield during years of larger runs.

**Detriments:** Harvest of king salmon would continue and may not be lower than historical harvest ranges. Reduction in harvest of king salmon bound for Sheep and Goose creeks would be unknown.

### **Option E. – Close All 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:** Board action to close commercial fishing in the Northern District until June 25.

**Benefits:** Potential harvest savings of 1,100 to 3,800 Northern District king salmon and an unknown increase in escapement to Sheep and Goose creeks 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.

### **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:** Board action to reduce subsistence fishing periods to fewer than 16 hours in length.

**Benefits:** Reducing subsistence fishing time may increase king salmon escapements in Sheep and Goose creeks by an unknown amount.

**Detriments:** Harvest of king salmon would continue and may not be lower than historical harvest ranges. Restricting hours per period in the subsistence fishery may not provide a reasonable opportunity for success because it may provide fishing opportunity during only one tide per period.

#### **Option B. – Reduce Number of Subsistence Fishing Periods**

Current fishing periods are three days per week (Tuesdays, Thursdays, and Fridays) from May 15–June 15, for a total of 13–15 periods, depending on the calendar year.

**Specific Action:** Board action to reduce subsistence fishing periods to fewer than 13–15 periods.

**Benefits:** Reducing subsistence fishing time may increase king salmon escapements in Sheep and Goose creeks by an unknown amount.

**Detriments:** Harvest of king salmon would continue and may not be lower than historical harvest ranges. Restricting number of periods in the subsistence fishery may not provide a

reasonable opportunity for success because king salmon abundance varies among fishing periods.

## **2014 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING SHEEP CREEK AND GOOSE CREEK**

- Proposal 55 – Decrease Cook Inlet king salmon annual limit to two king salmon 20 inches or greater in length, of which only one can be from the Kenai River.
- Proposal 292 – Restrict or close the commercial fishery if sport fishing is restricted to artificial lures or restricted to catch and release fishing.
- Proposal 293 –Restrict commercial fishery to one regular 12-hour period per week in the Northern District if sport fishing in the Deshka River is restricted to artificial lures or close the Northern District to commercial fishing if sport fishing is closed in the Little Susitna River, Fish Creek, Jim Creek, or Deshka River.

### **RESEARCH PLAN**

There has been little research directed at king salmon in Sheep and Goose creeks. 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 these stocks.

### **CURRENT RESEARCH PROJECTS**

The following research programs are being or will be conducted to gather detailed information about king salmon stocks in the Susitna River and Northern District. Projects that estimate inriver abundance or mixed stock harvest of Susitna River king salmon also fulfill data gaps identified as part of the Statewide Chinook Salmon Research Initiative.

1. King Salmon Genetic Baseline: The department is developing a genetic baseline for king salmon in Alaska. The baseline includes extensive sampling of populations within Cook Inlet and is nearing completion. At least nine reporting groups can be identified within Cook Inlet: West Cook Inlet streams/Yentna River, Susitna River, Deshka River, Knik and Turnagain Arm streams, Kenai River tributaries, Kenai River mainstem, Kasilof River mainstem, Crooked Creek (Kasilof River tributary), and South Kenai Peninsula streams. Work is ongoing to include additional king salmon populations in the baseline and determine if better separation of populations within these reporting groups may be possible.
2. Marine Harvest Sampling: The department will receive funding, contingent on allocation of funds to the Alaska Sustainable Salmon Fund program, to sample king salmon harvested in the Northern District commercial and Tyonek Subdistrict subsistence fisheries and apply genetic stock identification (GSI) techniques to estimate the contribution of the reporting groups mentioned above to each fishery. This project will provide information necessary to understand the production of Susitna River and North Cook Inlet king salmon stocks, and provide new information useful to manage king salmon fisheries in North Cook Inlet. Sampling would occur during the 2014-2016 fishing seasons.
3. Aerial Surveys: The department plans to continue the single annual escapement index surveys at Sheep and Goose creeks to monitor trends in king salmon abundance.



4. Susitna River King Salmon Abundance and Spawner Distribution: In 2012 the department conducted a project, funded by the Alaska Energy Authority (AEA), to capture king salmon in the mainstem Susitna River and tag them with radio transmitters to identify spawning locations in the drainage. In 2013 this project was expanded to include the Yentna River, a westside tributary to the Susitna River, and to estimate inriver abundance of king salmon in the Yentna and mainstem Susitna rivers. The project will continue in 2014. This project provides data to help assess king salmon escapement into Unit 2 streams and how well the aerial escapement surveys index escapement.
5. Assess Goose Creek Beaver Dam: Assessing beaver dams that impair fish passage is a project identified in the comprehensive anadromous fish habitat inventory document mentioned in the Habitat Assessment section of this Action Plan. A habitat survey could be conducted on Goose Creek to assess the degree the beaver dam blocks fish passage, and perhaps the quantity and quality of spawning and potential juvenile rearing habitat in the channel upstream of the dam.

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**Table 1. Index counts of king salmon escapement, and angler effort and king salmon harvest for Sheep and Goose creeks, 1979–2013.**

Year	Sheep Creek			Goose Creek		
	Escapement	Harvest	Effort	Escapement	Harvest	Effort
1979	778	10	6,728			
1980		45	8,014			
1981	1,013	0	6,936	262		
1982	527	0	9,093	140		
1983	975	0	6,237	477		
1984	1,028	0	6,106	258	0	1,305
1985	1,634	0	2,844	401		
1986	1,285	1,778	10,091	630	145	1,993
1987	895	1,610	9,019	416	334	1,865
1988	1,215	1,847	18,699	1,076	218	2,947
1989	610	1,116	13,010	835	385	3,058
1990	634	1,537	11,392	552	504	3,714
1991	154 <sup>b</sup>	1,519	14,872	968	288	2,811
1992	<sup>b</sup>	2,663	17,509	369	1,033	4,908
1993	<sup>b</sup>	2,300	12,636	347	633	3,423
1994	542	1,349	11,526	375	361	3,300
1995	1,049	746	9,758	374	226	1,993
1996	1,028	1,397	8,112	305	437	1,796
1997	<sup>b</sup>	550	9,172	308	298	3,151
1998	1,160	700	9,716	415	348	2,510
1999	<sup>b</sup>	2,558	17,188	268	371	3,561
2000	1,162	851	12,660	348	258	3,266
2001	<sup>b</sup>	1,420	11,742	<sup>b</sup>	160	2,339
2002	854	928	12,853	565	403	2,845
2003	<sup>b</sup>	1,284	12,878	175	350	2,965
2004	285	914	10,310	417	335	2,645
2005	760	878	8,521	468	150	2,039
2006	580	707	9,437	306	27	2,593
2007	400	964	10,156	105	31	621
2008	<sup>b</sup>	589	8,574	117	134	1,895
2009	500	393	9,248	65 <sup>c</sup>	0	1,640
2010	<sup>b</sup>	153	7,042	76 <sup>c</sup>	0	1,051
2011	350	213	5,868	80	0	717
2012	363	0	3,877	57	0	994
2013	<sup>b</sup>	NA	NA	62 <sup>b</sup>	NA	NA
<u>Averages</u>						
1979–2012	791	912	10,054	373	265	2,427
2003–2012	454	610	8,591	187	103	1,716
2008–2012	404	270	6,922	79	27	1,259
SEG <sup>a</sup>	600-1200			250–650		

<sup>a</sup> SEG = sustainable escapement goal.

<sup>b</sup> No or poor survey count due to timing, poor visibility or weather conditions.

<sup>c</sup> Beaver dam blocks fish passage.

NA = Not available.

**Table 2. Northern District commercial king salmon directed harvest by statistical area, 2004–2013.**

Year	Date	247-10	247-20	247-30	247-41	247-42	247-43	247-70	247-80	247-90	Total
2004	5/31/2004	74	33	17	30	43	40	108		9	
	6/7/2004	62	285	147	266	101	82	100		23	
	6/14/2004		137	47	46	56	38	59		16	
	<b>Total</b>	<b>136</b>	<b>455</b>	<b>211</b>	<b>342</b>	<b>200</b>	<b>160</b>	<b>267</b>	<b>0</b>	<b>48</b>	<b>1,819</b>
2005	5/30/2005	166	320		224	203	85	160	18	5	
	6/6/2005	103	430	290	97	60	69	65		31	
	6/13/2005	26	391		98	113	129	33	34		
	<b>Total</b>	<b>295</b>	<b>1141</b>	<b>290</b>	<b>419</b>	<b>376</b>	<b>283</b>	<b>258</b>	<b>52</b>	<b>36</b>	<b>3,150</b>
2006	5/29/2006	174	133	20	76	47	78	80	19	13	
	6/5/2006	322	312	150	247	108	74	127	23	13	
	6/12/2006	335	489	212	165	116	232	204	79	39	
	<b>Total</b>	<b>831</b>	<b>934</b>	<b>382</b>	<b>488</b>	<b>271</b>	<b>384</b>	<b>411</b>	<b>121</b>	<b>65</b>	<b>3,887</b>
2007	5/28/2007	178	99	21	15	42	7	78	28	30	
	6/4/2007	237	162	228	131	94	124	240	36	18	
	6/11/2007	94	366	126	120	87	181	346	24	20	
	<b>Total</b>	<b>509</b>	<b>627</b>	<b>375</b>	<b>266</b>	<b>223</b>	<b>312</b>	<b>664</b>	<b>88</b>	<b>68</b>	<b>3,132</b>
2008	5/26/2008	39	272	42	33	16	27	35	24	11	
	6/2/2008	110	165	49	72	50	37	96	7	11	
	6/9/2008	103	535	143	275	208	153	168	72	31	
	6/16/2008	118	282	138	162	81	110	132	33	15	
	<b>Total</b>	<b>370</b>	<b>1254</b>	<b>372</b>	<b>542</b>	<b>355</b>	<b>327</b>	<b>431</b>	<b>136</b>	<b>68</b>	<b>3,855</b>
2009	5/25/2009		28	14	6	3	1	24	3		
	6/1/2009	111	147	36	12	24	15	68	32	10	
	6/8/2009	148	181	94	64	101	56	77	3	8	
	<b>Total</b>	<b>259</b>	<b>356</b>	<b>144</b>	<b>82</b>	<b>128</b>	<b>72</b>	<b>169</b>	<b>38</b>	<b>18</b>	<b>1,266</b>
2010	5/31/2010	141	102		43	48	42	32	5	20	
	6/7/2010	180	302		71	63	71	74	22	19	
	6/14/2010		61		8	54	25	19	8	5	
	6/21/2010	17	147		2	23	39	20	7	4	
	<b>Total</b>	<b>338</b>	<b>612</b>	<b>0</b>	<b>124</b>	<b>188</b>	<b>177</b>	<b>145</b>	<b>42</b>	<b>48</b>	<b>1,674</b>
2011	5/30/2011	118	85		57	73	129	55	29	6	
	6/6/2011	305	192		51	53	112	64	19	25	
	6/13/2011	132	208		31	60	72	66	18	13	
	6/20/2011	27	83		18	20	32	22	3	9	
	<b>Total</b>	<b>582</b>	<b>568</b>	<b>0</b>	<b>157</b>	<b>206</b>	<b>345</b>	<b>207</b>	<b>69</b>	<b>53</b>	<b>2,187</b>
2011	5/30/2011	118	85		57	73	129	55	29	6	
	6/6/2011	305	192		51	53	112	64	19	25	
	6/13/2011	132	208		31	60	72	66	18	13	
	6/20/2011	27	83		18	20	32	22	3	9	
	<b>Total</b>	<b>582</b>	<b>568</b>	<b>0</b>	<b>157</b>	<b>206</b>	<b>345</b>	<b>207</b>	<b>69</b>	<b>53</b>	<b>2,187</b>
2012	5/28/2012	129	20		7	5	2	32	9	8	
	6/4/2012	35	27		36	26	44	40	6		
	6/11/2012	252	101		16	29	11	58	19	5	
	6/18/2012	10	34		12	14	16	20		7	
	<b>Total</b>	<b>426</b>	<b>182</b>	<b>0</b>	<b>71</b>	<b>74</b>	<b>73</b>	<b>150</b>	<b>34</b>	<b>20</b>	<b>1,030</b>
2013	6/3/2013	117			91	75	51	24	9		
	6/10/2013	179			52	74	51	87	14	12	
	6/17/2013	121			16	13	15	55	8	4	
	6/24/2013	44			3	13	6				
	<b>Total</b>	<b>461</b>	<b>0</b>	<b>0</b>	<b>162</b>	<b>175</b>	<b>123</b>	<b>166</b>	<b>31</b>	<b>16</b>	<b>1,134</b>

**Table 3. Subsistence salmon harvests, Tyonek Subdistrict, 1980–2012.**

Year	Permits		Reported salmon harvests					Total
	Issued	Returned	King	Sockeye	Coho	Chum	Pink	
1980	67	NA	1,757	235	0	0	0	1,992
1981	70	NA	2,002	269	64	32	15	2,382
1982	69	NA	1,590	310	113	4	14	2,031
1983	75	NA	2,665	187	59	6	0	2,917
1984	75	NA	2,200	266	79	23	3	2,571
1985	76	NA	1,472	164	91	10	0	1,737
1986	65	NA	1,676	203	223	46	50	2,198
1987	64	61	1,610	166	149	24	10	1,959
1988	47	42	1,587	91	253	12	8	1,951
1989	49	47	1,250	85	115	1	0	1,451
1990	42	37	781	66	352	12	20	1,231
1991	57	54	902	20	58	0	0	980
1992	57	44	907	75	234	19	7	1,242
1993	62	54	1,370	57	77	17	19	1,540
1994	58	49	770	85	101	22	0	978
1995	70	55	1,317	45	153	15	0	1,530
1996	73	49	1,039	68	137	7	21	1,272
1997	70	42	639	101	137	8	0	885
1998	74	49	1,027	163	64	2	1	1,257
1999	77	54	1,230	144	94	11	32	1,511
2000	60	59	1,157	63	87	0	6	1,313
2001	84	58	976	172	49	6	4	1,207
2002	101	71	1,080	209	115	4	9	1,417
2003	87	74	1,183	111	44	10	7	1,355
2004	97	75	1,345	93	130	0	0	1,568
2005	78	66	982	61	139	2	0	1,184
2006	82	55	943	20	14	1	0	978
2007	84	67	1,281	200	123	2	3	1,609
2008	94	77	1,178	121	194	9	13	1,515
2009	89	69	636	184	258	2	1	1,081
2010	105	77	843	212	167	2	2	1,226
2011	114	63	595	154	26	7	7	789
2012	89	69	840	176	138	2	4	1,160
<u>Averages</u>								
1980-2012	75	58	1,237	139	122	10	8	1,516
2003-2012	92	69	983	133	123	4	4	1,247
2008-2012	98	71	818	169	157	4	5	1,154

NA = Not available. Information on number of permits returned exists but was not available at the time this report was written.

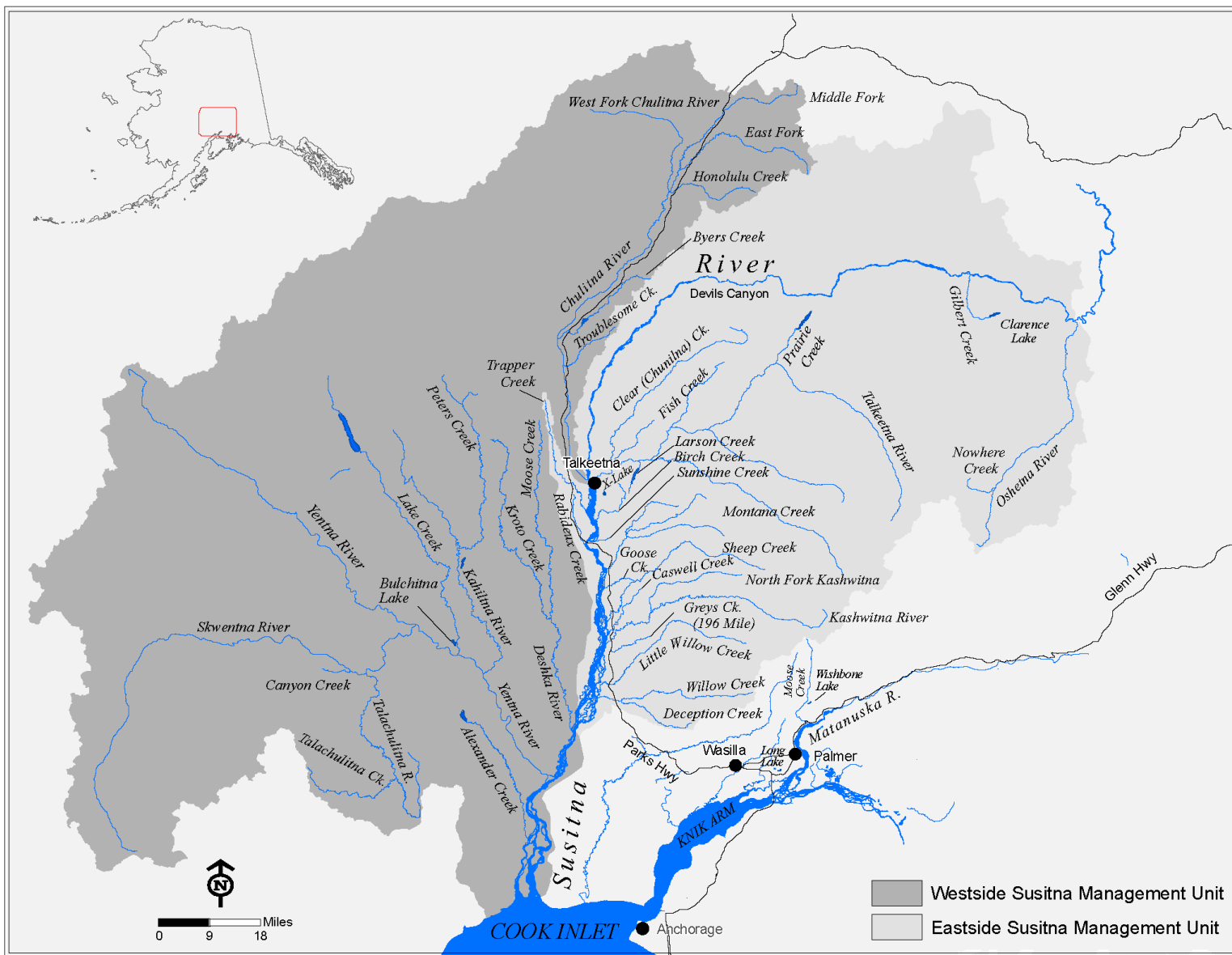
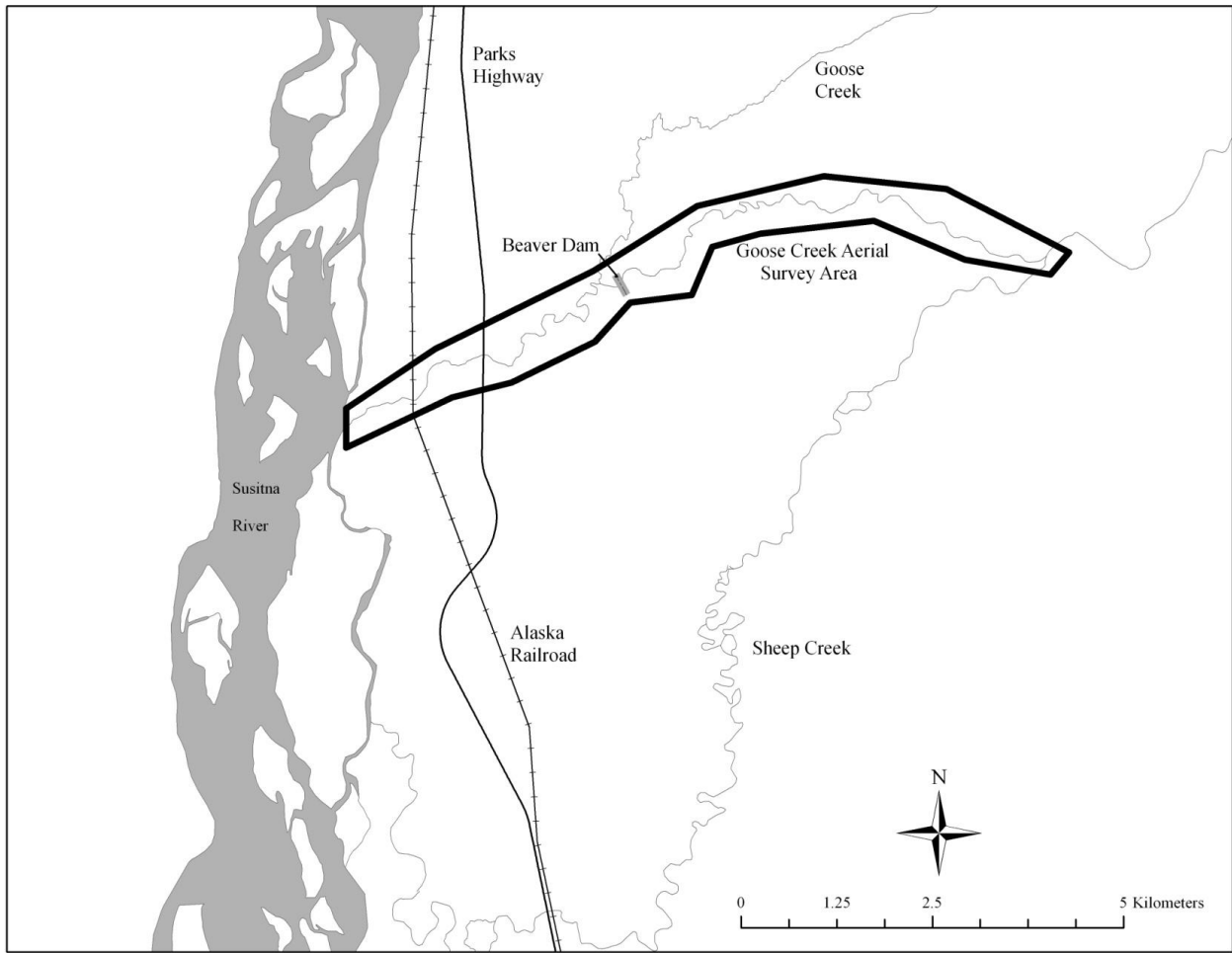


Figure 1. Map depicting Susitna River drainages.



**Figure 2. Goose Creek king salmon aerial escapement survey index area.**

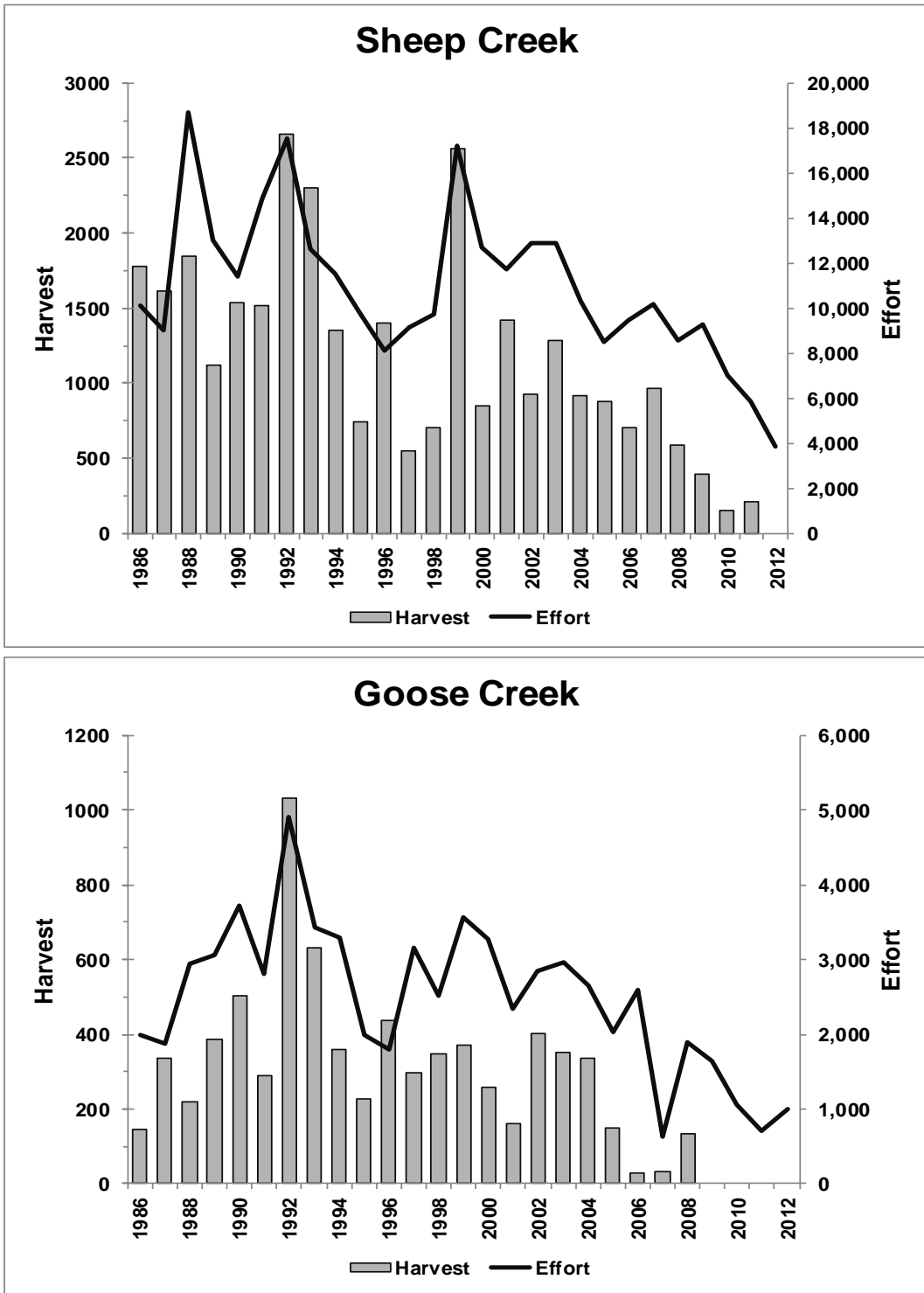


Figure 3. Angler effort and king salmon sport harvest for Sheep and Goose creeks, 1986–2012.



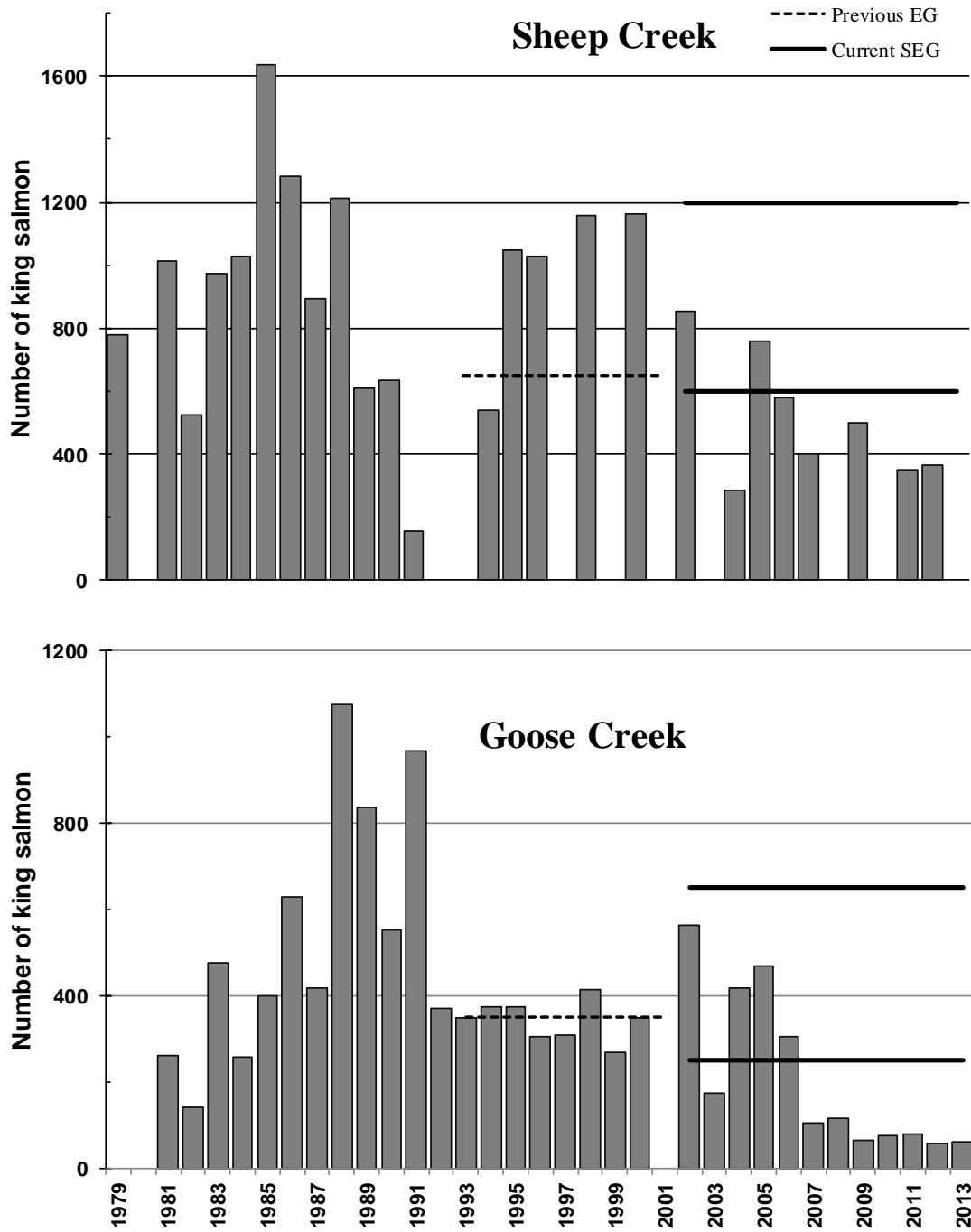


Figure 4. Sheep Creek and Goose Creek king salmon escapement index counts, 1979–2013.

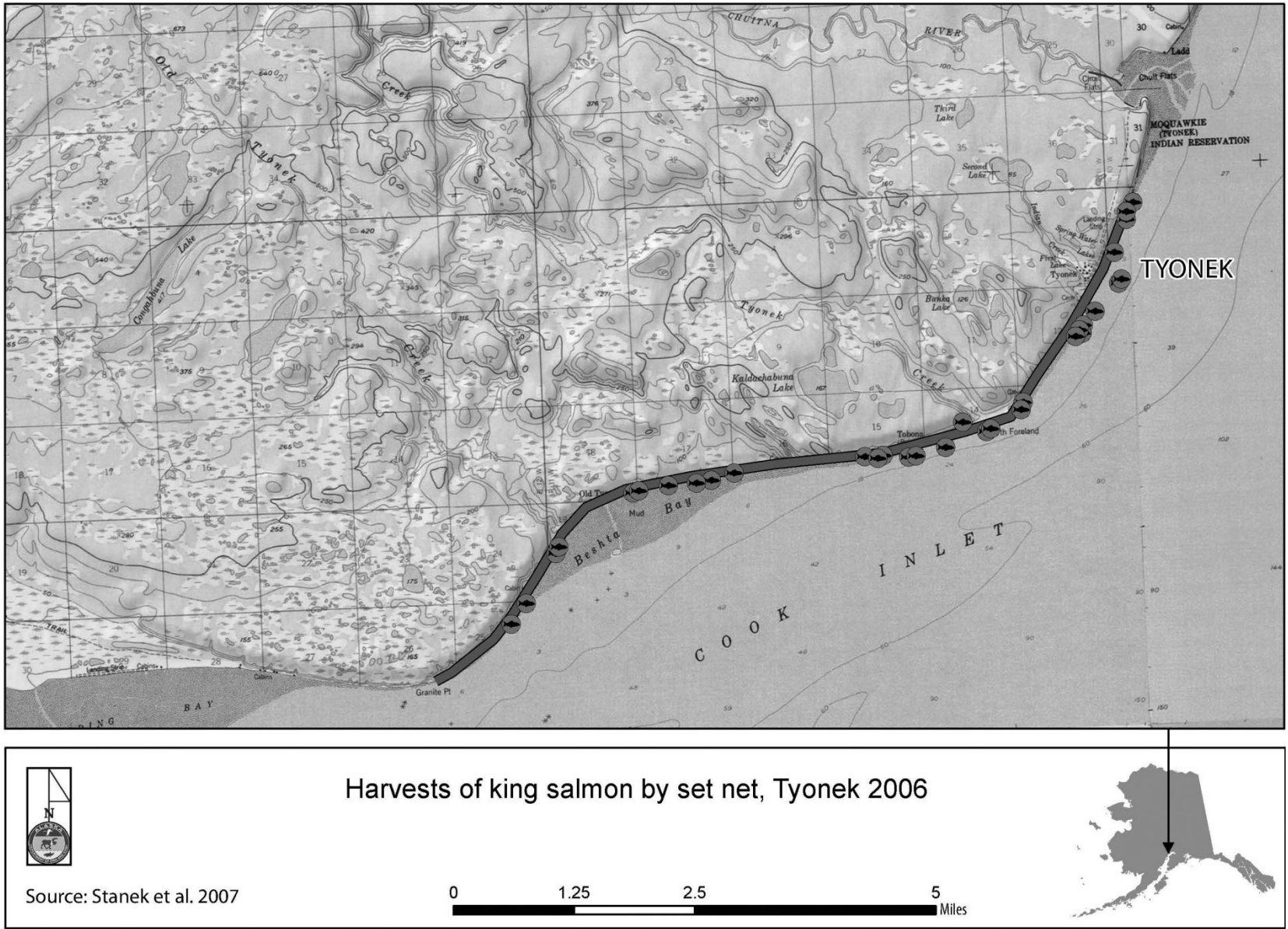


Figure 5. Map showing harvest locations of king salmon by set gillnet, Tyonek Subdistrict subsistence salmon fishery, 2006.

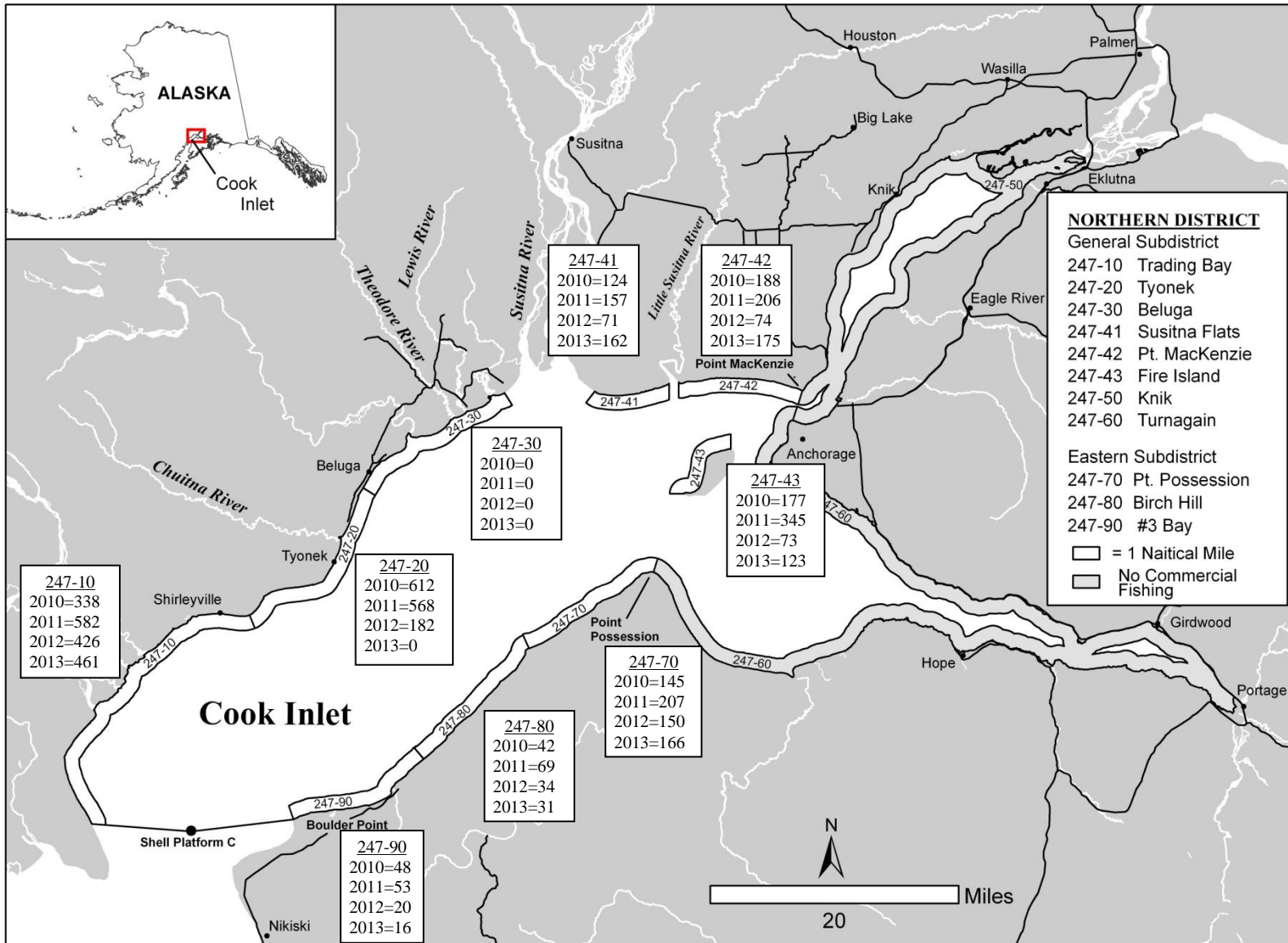


Figure 6. Northern District statistical harvest reporting areas and commercial king salmon harvest, 2010–2013.