Report to the Alaska Board of Fisheries

Alexander Creek King Salmon Stock Status and Action Plan, 2011

By

Cook Inlet Staff

February 2011

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)

Centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
metric ton	mt
milliliter	ml
millimeter	mm

Weights and measures (English)

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

Spell out acre and ton.

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
hour (spell out for 24-hour clock)	h
minute	min
second	s

Spell out year, month, and week.

Physics and chemistry

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

General

All commonly accepted abbreviations.	e.g., Mr., Mrs., a.m., p.m., etc.
All commonly accepted professional titles.	e.g., Dr., Ph.D., R.N., etc.
And	&
At	@
Compass directions:	
east	E
north	N
south	S
west	W
Copyright	©
Corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
et alii (and other people)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.,
id est (that is)	i.e.,
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures): first three letters	Jan,...,Dec
number (before a number)	# (e.g., #10)
pounds (after a number)	# (e.g., 10#)
registered trademark	®
Trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S. state and District of Columbia abbreviations	use two-letter abbreviations (e.g., AK, DC)

Mathematics, statistics, fisheries

alternate hypothesis	H_A
base of natural logarithm	e
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	F, t, χ^2, etc.
confidence interval	C.I.
correlation coefficient	R (multiple)
correlation coefficient	r (simple)
covariance	cov
degree (angular or temperature)	°
degrees of freedom	df
divided by	÷ or / (in equations)
equals	=
expected value	E
fork length	FL
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mideye-to-fork	MEF
minute (angular)	'
multiplied by	x
not significant	NS
null hypothesis	H_O
percent	%
probability	P
probability of a type I error (rejection of the null hypothesis when true)	α
probability of a type II error (acceptance of the null hypothesis when false)	β
second (angular)	"
standard deviation	SD
standard error	SE
standard length	SL
total length	TL
variance	Var

REPORT TO THE ALASKA BOARD OF FISHERIES

ALEXANDER CREEK KING SALMON STOCK STATUS AND ACTION PLAN, 2011

by

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

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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 Alexander 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 follows to manage Alexander Creek king salmon. Options are then presented for potential management actions for the commercial, sport, and subsistence fisheries, and research projects for this king salmon stock.

In October 2010, the department recommended that the board declare Alexander Creek king salmon as a stock of management concern at the regulatory board meeting for the Northern Cook Inlet (NCI) Management Area in February of 2011[1]. 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.

STOCK ASSESSMENT BACKGROUND

The department has conducted annual single aerial surveys on Alexander Creek (Figure 1) since 1974 to index spawning escapement of king salmon. These surveys are conducted from helicopters at slower speeds than traditional fixed-wing aircraft surveys.

Until 2008, Alexander Creek king salmon were harvested by three users groups: a sport fishery, the Northern District commercial set gillnet king salmon fishery, and a subsistence fishery that occurs in the Tyonek Subdistrict marine waters adjacent to the village of Tyonek. Sport harvests from 1977–2008 have been estimated from the Statewide Harvest Survey (Table 1; Figure 2). The sport fishery was closed in 2008 by the board. No estimates of harvest for Alexander Creek king salmon to the marine fisheries are available because the stock contribution of these fisheries has never been fully determined, but it is suspected to be small.

Escapement

The average escapements from 1979–1999 were approximately 3,700 fish (Table 1; Figure 3). The most recent 10-year average (2001 through 2010) was approximately 1,300 fish, less than one-half the previous 10-year average. Despite restrictive action since the mid 1990s and closure of the sport fishery in 2008, king salmon escapements to this system in the past five years have

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

been far below the SEG, averaging 393 fish annually. In seven of the last 10 years, the goal was not achieved. At a time (1999–2006) when other Susitna drainage systems were experiencing strong king salmon runs, the Alexander Creek run was either not making or barely meeting the escapement goal.

Harvest

The subsistence fishery occurs in the Tyonek Subdistrict marine waters adjacent to the village of Tyonek on West Cook Inlet (Figure 4). 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 king salmon subsistence harvest from 1981–2009 was 1,269 fish (Table 2). The average number of permits issued during the same time period was 72. In the past five years (2005–2009), the subsistence king salmon harvest ranged from 636 to 1,281 fish.

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) 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 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 the Northern District averaged approximately 2,700 over the past five years (Table 3) and about 2,400 since 1993.

Prior to 2000, Alexander Creek was one of the most popular king salmon sport fisheries in the entire westside Susitna River. From 1986–1994, this system experienced more than 20,000 angler days of sport fishing effort per year (Figure 2). In 2007, prior to its closure, there was an estimated 2,666 angler days of effort. Historically, sport harvest of king salmon from this system was as high as 6,548 fish (1991). In 2007, only 412 fish were harvested (Table 1; Figure 2).

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 goal for this system was adopted in 1993 and was set as a point biological escapement goal representing the escapement that produced the greatest yield. The goal was calculated as 66% of the average escapement index. The escapement index for Alexander Creek 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 1974–1992, except for various years when conditions were too poor to survey. The king salmon escapement goal for Alexander Creek was 2,700 fish.

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 Alexander Creek king salmon. King salmon harvest data are available for this system for the sport fishery only (Table 1). Some marine harvest of these stocks is likely in the 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."

Eighteen years of spawner index counts between 1974 and 2000 were inspected and found to have fair data quality, with a medium contrast of 6.1 (ratio of highest escapement to lowest escapement). This indicated that the SEG range should be set from the 15th and 85th percentiles of the escapement data and rounded to the nearest 100 fish. The 15th percentile was 2,177 fish and the 85th percentile was 5,998, for a SEG range of 2,100 to 6,000 fish (Bue and Hasbrouck *Unpublished*).

ESCAPEMENT GOAL RECOMMENDATION

The department has undertaken a review this escapement goal in 2010 and recommends no change to the escapement goal (Fair et al. 2011).

STOCK OF CONCERN RECOMMENDATION

Escapement of king salmon has fallen below the lower end of the current SEG range for Alexander Creek in each of the past five years. Escapement of king salmon in Alexander Creek was compared to the current SEG range of 2,100 to 6,000 fish. Regulatory changes adopted in the 1995–1996 board meeting cycle, and closure of the sport fishery beginning in 2008 to correct this trend have proven to be insufficient to achieve the current SEG. Therefore, in October 2010, the department recommended that the board declare Alexander Creek king salmon a stock 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 runs the last three seasons, king salmon abundance is likely to be below the long-term average and it is unlikely that the escapement goal will be achieved in 2011.

HABITAT ASSESSMENT

Land development activities affecting fish habitat in the Alexander Creek drainage have been very minor and there are no known upcoming development projects that would have significant impacts on this watershed. Fish habitat assessment has been mostly limited to fish research activities and aquatic habitat assessment as it relates to invasive northern pike. Past escapement surveys on Alexander Creek documented king salmon spawning throughout the stream's course, with a large percentage spawning in tributaries upstream of Alexander Lake. More recent observations indicate few king salmon spawning in the mainstem above or below Sucker Creek (Figure 1), and none were observed spawning in tributaries upstream of the lake. Most of the king salmon production for Alexander Creek now takes place in lower Sucker Creek and the Wolverine fork of Sucker Creek, where very little pike habitat occurs.

Northern pike were illegally introduced to at least one lake in the Susitna River drainage during the 1950s and have since spread throughout the drainage. Northern pike were first observed in Alexander Lake in the late 1960s and since then, have colonized the lake and 40 miles of creek. The system contains numerous backwater side-sloughs and oxbow channels, several tributaries, many interconnecting shallow lakes and ponds, and vast expanses of wetlands and marshes, all of which provide for optimum spawning and rearing habitat for northern pike. Unfortunately, juvenile king salmon habitat overlaps with northern pike habitat throughout this river system.

Northern pike are voracious, opportunistic feeders that prey on and prefer salmonids over other available prey. In the absence of refuge areas for juvenile salmon, predation by northern pike can lead to severe reductions in salmonid populations, such as king salmon. This is likely the cause for the decrease of king salmon escapement in the Alexander Creek drainage. Northern pike have colonized nearly all of the drainage (with the exception of lower Sucker and Wolverine creeks), while king salmon escapement has declined significantly. Because of the tremendous overlap of northern pike and juvenile king salmon habitat throughout most of this system, there is little refuge for juvenile king salmon to escape northern pike predation. Therefore, it is unlikely that Alexander Creek king salmon will rebound in this system without significant changes to the northern pike infestation. Other salmon species and resident fish populations have declined in this system as well, the extent of which is currently unknown since the department monitors only king salmon.

FISHERIES MANAGEMENT OVERVIEW AND BACKGROUND

SPORT FISHERIES

Alexander Creek (Figure 1) is a remote river accessible via float plane or boat. The creek is a low velocity, winding, clearwater system flowing into the west side of the Susitna River approximately eight river miles upstream from where the Susitna River empties into Cook Inlet. Sport fisheries, primarily the king salmon fishery in the Alexander Creek system, once supported nine full time lodges. In addition to the lodge operations, this system also supported several float plane charter operations based at Anchorage's Lake Hood, numerous boat charter/guide operations, and a cabin and boat rental business. Today, few if any, of these operations are still

in business. Alexander Creek was closed to king salmon fishing in 2008 by the board, primarily to address a decade of declining king salmon escapements.

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.

The department's sport fish harvest management strategy for pike in all Cook Inlet waters is considered very liberal. There are no bag or possession limits, spears and bow and arrows are allowed, and on many lakes anglers are allowed to use up to five lines when fishing through the ice. The only lake in the entire management area that deviates from these regulations is Alexander Lake. On Alexander Lake, a slot limit was instituted by the board in an effort to investigate potential management strategies that would provide opportunities for anglers to harvest large-sized pike (> 30 inches), but at the same time reduce the number of small-sized pike which are primarily responsible for decimating salmonid populations. This scenario was designed to maintain angler interest by providing the opportunity to catch a large pike while at the same time keeping as many small pike as they desire. Without the opportunity to catch large pike, anglers typically lose interest in fishing the area and pike populations continue to increase. At higher densities and in the absence of large-sized pike, pike growth tends to become stunted. The result is a large population of small, undesirable pike that few anglers want to fish for.

REGULATORY HISTORY FOR ALEXANDER KING SALMON SPORT FISH

1979:
- Opened to king salmon fishing.

1980:
- Bag changed from one to two over 20 inches; only one over 28 inches.

1986:
- Bag/possession changed to two per day/four possession over 16 inches; only one daily/two possession over 28 inches.

1987:
- Season extended from July 6 to July 13.

1990:
- No seasonal limit.

1992:
- Seasonal limit of 5 over 16 inches; bag/possession changed to 1 daily/2 in possession over 16 inches.

1995:
- Bait prohibited; bag/possession of one over 16 inches.
- Closed fishing upstream of Trail Creek.
- Fishing allowed only between the hours of 6:00 a.m. to 11:00 p.m.

1996:
- Season ends June 30; harvest allowed downstream of Granite Creek only.

1999:

- Harvest area extended upstream of Granite Creek to Trail Creek.

2008:

- King salmon fishery closed.

REGULATORY HISTORY FOR NORTHERN PIKE FOR ALEXANDER CREEK/LAKE

1989:

- Bag/possession limit is 10/10.

1997:

- May use five lines in lake.
- No bag or possession limit for northern pike.

1998:

- Slot limit implemented. Northern pike 22–30 inches may not be retained; no limit for fish less than 22 inches; limit of one per day and in possession for fish greater than 30 inches.

2009:

- Slot limit modified. Northern pike less than 27 inches in length, no limit; 27 inches or longer, one per day and in possession.

COMMERCIAL FISHERIES

Some marine harvest of Alexander Creek king salmon stocks may occur in the 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 this river 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 an ADF&G regulatory marker located one mile south of the Chuitna River 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 Alexander Creek:

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:

- 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:

- 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.

SUBSISTENCE FISHERIES

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. The board has not adopted this ANS finding in regulation. Subsistence fishing is allowed only in the Tyonek Subdistrict of the Northern District and 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, but no more than 4,200 king salmon may be taken from May 15 through June 30. If 4,200 king salmon have been taken in the early season, the early season closes by emergency order and the late season cannot open until July 1.

Past Subsistence Fishery Management Actions

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

MANAGEMENT ACTION PLAN OPTIONS FOR ADDRESSING STOCK OF CONCERN

ACTION PLAN GOAL

To rebuild the Alexander Creek king salmon runs back to levels that achieve the current SEG range.

ACTION PLAN ALTERNATIVES

Potential management actions described below 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 Alexander Creek.

ACTION #1 – SPORT FISHERIES

Objective: Reduce abundance of northern pike.

Background: Northern pike are not indigenous to the NCI management area and has threatened multiple fish species in the Alexander Creek drainage. In Alexander Lake, the size and bag limits for northern pike are as follows: northern pike less than 27 inches in length, no bag or possession limit; northern pike 27 inches or greater in length, bag and possession limit of one fish; spears and bow and arrow may not be used to take northern pike in Alexander Lake. Sport fishing through the ice with five lines is allowed on Sucker and Alexander lakes and Alexander Creek provided the fishing gear is closely attended and all other fish caught are released immediately.

Changes to the management strategy employed to control northern pike abundance in Alexander Creek are warranted to reduce the immediate impact of pike predation on juvenile salmon. The department plans to implement a control netting program on Alexander Creek in spring 2011. Suppression of pike in Alexander Lake will likely follow efforts directed at the creek within the next two years.

Option A. – Liberalize methods and means for harvesting northern pike in Alexander Lake

Specific Action to Implement the Object: Take board action to eliminate size restriction and increase methods and means to harvest northern pike in Alexander Lake.

Benefits: Reducing the abundance of northern pike would benefit salmonid productivity. A change in the current management strategy to liberalize regulations governing pike harvest in the

lake will allow anglers the opportunity to harvest large-sized pike prior to suppression efforts by the department.

Detriments: This action will only suppress northern pike abundance and not eradicate its presence.

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 Chuitna River is closed to sport fishing, the area from an ADF&G regulatory marker located one mile south of the Chuitna River to the Susitna River shall close to commercial king salmon fishing for the remainder of the directed king salmon fishery.

Option A. – 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 fewer than twelve hours in length.

Benefits: Reducing the Northern District king salmon commercial fishing time would increase king salmon escapements in Alexander Creek by an unknown amount. This may limit future growth in this fishery during years of larger runs.

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

Option B. – Reduce Number of Commercial Fishing Periods

Current fishing periods are four or five periods, 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 periods.

Benefits: Reducing the Northern District king salmon commercial fishing time would increase king salmon escapements in Alexander Creek by an unknown amount. This may limit future growth in this fishery during years of larger runs.

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

Option C. – 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 Alexander Creek by an unknown amount. This may limit future growth in this fishery during years of larger runs.

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

Option D. – 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 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 3,800 Northern District king salmon and an unknown increase in escapement to Alexander Creek 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. This season closes by emergency order when 4,200 king salmon have been harvested. The second part is open from 6:00 a.m. through 6:00 p.m. on Saturdays from June 16–October 15; however, if 4,200 king salmon have been taken before June 16, the second part does not open until July 1. 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 Alexander Creek by an unknown, but likely small, amount.

Detriments: The harvest of king salmon will still occur and may not be lower than historic 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 Alexander Creek by an unknown, but likely small, amount.

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

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

2011 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING ALEXANDER CREEK

- Proposal 102 – Modify gear for subsistence fishing.
- Proposal 133 – Make consumptive use a priority for fishing kings and cohos.
- Proposal 142 – the Northern District King Salmon Management.
- Proposal 143 – Modify the *Northern District King Salmon Management Plan* to articulate recreational use priority.
- Proposal 158 – Restrict all harvest until minimum escapement goals are reached.
- Proposal 270 – Restrict sport, commercial, and subsistence fishing for Alexander Creek king salmon.
- Proposal 284 – Repeal size and bag limits, and liberalize methods and means for northern pike in Alexander Lake.
- Proposal 285 – Liberalize bag limits and gear allowed for northern pike fishing in Alexander Lake and eliminate salvage requirements.

RESEARCH PLAN

To date there has been little research directed at king salmon in Alexander Creek. Research has been mostly limited to activities and aquatic habitat assessment as it relates to invasive northern pike. Aside from the current aerial survey program 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.

PAST RESEARCH PROJECTS

The following research programs have been conducted to gather detailed information about northern pike in Alexander Creek:

1. Lake – 1995 - abundance estimate was 12,959 (SE=2,216); 36 fish/hectare.
2. Lake – 1995 - stomach content analysis would likely be similar to other type 2 habitat (slow moving streams and shallow lakes with abundant vegetative mats) sampled in NCI during 1994-1995.
3. Creek – 2006 - stomach contents of side-channel slough dwelling pike in 10-mile stretch upstream of Sucker Creek confluence. Sampled 9 sloughs. Caught 68 pike from which 53 stomachs were dissected. 15% of stomachs contained salmonids and 76% of stomachs contained invertebrates.
4. Lake – 2008 - evaluation of 12-year slot limit effect on size structure. In 2008, 1,305 pike >12 inches were caught, of which about 22% were >22 inches and 5% >30 inches. Historic size structure appears to be maintained 1996 and 2008.
5. Creek – 2009–2010 - control netting feasibility/mapping of side channel sloughs conducted along a 10-mile stretch downstream of Sucker Creek confluence. Goal was 85% reduction over 3-week period.

CURRENT RESEARCH AND NORTHERN PIKE SUPPRESSION PROJECTS

The following research programs have been and are being conducted to gather detailed information about king salmon or northern pike in Alexander Creek:

1. Long-term Northern Pike Suppression: In May 2011, a large-scale gillnetting operation will begin in side-channel sloughs of Alexander Creek. Northern pike will be targeted with 75 gillnets while congregated for spawning. Three field camps will be set up along Alexander Creek. One will be located in the lower river between the mouth of Alexander Creek and Sucker Creek, and two will be located between Sucker Creek and Alexander Lake. Field staff assigned to each field camp will be responsible for gillnetting their corresponding creek section. In each section, 12 side-channel sloughs will be targeted for a total of 36 sloughs in all. Sloughs remaining hydrologically-connected with the mainstem will be targeted until either an 85% reduction in northern pike catch is achieved or the end of the netting period is reached. For long-term reductions in catch rates, the sloughs will need to be gillnetted annually.

2. Northern Pike Radio-Telemetry: The second major component of the suppression project will be to quantify movement patterns of northern pike in the Alexander Creek drainage through a radio-telemetry project. This information will help define and strengthen northern pike suppression efforts and will also identify how northern pike utilize open systems, in general within their invasive range. Little is presently known about the degree to which northern pike move between Alexander Lake and the mainstem of Alexander Creek, and between the sloughs and the mainstem. If substantial movement between Alexander Lake and the mainstem is observed, it is likely that ADF&G will propose targeted northern pike suppression in Alexander Lake at a future date. This would be an expensive and controversial endeavor which is why this current project focuses on suppression in side-channel sloughs while a determination is made about the need to expand suppression work to the lake. For this study, 150 northern pike will be fitted with radio transmitters and ID tags. Seventy-five percent of the tagged northern pike will be released into the middle of Alexander Lake, and 25% will be released into each of two side-channel sloughs that have permanent connections with Alexander Creek. Radio transmitters will have a two-year life span. Radio-implanted northern pike will be released in July 2011 and tracked through the fall of 2013. Northern pike movements will be tracked using five stationary receivers installed at one mile below Alexander Lake, at the confluence of Alexander Creek and Sucker Creek, at the outlets of the two permanently-connected sloughs, and a mile above the confluence of Alexander Creek and the Susitna River. Data from the receivers will be downloaded every two months. Aerial telemetry surveys will also be conducted to detect fine-scale northern pike movements. Northern pike movements will be mapped using GIS.

3. Salmonid Monitoring Protocol: The third component of this project will collect baseline data needed for long-term monitoring of salmon abundance to evaluate the success of the northern pike suppression efforts. This will be accomplished through annual minnow trap surveys of juvenile salmonids and an investigation of temporal shifts in northern pike diets. To begin building a long-term data set, two minnow trap sampling events will take place annually in concert with the northern pike suppression schedule. Alexander Creek will be divided into the three sections discussed in the northern pike suppression section.

Field crews responsible for gillnetting those sections will also be responsible for minnow trap surveys in their assigned areas. Sampling locations will be fixed. Each of the three creek sections will contain twelve sample sites: six in Alexander Creek and six in side-channel sloughs. Five minnow traps will be set in each of the sample sites. Therefore, each field crew will be responsible for 60 minnow traps, for a total of 180 traps per overall sampling event. Traps will be fished for 24 hours. Trends in CPUE and relative abundance will be monitored over time. Northern pike suppression will be considered successful if large, significant, increases in salmonid catch-per-unit-effort and relative abundance can be observed within five years. For the near term, the focus will be on gathering the initial monitoring data sets from which the northern pike suppression initiative will eventually be evaluated.

Another complement to the juvenile salmonid minnow trap monitoring will be to investigate shifts in northern pike diet over time as the suppression efforts continue. Approximately 50% of the northern pike that are removed in gillnets during the suppression project will be dissected to enumerate prey species in their stomach contents. Shifts in northern pike diet will be evaluated by observing changes in the relative abundance of prey species over time. Again, the final evaluation of this will likely occur outside the time frame of this AKSSF period. However, data collected during this period will lay the foundation by which future comparisons can be made.

4. Aerial Surveys: The department plans to continue the single, annual aerial surveys (helicopter) of Alexander Creek to monitor the trends in king salmon abundance.

5. Marine Harvest Sampling: If a useful amount of discrimination exists in the genetic baseline, the department plans to propose sampling marine king salmon fisheries in NCI.

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Table 1. Alexander Creek king salmon escapement and harvest, 1979–2010.

Year	Escapement	Sport Harvest
1979	6,215	712
1980	[a]	1,438
1981	[a]	1,121
1982	2,546	2,506
1983	3,755	1,711
1984	4,620	2,107
1985	6,241	2,761
1986	5,225	2,937
1987	2,152	2,224
1988	6,273	4,687
1989	3,497	4,882
1990	2,596	5,119
1991	2,727	6,548
1992	3,710	4,124
1993	2,763	5,154
1994	1,514	3,070
1995	2,090	1,217
1996	2,319	1,005
1997	5,598	1,470
1998	2,807	1,275
1999	3,974	2,241
2000	2,331 [b]	2,721
2001	2,282	2,313
2002	1,936	1,992
2003	2,012	2,293
2004	2,215	1,294
2005	2,140	1,052
2006	885	1,396
2007	480	412
2008	150 [b]	[c]
2009	275	[c]
2010	177	[c]
Average		
1979–1999	3,717	2,777
2001–2010	1,255	-
2006–2010	393	-

[a] No count due to poor water visibility.

[b] Low count due to timing, poor visibility, or weather conditions.

[c] Sport fishery closed by regulation.

Table 2. Historical subsistence salmon harvests, Tyonek Subdistrict, 1981–2009.

	Permits		Reported salmon harvests					
Year	Issued	Returned	King	Sockeye	Coho	Chum	Pink	Total
1980	67	67	1,757	235	0	0	0	1,992
1981	70	70	2,002	269	64	32	15	2,382
1982	69	69	1,590	310	113	4	14	2,031
1983	75	75	2,665	187	59	6	0	2,917
1984	75	75	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
5-year average (2005–2009)	85	67	1,004	117	146	3	3	1,273
10-year average (2000–2009)	86	67	1,076	123	115	4	4	1,323
Historical average (1980–2009)	72	59	1,285	134	124	10	8	1,561

Source ADF&G Division of Subsistence Alaska Salmon Fishing Database 2010.

NA = Information regarding the number of permits returned in 1985–1986 does exist; however, it was not available at the time this report was written.

Table 3. Northern District commercial king salmon directed harvest by statistical area, 2001–2010.

Year	Date	247-10	247-20	247-30	247-41	247-42	247-43	247-70	247-80	247-90	Total
2001	6/4/2001	173	218	80	30	42	15	59		15	
	6/11/2001	300	282		22	119	21	37		12	
	6/18/2001	118			6	28	23	7		9	
	Total	591	500	80	58	189	59	103	0	36	1,616
2002	5/27/2002	95			13	60	4	37	56	5	
	6/3/2002	223	136	85	87	57	16	64	70	72	
	6/10/2002	159	131		34	104	3	63	115	58	
	Total	477	267	85	134	221	23	164	241	135	1,747
2003	5/26/2003	18		36	37	45		24		19	
	6/2/2003	5	101	4	45	43	54	74	17	6	
	6/9/2003	47	383	67	53	49	2	33	9	1	
	Total	70	484	107	135	137	56	131	26	26	1,172
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	
	Total	136	455	211	342	200	160	267	0	48	1,819
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		
	Total	295	1141	290	419	376	283	258	52	36	3,150
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	
	Total	831	934	382	488	271	384	411	121	65	3,887
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	
	Total	509	627	375	266	223	312	664	88	68	3,132
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	
	Total	370	1254	372	542	355	327	431	136	68	3,855
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	
	Total	259	356	144	82	128	72	169	38	18	1,266
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	
	Total	338	612	0	124	188	177	145	42	48	1,674

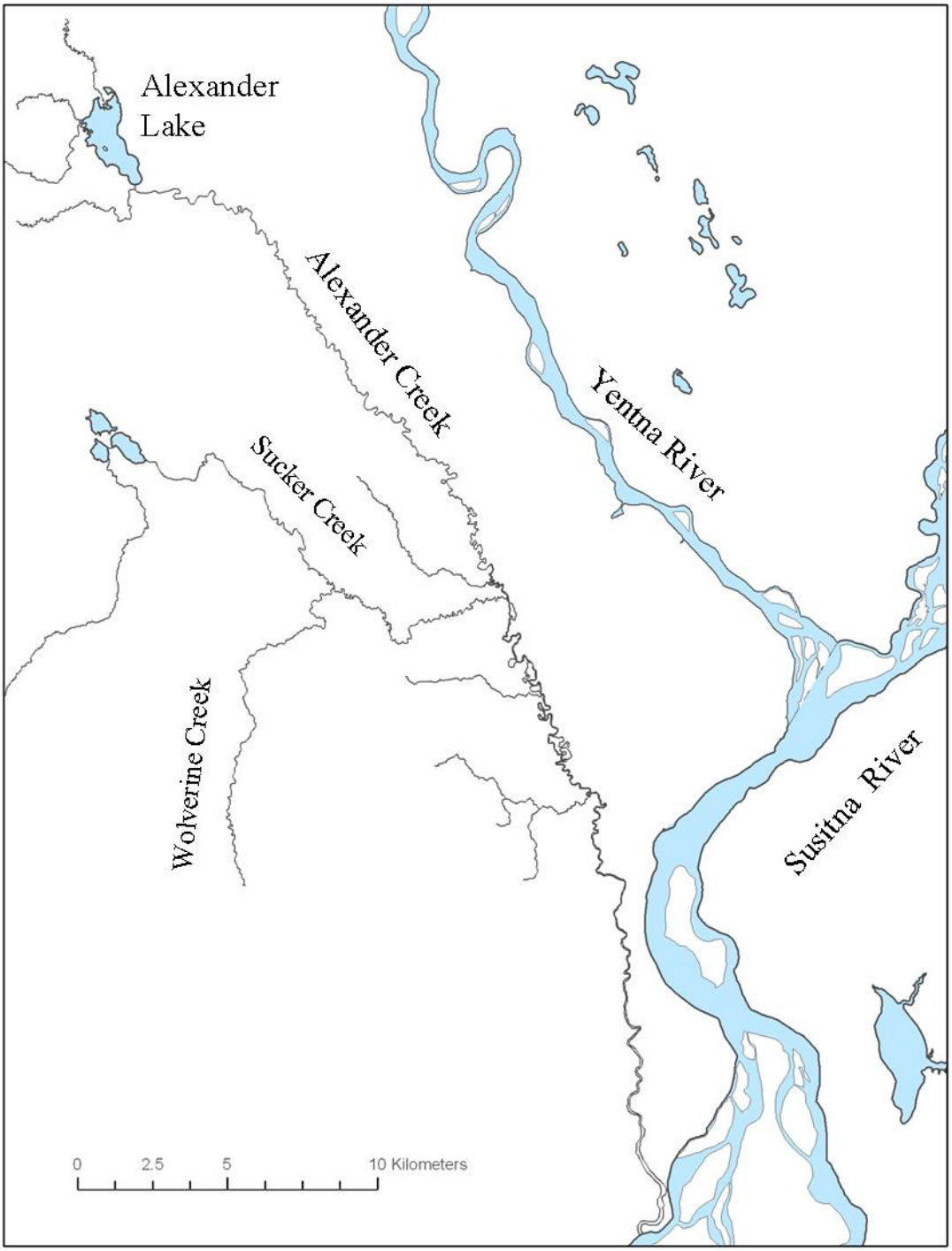

Figure 1. Map depicting Alexander Creek drainage.

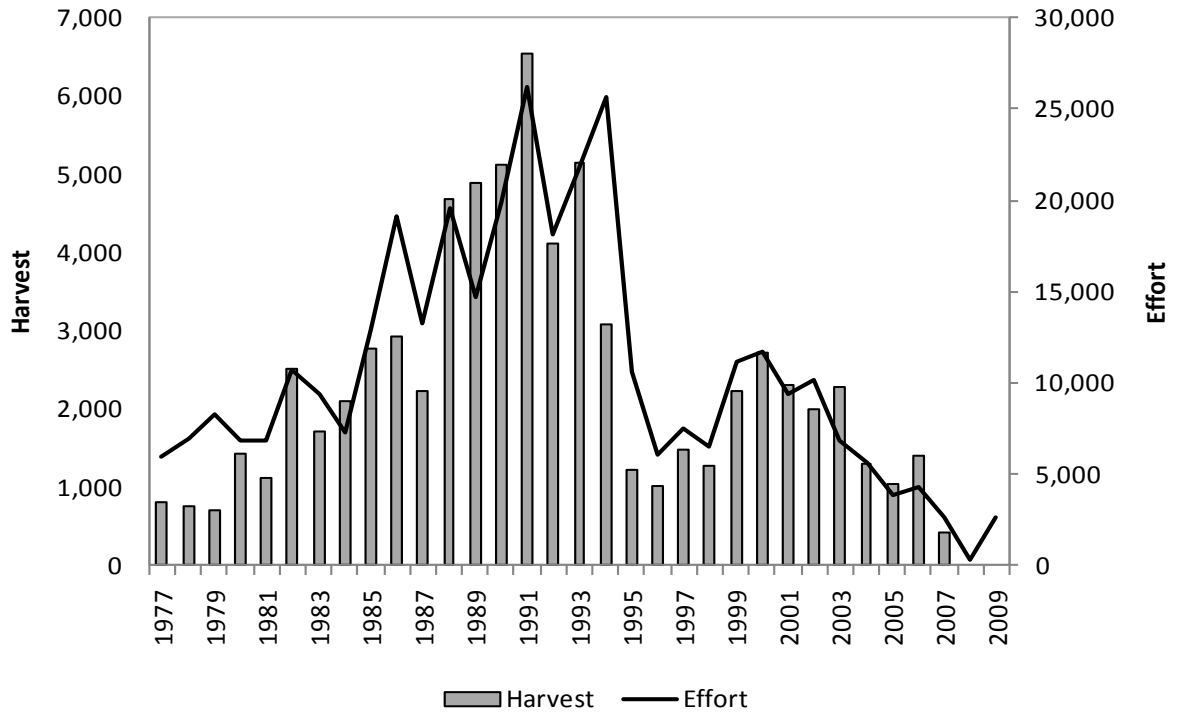

Figure 2. Alexander Creek king salmon sport harvest and fishing effort, 1977–2009 (Jennings *et al. In prep*.).

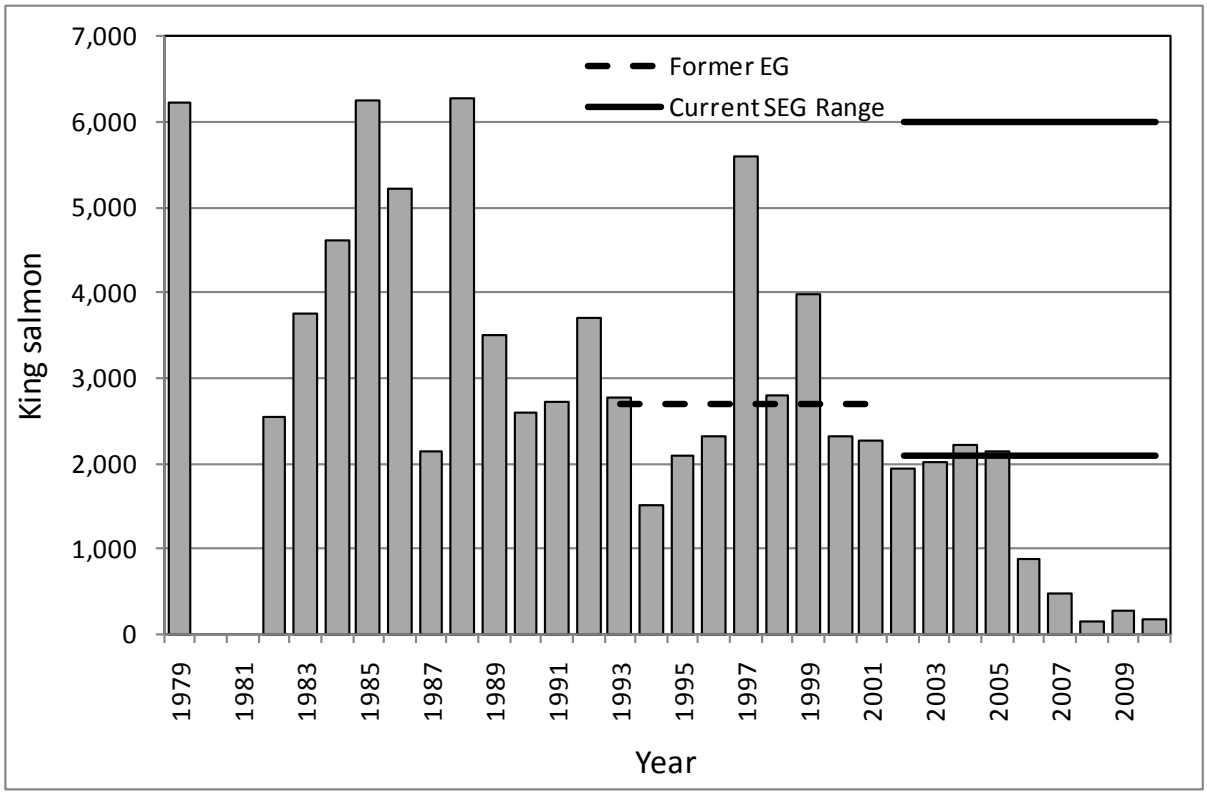

Figure 3. Alexander Creek king salmon escapement index counts, 1979–2010.

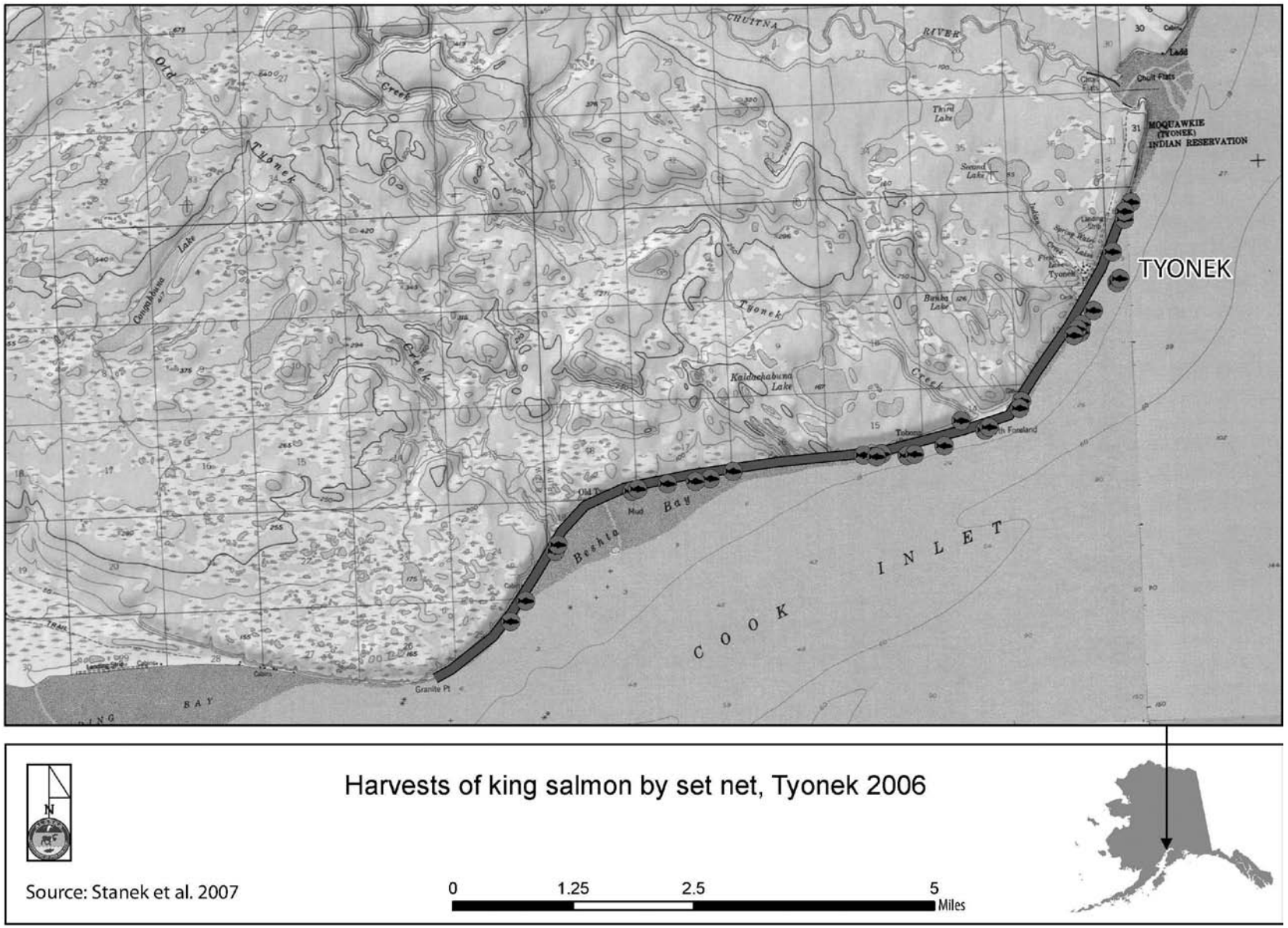

Figure 4. Map showing harvest locations of king salmon by set gillnet, Tyonek Subdistrict subsistence salmon fishery, 2006.

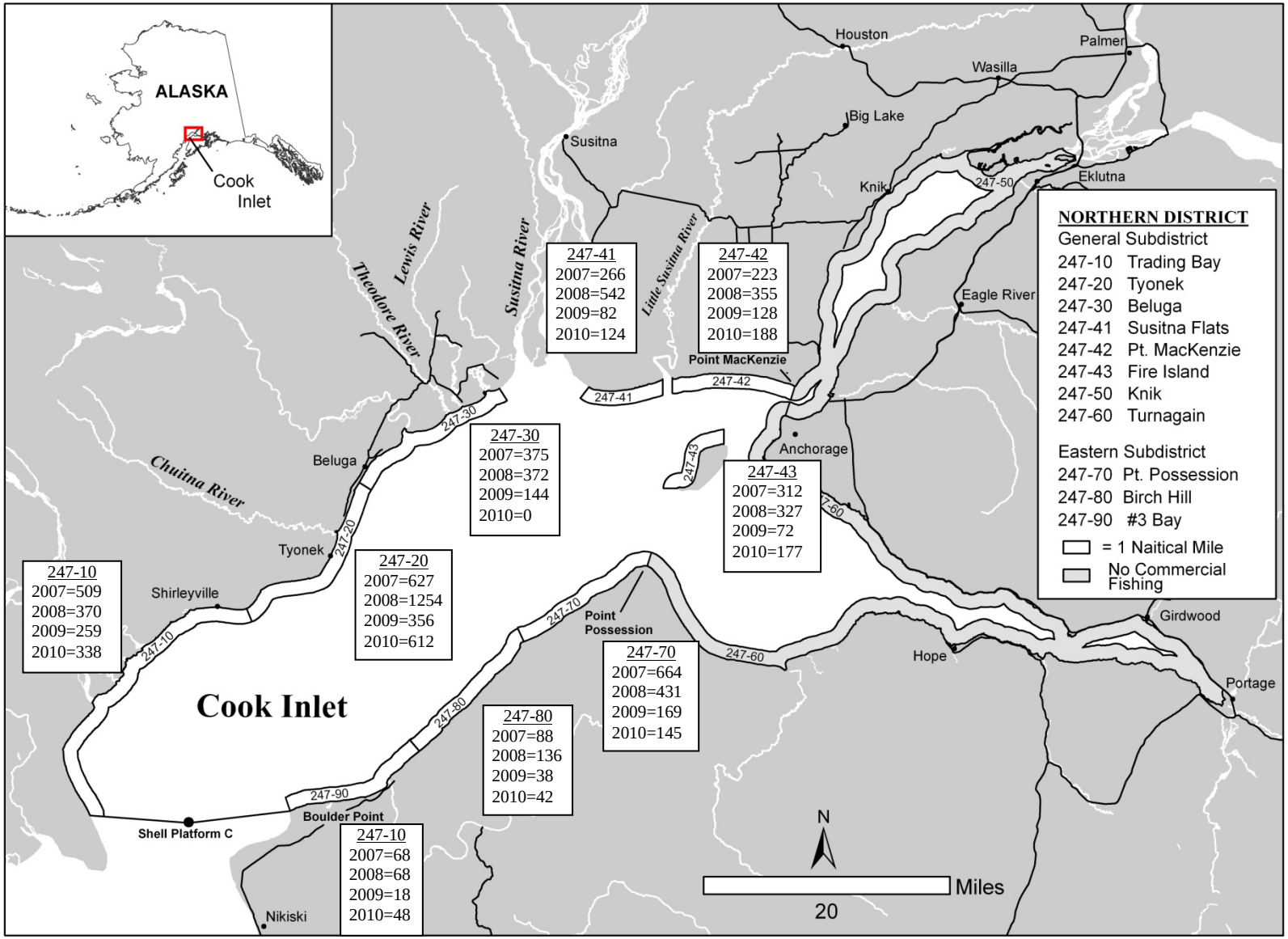

Figure 5. Northern District statistical harvest reporting areas and commercial king salmon harvest, 2007–2010.