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Kenai River Late-Run King Salmon Stock Status and Action Plan, Alaska Department of Fish and Game Report to the Alaska Board of Fisheries, February 23, 2024

by

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and

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December 2023

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

Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

SPECIAL PUBLICATION NO. 23-11

KENAI RIVER LATE-RUN KING SALMON STOCK STATUS AND ACTION PLAN, ALASKA DEPARTMENT OF FISH AND GAME REPORT TO THE ALASKA BOARD OF FISHERIES, FEBRUARY 23, 2024

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The Special Publication series was established by the Division of Sport Fish in 1991 for the publication of techniques and procedures manuals, informational pamphlets, special subject reports to decision-making bodies, symposia and workshop proceedings, application software documentation, in-house lectures, and similar documents. The series became a joint divisional series in 2004 with the Division of Commercial Fisheries. Special Publications are intended for fishery and other technical professionals. Special Publications are available through the Alaska State Library, Alaska Resources Library and Information Services (ARLIS), and on the Internet: http://www.adfg.alaska.gov/sf/publications/. This publication has undergone editorial and peer review.

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ABSTRACT

In response to guidelines established in the *Policy for Management of Sustainable Fisheries* (SSFP), the Alaska Department of Fish and Game (department) recommended that Kenai River late-run king (Chinook) salmon be designated a "stock of management concern" based on failure to achieve escapement goals over a 4- to 5-year period. In October of 2023, the Alaska Board of Fisheries designated this stock as such and triggered the requirement for the department to develop an action plan identifying options to rebuild the stock. This plan identifies a range of options for both directed and indirect (incidental) fisheries that could potentially impact rebuilding.

Keywords: Kenai River, Chinook salmon, *Oncorhynchus tshawytscha,* stock of management concern, sport fisheries, commercial fisheries, personal use fisheries, SSFP, Alaska Board of Fisheries, BOF, Upper Cook Inlet

INTRODUCTION

In October of 2023, the Alaska Board of Fisheries (board), based on the recommendation of the Alaska Department of Fish and Game (department), established the Kenai River late-run king (Chinook) salmon as a stock of management concern. This action was based on the guidelines established in the *Policy for Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222). The SSFP defines management concern as "a concern arising from the 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"[1]. 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" and is based on the generation time of most salmon species. The plan directs the department and the board to collaborate in the development and periodic review of an action plan for stocks of concern and specifies in section 5 AAC 39.222(d)(4) that action plans should contain goals, measurable and implementable objectives, and provisions as follows:

A. measures required to restore and protect salmon habitat, including necessary coordination with other agencies and organizations;
B. identification of salmon stock or population rebuilding goals and objectives;
C. fishery management actions needed to achieve rebuilding goals and objectives, in proportion to each fishery's use of, and hazards posed to, a salmon stock;
D. descriptions of new or expanding salmon fisheries, management concern, yield concern, or conservation concern; and
E. performance measures appropriate for monitoring and gauging the effectiveness of the action plan that are derived from the principles and criteria contained in this policy.

Within this Action Plan review, the department will

- present background and pertinent information
- present potential actions
- discuss those and additional options with the board and stakeholders
- provide expertise regarding biological and management impacts of proposed options
- present options for removing the Stock of Concern status

[1] SEG is sustainable escapement goal, BEG is biological escapement goal, and OEG is optimal escapement goal.

Within this Action Plan review, the board will

- identify goals for rebuilding Kenai River late-run king salmon stocks and address the question, "What does rebuilding look like?"
- consider actions to achieve those goals
- consider how far-reaching actions to conserve Kenai River late-run king salmon should extend within and beyond Upper Cook Inlet

CONDITIONS FOR DELISTING A STOCK OF CONCERN

The *Policy for the Management of Sustainable Salmon Fisheries* defines "management concern" as "a concern arising from a chronic inability, despite the 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."

An optimal escapement goal (OEG) is defined (5 AAC 39.222[f][25]) as a specific management objective for salmon escapement that considers biological and allocative factors and may differ from SEG or BEG; the OEG will be sustainable and may be expressed as a range with the lower bound above the level of SET (sustained escapement threshold), and will be adopted as a regulation by the board; the department will seek to maintain evenly distributed escapements within the bounds of the OEG.

A sustainable escapement goal (SEG) is defined (5 AAC 39.222[f][36]) as a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a 5- to 10-year period, and is used in situations where the BEG cannot be estimated due to the absence of a stock-specific catch estimate; the SEG is the primary management objective for the escapement, unless an optimal escapement or inriver run goal has been adopted by the board, and will be developed from the best available biological information; the SEG will be determined by the department and will be stated as a range that takes into account data uncertainty; the department will seek to maintain escapements within the bounds of SEG.

The stock of management concern recommendation for this stock is based on failure to achieve the OEG established by the board in 2020. Future recommendations for delisting Kenai River late-run king salmon as a stock of concern will be based on the ability of the stock to achieve the SEG unless an OEG is prescribed in the *Kenai River Late-Run King Salmon Management Plan*. If an OEG is in place, then that becomes the metric used to measure success of achieving the goal.

- Delisting. If the lower bound of the management goal (currently the OEG) is met or exceeded in 3 consecutive years and is expected to meet the goal range in the future years or is met in 4 out of 6 consecutive years and is expected to meet the goal range in future years, the department will recommend removing Kenai River late-run king salmon as a stock of management concern at the first Upper Cook Inlet board meeting after this condition is met.
- Restrictions. Management restrictions may be relaxed if inseason projections indicate restrictions are not needed to ensure the escapement goal is met.

Stock status, action plan performance (including information on harvest rate, distribution, and timing in fisheries), and the results of the escapement goal review will be updated in a report to the board at the 2026–2027 Upper Cook Inlet meeting.

SYNOPSIS

The basis for adopting the stock of management concern designation for Kenai River late-run king salmon was the failure to meet the OEG of 15,000–30,000 large fish (75 cm mid eye to tail fork [METF] and longer) in the past 4 years when this stock was managed to the OEG (2020–2023) and in 2019 when this stock was managed to an SEG of 13,500–27,000 large fish (Table 1). Despite specific management measures taken by the department to reduce harvest in the sport, personal use, and commercial fisheries, these goals failed to be met in 5 of the past 5 years.

This triggered the requirement for the department to develop an action plan to identify options that may rebuild this stock and mitigate negative influences on affected fisheries. This action plan summarizes historical assessment of annual run size and describes the existing regulations and emergency order (EO) authority that the department follows to manage the Kenai River late-run king salmon run. Options are then presented for potential management actions for the commercial, sport, and subsistence fisheries, and research projects for the Kenai River late-run king salmon stock. It also includes proposed criteria for future removal of the stock of concern status.

BACKGROUND

The late run has an SEG of 13,500–27,000 large (75 cm METF and longer) king salmon. In 2020, the board established an OEG of 15,000–30,000 large Kenai River late-run king salmon. The board stated their intent for setting the OEG was to help rebuild this stock. The OEG is the current management target for the fishery.

Management actions implemented under this action plan for the late run Kenai River stock will probably have impacts on nearby fisheries as fishing effort is displaced. Stocked and naturally produced (a population consisting of both wild fish and naturalized hatchery fish) king salmon runs to Crooked Creek support an early-run fishery in the Kasilof River. A late run composed of wild king salmon also provides sport fishing opportunity at the Kasilof River.

The Russian, Kenai, and Kasilof Rivers support very robust fisheries for both early and late sockeye salmon runs. These stocks support the largest sockeye salmon sport fisheries in Alaska. The Northern Kenai Peninsula Management Area also supports personal use sockeye salmon dip net fisheries at the mouths of the Kenai and Kasilof Rivers and a personal use set gillnet fishery at the mouth of the Kasilof River. The personal use fisheries on the Kenai, Kasilof, and Susitna Rivers are managed with established seasons and provide salmon harvest opportunities for Alaska residents.

STOCK ASSESSMENT AND ESCAPEMENT GOAL HISTORY

Stock Assessment and Run Timing

Kenai River King Salmon Sonar

Adaptive Resolution Imaging Sonar (ARIS) is used at river mile 14 on the lower Kenai River to estimate passage of king salmon 34 inches (75 cm) or longer in length entering the river. The sonar site was chosen for its bathymetric, or river contours, qualities which allow the sonar technology to cover the entire span of the river. The sonar is located just above tidal influence, which allows more complete bank-to-bank coverage and ensures fish are migrating upstream. Software allows biologists and technicians to measure fish in the ensonified zone to estimate the number of fish 34 inches (75 cm) or longer. By only estimating large fish, the estimates are less likely to be corrupted

by the presence of other species such as sockeye and pink salmon. The goal of this project is to produce daily estimates of net upstream passage of fish 75 cm or longer for both early and late runs. Data collected from the sonar are critical for effective inseason management of Kenai River king salmon.

Inriver Gillnetting Program

Standardized gillnetting occurs daily from May 16 until the sonar is discontinued or through August 20 at river mile 9 in the estuary area of the Kenai River. Sampling is scheduled to occur from 0700 h to 1300 h daily. Sixty-foot gillnets are drifted downstream with the current to capture upstream migrating salmon. Gillnets of 2 different mesh sizes (4.0 inch and 7.5 inch stretched mesh) are used to reduce selectivity of the size and species of fish caught. Once caught, captured king salmon are untangled and remain in the water while they are placed in a padded cradle attached to the outside of the boat. Each fish is then sampled for biological data and released to continue their upstream migration. Goals of this project are to estimate the age, sex, and length compositions of returning king salmon for both the early and late runs, and to estimate the daily species composition (king salmon vs. other Pacific salmon species) and daily catch rates or CPUE (catch per unit of effort) of king salmon. Data collected from the inriver gillnetting program are critical for effective inseason management of Kenai River king salmon.

Sport Fishing Creel Survey

An onsite roving creel survey of anglers has been conducted on the lower Kenai River during king salmon season since 1977. The primary goals of the creel survey are to estimate the number of king salmon caught and those retained by the sport fishery downstream of the Soldotna Bridge to the Warren Ames Bridge. Anglers are also interviewed for catch and harvest rate information as they exit the fishery. Harvested king salmon are sampled for biological data including age (scale sample), sex, length, and genetic tissue (axillary process). Data collected from the creel survey are critical for effective inseason management of Kenai River king salmon.

Genetic Sampling

Recent advances in genetics and the development of a king salmon genetics baseline database (Barclay and Habicht 2015) now provides a tool to differentiate different stocks of king salmon that enter the Kenai River. Sampling king salmon for genetic tissue, using the axillary process (a small fin beneath the pelvic fin of the fish), in the inriver gillnetting program provides information on the return timing of tributary and mainstem spawning fish. King salmon harvested in the sport fishery are sampled for genetic information as well to determine stock-specific harvest estimates and refine fishing regulations. Recently, it has also become possible to incorporate genetic stock information data into comprehensive abundance and run–timing models to obtain stock-specific estimates of annual abundance (Reimer and Fleischman 2016).

King Salmon Radiotelemetry

Kenai River king salmon were radiotagged from 2010 to 2016. Early-run king salmon were tagged from 2010 to 2016, whereas late-run king salmon were tagged from 2012 to 2014 (Eskelin and Reimer 2017). Esophageal implant radio transmitters were inserted into some king salmon captured at the river mile 9 inriver gillnetting project and released to continue their migration (Perschbacher and Eskelin 2016). Radiotagged fish were monitored both passively, using a network of stationary radio receiving stations, and actively, by foot, boat, or aerial surveys. Stationary receiving stations allowed 24-hour monitoring of radiotagged king salmon at key points

along their migration routes, whereas active tracking was used to determine times at specific locations. This system provided multiple, redundant locations for each tagged fish with resolution sufficient to detect noteworthy behavior patterns.

Spawning locations were determined by analyzing all available data. Spawning destinations for tributary spawners were determined via aerial surveys, whereas spawning destinations for mainstem spawners were determined via boat surveys. Tagged king salmon were analyzed relative to time of entry to the Kenai River (early or late run) and eventual spawning destination (tributary or mainstem). King salmon that spawned in tributaries of the Kenai River migrated into the river during spring and early summer (May–June), whereas for mainstem spawning king salmon, the time of entry to the Kenai River was not related to the eventual mainstem spawning location. Killey River and Benjamin Creek fish were the predominant stocks entering in May to mid-June. Funny River fish primarily entered the Kenai River in June. Mainstem spawning fish entered in mid-June to mid-to-late August. Nearly all fish radiotagged in July during 2012–2014 were mainstem spawners. There were few tributary spawners still present in the lower Kenai River (downstream of Soldotna Bridge) in early July.

Commercial Harvest Sampling

King salmon harvested in the late-run eastside set gillnet (ESSN) commercial fishery in Upper Cook Inlet are sampled by department technicians for genetic analysis by clipping off the axillary process, a small fin beneath the pelvic fin of the fish. Samples are taken throughout the entire commercial fishing season and from all fishing districts. Age, sex, and length composition data are also collected. The goals of this project are to estimate the king salmon stock composition of the harvest and to estimate the age composition of harvested king salmon. Data collected from the ESSN commercial king salmon harvest are not used for inseason management; however, these data do aid in estimating the total run of late-run king salmon to the Kenai River. Estimating the total run provides the data necessary to review the escapement goal and forecast Kenai River late-run king salmon. From 2010, 2011, and 2013–2022, Kenai River mainstem spawning fish composed on average 70% (range 61–79%) of the total ESSN harvest of all-sized king salmon. Kasilof River mainstem spawning fish composed on average 24% (range 13–39%) of the ESSN harvest of all-sized king salmon with the remainder (6%) being attributed to other Cook Inlet stocks and Kenai River tributary fish (Table 2; Eskelin and Barclay 2023). The ESSN fishery did not open in 2023 due to Kenai River late-run king salmon conservation measures as prescribed in the *Kenai River Late-Run King Salmon Management Plan*.

Escapement Goals

In 2014, the Kenai River late-run king salmon escapement goal was an interim SEG for fish of all sizes of 15,000–30,000 while the large fish metric was being studied in a pilot project. In 2017, the department switched to a goal for Kenai River king salmon based on large fish (75 cm METF and longer). In progressing from a goal based on all-sized fish to a goal based on large fish, the department changed the SEG to 13,500–27,000. At the 2020 board meeting, the department did not change the SEG, but the board created a Kenai River late-run king salmon OEG of 15,000–30,000 large fish. The department is recommending no change to the SEG following the 2023 escapement goal review. The department does not evaluate OEGs because they are set by the board.

FISHERY MANAGEMENT

Management of Kenai River late-run king salmon is prescribed primarily in the *Kenai River Late-Run King Salmon Management Plan* (KRLRKSMP), which provides guidance on inriver and mix-stock marine fisheries in Cook Inlet.

Kenai River Late-run King Salmon Management Plan (5 AAC 21.359)

The purpose of the plan is to ensure an adequate escapement of late-run king salmon into the Kenai River system and to provide management guidelines to the department. Provisions of the plan are in effect from June 20 through August 15 and include direction to the department to achieve an OEG of 15,000–30,000 king salmon 75 cm METF or longer in length. The plan provides direction on actions to implement on sport, personal use, and commercial fisheries when the goal is not projected to be achieved or exceeded. The prescribed restrictions intended to slow or minimize the mortality of late-run king salmon are a series of paired step-down restrictions created to share the burden of conservation between user groups in varying run strength scenarios.

The KRLKSMP has included regulations to restrict and close sport king salmon fisheries and ESSN commercial fisheries for all species since its inception in 1988. Prior to 2014, the only paired restriction was that if the king salmon sport fishery in the Kenai River was closed, then salt waters of Cook Inlet north of Bluff Point were closed; the commercial drift gillnet fishery in the Central District was restricted within 1 mile of the Kenai Peninsula shoreline north of the Kenai River and within one-half mile south of the Kenai River; and the commercial set gillnet fishery in the Upper Subdistrict was closed. In 2014, to share the burden of conservation of Kenai River late-run king salmon, the board modified the KRLKSMP to include the step-down restrictions in sport, commercial, and personal use fisheries during periods of low Kenai River late-run king salmon abundance. The current OEG (15,000–30,000 large fish) for Kenai River late-run large king salmon was established by the board in 2020. The current SEG (13,500–27,000 large fish) was established by the department in 2017. Restrictions to all fisheries to reduce the mortality of Kenai River late-run king salmon has resulted in exploitation of this stock below 5% in all fisheries combined since 2020 (Table 3).

Following KRLKSMP stipulations limits the department's ability to manage Kenai and Kasilof Rivers sockeye salmon runs to achieve escapement goals when Kenai River late-run king salmon abundance is low and sockeye salmon abundance is average to high. Kenai and Kasilof Rivers sockeye salmon stocks are managed via the *Kenai River Late-Run Sockeye Salmon Management Plan* (KRSSMP, 5 AAC 21.360) and the *Kasilof River Salmon Management Plan* (KRSMP, 5 AAC 21.365) These plans outline the departments strategy and management targets in the commercial, personal use, and sport fisheries for sockeye salmon. The sockeye salmon management plans direct the department to achieve escapement goals for sockeye salmon through directed harvest and use of time and area EO authority. Within the KRSSMP, allocative stipulations direct the department to manage for inriver goals based upon 3 tiers of estimated Kenai River sockeye salmon total run size. Run size tiers determine the amount of commercial fishing time and which areas are available (Table 4), sockeye salmon bag limits in the Kenai River sport fishery, and time available in the Kenai River personal use fishery. Conflicting management objectives arise when stipulations in the KRLKSMP restrict the commercial fisheries harvest potential below what would be necessary to achieve sockeye salmon escapement goals. The Kenai River inriver goal has been exceeded in 6 of the 7 years since 2017, and the SEG has been exceeded in 4 of the 7 years since 2017 (Table 5). The Kasilof River sockeye salmon BEG/OEG has been

exceeded in 6 of the 7 years since 2017 (Table 6). Attempting to keep abundant sockeye salmon escapement within SEG ranges requires liberal harvest opportunity, exactly opposite of what weak king salmon run management requires.

Past 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. EOs may also not supersede provisions for increasing or decreasing bag and possession limits or changing methods and means specified in regulatory management plans established by the board.

The department has repeatedly used its EO authority to reduce harvest of Kenai River late-run king salmon in the sport, personal use, and commercial fisheries to meet escapement objectives. All actions have been taken with board guidance and direction and have withstood legal challenges. Such actions have become more frequent given poor returns since 2011, with restrictive actions being taken in 5 of the last 6 years (2018–2023).

The KRLRKSMP delineates, in a highly prescriptive manner, which restrictions will be implemented to the Central District drift gillnet (CDDGN) and Upper Subdistrict set gillnet (ESSN) fisheries at different levels of projected escapement and subsequent inriver restrictions (Figures 1–3). Commercial fishery restrictions primarily impact the ESSN fishery because it has historically harvested a greater number of Kenai River late-run king salmon than other UCI commercial fisheries. In years when sockeye salmon runs are large and the Kenai River king salmon run is small, this means harvesting far fewer sockeye salmon than are available and possibly exceeding the inriver and escapement goals in the Kenai and Kasilof Rivers.

Management measures specific to the Kenai River late-run king salmon fishery have been implemented since 2017, which was the initial year that management was based on a large fish (75 cm METF and longer) goal, as follows:

	Sport and Personal Use	Commercial
2017	Preseason late-run projection of 33,000 large king salmon (SEG 13,000–27,000). Kenai late-run king salmon fishery prosecuted by regulations in KRLRKSMP. **Below the Slikok Creek markers, only single hooks are allowed, bait is allowed, and any size fish may be harvested.* **Above the Slikok Creek markers, only single hooks are allowed, bait is NOT allowed, and only fish less than 36 inches may be harvested.* **The bag and possession limit for king salmon 20 inches or greater in length is one king salmon below Skilak Lake.*	No restrictions

-continued-

	Sport and Personal Use	Commercial
2017	**There is a 5-fish annual limit for king salmon over 20 inches from all Cook Inlet Drainage waters in combination, which includes only 2 fish per year over 20 inches that can come from the Kenai River. All harvested fish that count toward an annual limit must be recorded on a harvest record or the back of your license.* **The bag and possession limit for king salmon less than 20 inches (jacks) is 10 fish.*	

2017 Goals:

Kenai River late-run large king salmon SEG was achieved.
Kenai River late-run sockeye salmon SEG and IRG were achieved.
Kasilof River sockeye salmon BEG was exceeded.

	Sport and Personal Use	Commercial
2018	**July 1**, anglers were prohibited from fishing for king salmon of any size in the Kenai River from an ADF&G marker located approximately 300 yards downstream from the mouth of Slikok Creek, upstream to an ADF&G regulatory marker at the outlet of Skilak Lake. **July 1**, the late-run sport fishery was restricted to no bait on the Kenai River. **July 10**, retention of king salmon was prohibited in the Kenai River dip net fishery. **July 18**, retention of king salmon was prohibited on the Kenai River from its mouth upstream to an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek.	**July 1–July17**, ESSN restricted to 48 hours per week **July 18–July 28**, ESSN restricted to 24 hours per week **July 28**, Closed ESSN and CDDGN due to low Kenai River sockeye salmon abundance.

2018 Goals:

Kenai River late-run large king salmon SEG was achieved.
Kenai River late-run sockeye salmon SEG and IRG were achieved.
Kasilof River sockeye salmon BEG was exceeded.

	Sport and Personal Use	Commercial
2019	**July 1**, retention of king salmon was prohibited from an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek upstream to the outlet of Skilak lake. In addition, only 1 unbaited, single-hook, artificial lure was allowed in waters restricted to catch-and-release. **July 4**, king salmon fishing reopened in the Kenai River from an ADF&G regulatory marker located approximately 300 yards downstream of the mouth of Slikok Creek upstream to an ADF&G regulatory marker located at the outlet of Skilak Lake to the retention of king salmon under general regulations (1 king salmon less than 36 inches in length per day and no more than 1 king salmon in possession. Sport fishing gear is limited to 1 unbaited, single-hook, artificial fly or lure) **July 10**, retention of king salmon was prohibited in the Kenai River dip net fishery. **August 1**, bait and multiple hooks were prohibited from the mouth of the Kenai River upstream to the outlet of Skilak Lake until August 15 to reduce incidental catch of king salmon.	**July 1–July 31**, ESSN restricted to 48 hours per week and gear reduced, select commercial periods area reduced to within 600 ft from shore. **August 4–August 15**, Closed ESSN due to low Kenai River late-run king salmon abundance.
	2019 Goals: Kenai River late-run large king salmon SEG was not achieved. Kenai River late-run sockeye salmon SEG and IRG were exceeded. Kasilof River sockeye salmon BEG was exceeded.	

	Sport and Personal Use	Commercial
2020	**July 1**, bait and retention of king salmon 34 inches and greater was prohibited on the Kenai River from its mouth upstream to an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek. This restriction was in conjunction with the Kenai River early-run king salmon sport fishing closure that remained in effect from ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake. **July 10,** retention of king salmon was prohibited in the Kenai River dip net fishery. **July 15**, retention of king salmon of all sizes was prohibited from the mouth of the Kenai River upstream to an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek. In addition, only one unbaited, single-hook, artificial lure was allowed. **July 24**, king salmon fishing was closed from the Kenai River mouth upstream to the outlet of Skilak Lake until July 31. The use of bait was also prohibited. **August 1**, bait and multiple hooks were prohibited from the mouth of the Kenai River upstream to the outlet of Skilak Lake until August 15 to reduce incidental catch of king salmon.	**June 20–July 14**, ESSN restricted to 36 hours per week and gear reduced, select commercial periods area reduced to within 600 ft from shore. **July15–July 23**, ESSN restricted to 24 hours per week and gear reduced, select commercial periods area reduced to within 600 ft from shore. **July 24–August 15**, Closed ESSN and area reduced in CDDGN due to low Kenai River Late-run king salmon abundance.

2020 Goals:

Kenai River late-run large king salmon OEG was not achieved.
Kenai River late-run sockeye salmon SEG and IRG were exceeded.
Kasilof River sockeye salmon BEG was exceeded

	Sport and Personal Use	Commercial
2021	**July 1**, use of bait was prohibited on the Kenai River from its mouth upstream to the outlet of Skilak Lake. In addition, the retention of king salmon of any size was prohibited from an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake through July 31. **July 10**, retention of king salmon was prohibited in the Kenai River dip net fishery. **July 14**, retention of king salmon of all sizes was prohibited from the mouth of the Kenai River upstream to an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek. In addition, only one unbaited, single-hook, artificial lure was allowed. **July 21**, king salmon fishing was closed from the Kenai River mouth upstream to the outlet of Skilak Lake. The use of bait and multiple hooks were also prohibited while fishing for other species. **August 1**, bait and multiple hooks were prohibited from the mouth of the Kenai River upstream to the outlet of Skilak Lake until August 15 to reduce incidental catches of king salmon while fishing for other species.	**June 22–July 11**, ESSN restricted to 48 hours per week and gear reduced by 2/3 of regulatory amount, select commercial periods were limited to within 600 ft from shore. **July12–July 20**, ESSN restricted to 24 hours per week and amount of gear reduced **July 21–August 15**, Closed ESSN and area reduced in CDDGN due to low Kenai River late-run king salmon abundance.
	2021 Goals: Kenai River late-run large king salmon OEG was not achieved. Kenai River late-run sockeye salmon SEG and IRG were exceeded. Kasilof River sockeye salmon BEG was exceeded.	

	Sport and Personal Use	Commercial
2022	**July 1,** retention of king salmon of all sizes was prohibited from the mouth of the Kenai River upstream to an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek. In addition, only one unbaited, single-hook, artificial lure was allowed. From an ADF&G regulatory marker located approximately 300 yards downstream from the mouth of Slikok Creek, upstream to the outlet of Skilak Lake remained closed to king salmon fishing. **June 15**, sport fishing for king salmon was closed in the marine waters of Cook Inlet north of Bluff Point. **July 10**, retention of king salmon was prohibited in the Kenai River dip net fishery. **July 17**, king salmon fishing was closed from the Kenai River mouth upstream to the outlet of Skilak Lake. The use of bait and multiple hooks were also prohibited. **July 17**, closure for fishing for king salmon was extended in Cook Inlet marine waters north of Bluff Point. **August 1**, bait and multiple hooks were prohibited from the mouth of the Kenai River upstream to the outlet of Skilak Lake until August 15 to reduce incidental catches of king salmon while fishing for other species.	**June 23–July 16**, ESSN restricted to 24 hours per week and amount of gear reduced. **July 17–August 15**, closed ESSN and area reduced in CDDGN due to poor Kenai River late-run king salmon abundance.

2022 Goals:

Kenai River late-run large king salmon OEG was not achieved.

Kenai River late-run sockeye salmon SEG was achieved and IRG was exceeded.

Kasilof River sockeye salmon BEG was exceeded.

	Sport and Personal Use	Commercial
2023	**May 1**, preseason closed sport fishing for king salmon of all sizes in the Kenai River from the mouth upstream to the outlet of Skilak Lake through July 31. **May 15**, preseason closed sport fishing for king salmon, including catch-and-release, in all Cook Inlet salt waters north of the latitude of Bluff Point. **July 10**, retention of king salmon was prohibited in the Kenai River dip net fishery. **June 15**, closed the personal use set gillnet fishery at the mouth of the Kasilof River. **July 27**, bait and multiple hooks were prohibited from the mouth of the Kenai River upstream to the outlet of Skilak Lake until August 15 to reduce incidental catches of king salmon while fishing for other species. **August 15**, extended the prohibition of bait and multiple hooks from the mouth of the Kenai River upstream to the outlet of Skilak Lake until August 31 to reduce incidental catches of king salmon while fishing for other species.	**June 20–August 15**, Closed ESSN and area reduced in CDDGN due to poor Kenai River Late-run king salmon abundance.
	2023 Goals: Kenai River late late-run large king salmon OEG was not achieved. Kenai River late late-run sockeye salmon IRG was exceeded. Kasilof River sockeye salmon BEG was exceeded.	

MANAGEMENT OPTIONS FOR ADDRESSING STOCK OF CONCERN

The goal of this action plan is to rebuild the Kenai River late-run king salmon stock to levels that consistently achieve the board established management objective (currently the OEG) and provide sustainable harvest opportunity. **The board will need to decide whether it wishes to keep or change the OEG as the management target for Kenai River late-run king salmon.**

The plan identifies a range of options for both directed and indirect (incidental) fisheries that potentially impact rebuilding. For example, the plan includes management actions for inriver fisheries that directly target and harvest late-run king salmon, and commercial fisheries that harvest king salmon with nonselective gear that doesn't allow for successful release. However, the plan also identifies potential management actions for fisheries that indirectly harvest king salmon including the personal use dipnet and setnet fisheries, the commercial set gillnet and drift gillnet

fisheries, and marine sport fisheries. Each of these fisheries harvest some late-run Kenai River king salmon, but to varying degrees. The board will need to weigh options considering how much of a reduction in king salmon exploitation is necessary, how that burden should be distributed among user groups, and how extensively they wish to restrict fisheries to rebuild late-run Kenai River king salmon. A summary of the options for all fisheries is provided in Table 7.

Although the stated purpose of this plan is to rebuild the Kenai River late-run king salmon stock, many proposed actions would affect the ability to harvest sockeye salmon and achieve Kenai and Kasilof Rivers sockeye salmon goals. Each section has comments or additional options regarding ways to potentially increase the harvest of sockeye salmon while minimizing Kenai River late-run king salmon harvest. Although goals are developed for stocks, not fisheries, the board could consider options where not projecting to achieve the SEG is the trigger to close all fisheries, and Rebuilding Objectives are established as triggers for sport and personal use fisheries or a limited set net fishery. Rebuilding Objectives would be inriver goals that, based on estimated passage of king salmon past the RM 13.7 sonar, would potentially restrict king salmon fisheries for inriver users at some level above the SEG but allow commercial sockeye harvest.

Potential management actions described below, other than status quo, are allocative and do not indicate endorsement by the department.

The options presented below provide the board and the public the chance to discuss management options for fisheries that harvest late-run Kenai River king salmon, or a combination of options that provide meaningful reductions to the mortality of the Kenai River late-run king salmon stock. The board may choose to

- Pick one option for a fishery as a stand-alone action
- Pick more than one option for a fishery to provide a step-down approach through the season
- Pick an option or options for a fishery that trigger(s) actions in other fisheries (currently if the Kenai River inriver sport fishery is closed, the personal use fishery is closed to retention of king salmon, the drift fishery closed waters near shore are expanded, and the ESSN is closed.)

When developing an Action Plan, the board should consider using elements of the existing Kenai River Late-Run King Salmon Management Plan 5 AAC 21.359 as a template for drafting regulatory language for an Action Plan that, when adopted, could supersede the existing plan until conditions are met to remove Kenai River late-run king salmon as a stock of concern and the board can meet to repeal the Action Plan.

SPORT FISHERIES

1. Kenai River Late-Run Inriver Sport Fishery

Objective: Reduce mortality of Kenai River directed late-run king salmon in the Kenai River sport fishery.

Option 1A – Status quo

Specific Action: Follow the existing management plan, 5 AAC 21.359 *Kenai River Late-Run King Salmon Management Plan* (KRLRKSMP), and use EO authority to restrict and (or) close Kenai River late-run king salmon sport fishery as needed, preseason and (or) inseason, if the OEG is not

projected to be achieved. Absent board action, the department anticipates restricting or closing the Kenai River inriver king salmon sport fishery as appropriate based on preseason forecasts and inseason projections as necessary to achieve the escapement goal. Inseason stock assessment is based in part on RM 14 sonar estimates, inriver gillnetting, creel and commercial sampling when available, run-timing, and performance of other Cook Inlet king salmon stocks.

Benefits: Benefits of continuing to manage Kenai River late-run king salmon sport fishery with EO authority include keeping regulations consistent while retaining the ability to provide some opportunity based on inseason conditions and assessment. Actions are specific to Kenai River late-run king salmon.

Detriments: Regulations can change inseason, making it difficult for anglers and businesses to plan their season. This action allows an unknown level of Kenai River late-run king salmon mortality depending on forecast strength, run timing, and abundance.

Option 1B – Restrict fishing for king salmon to nonretention

Specific Action: Board action restricts the Kenai River late-run king salmon sport fishery to non-retention by regulation. The department could use EO authority to further restrict but not liberalize.

Benefits: Sport fishing gear in nonretention fisheries is typically restricted to one unbaited, single-hook, artificial lure to allow fishing opportunity and minimize release mortality. Release mortality would probably range from 6% to 10%. This action allows some inriver opportunity for anglers and businesses.

Detriments: This action allows an unknown level of Kenai River late-run king salmon mortality.

Option 1C – Reduce the king salmon sport fishing season

Specific Action: Board action reduces days per week to fishing for Kenai River late-run king salmon. The department could use EO authority to further restrict but not liberalize.

Benefits: This action allows some inriver opportunity for anglers and businesses.

Detriments: This action would still result in release mortality of Kenai River king salmon during periods of low returns.

Option 1D – Allow inriver sport fishing opportunity when preseason and inseason projections of Kenai River king salmon escapement are above 13,500 large fish and below 15,000

Specific actions: When the inseason projection of Kenai River large king salmon escapement is within the SEG (13,500–27,000 large fish) but below the OEG (15,000–30,000 large fish), the inriver sport fishery may be opened as follows:

- Board action to
    - restrict the Kenai River late-run king salmon sport fishery to nonretention with one single hook artificial lure by regulation
    - reduce days per week to fishing for Kenai River late-run king salmon
    - allow resident harvest all sizes or under 34 inches
    - allow the department to use EO authority to further restrict but not liberalize

- The Commissioner may use emergency order to
    - restrict the Kenai River late-run king salmon sport fishery to nonretention with one single hook artificial lure by regulation.
    - reduce days per week to fishing for Kenai River late-run king salmon.

Benefits: If the SEG was projected to be achieved, this would allow the inriver anglers to have fishing opportunity with minimal detriment to late-run king salmon.

Detriments: There may be some unknown number of Kenai River late-run king salmon mortality when the OEG is not projected to be achieved, potentially slowing recovery.

Option 1E – Close king salmon sport fishery

Specific Action: Kenai River late-run king salmon sport fishery would be closed to sport fishing for king salmon, including nonretention. May remove bait for other Kenai River fisheries.

Benefits: Provides the most consistent management option and eliminates release mortality in the sport fishery.

Detriments: There would be no opportunity to fish for Kenai River late-run king salmon until conditions of the Action Plan are met. This action would eliminate opportunity to use a gear type that allows for selective harvest.

Option 1F – Remove bait during the August inriver sport fishery

Specific Action: Bait would be not allowed in Kenai River sport fishery during August if the OEG is not projected to be achieved.

Benefits: This would protect milling and spawning king salmon.

Detriments: This action would impact inriver sport fisheries for coho salmon.

Objective: Increase harvest of Kenai River sockeye salmon in the Kenai and Kasilof River inriver fisheries to reduce the likelihood of exceeding the sockeye salmon BEG.

Option 1X – Increase sockeye salmon bag limit to 6/day, 12/possession

Specific Action: Board action increases the bag limit of Kenai and Kasilof River sockeye salmon. Currently, EO authority requires that the department projects exceeding the sockeye salmon escapement goal before the bag limit can be liberalized. This doesn't occur until late July depending on run strength. The department could use EO authority to further restrict but not liberalize.

Benefits: This action allows additional harvest by anglers early in the run. This action with selective gear would result in minimal impact to Kenai River king salmon. This would reduce the probability of exceeding the sockeye salmon BEGs.

Detriments: Sockeye salmon fishing is typically not very productive in the Kenai and Kasilof Rivers until large numbers of fish move into the river.

2. Cook Inlet Marine Sport Fisheries

Objective: Reduce mortality of Kenai River late-run king salmon in the Cook Inlet marine sport fisheries. *Proposals 1–4 affecting summer and winter marine fisheries north and south of Bluff Point were presented at the Lower Cook Inlet board meeting in November and will be deliberated at the Upper Cook Inlet meeting in February*.

Option 2A – Status quo

Specific Action: Follow the KRLRKSMP and use EO authority to close the marine king salmon fisheries north of Bluff Point when the Kenai River late-run king salmon fishery is closed. Absent board action, the department anticipates restricting the marine sport fishery as appropriate based on preseason forecasts and inseason projections as necessary to achieve the Kenai River late-run large king salmon escapement goal.

Benefits: Benefits of continuing to manage the Cook Inlet marine king salmon sport fishery with EO authority include keeping regulations consistent while retaining the ability to provide some opportunity based on inseason conditions and assessment.

Detriments: Regulations can change inseason making it difficult for anglers and businesses to plan their season. Allows an unknown level of Kenai River late-run king salmon mortality.

Option 2B – Modify provisions of the *Upper Cook Inlet Summer Salt Water King Salmon Plan*

Specific Action: Modify provisions of the *Upper Cook Inlet Summer Salt Water King Salmon Plan* (5 AAC 58.055), which is in effect April through August and includes a guideline harvest level (GHL) of 8,000 king salmon and bag and possession limit of two king salmon of any size. Board could modify Upper Cook Inlet marine king salmon sport fishery regulations within the management plan by restricting area, time, bag, or size limits, or by restricting or closing sport fishing for king salmon until the Kenai River late-run king salmon are no longer designated as a stock of concern.

Benefits: Addressing king salmon harvest in the Upper Cook Inlet marine fishery in the *UCISSWKSMP* could provide regulatory clarity on harvest of Cook Inlet king salmon in a comprehensive plan.

Detriments: This action would still allow an unknown level mortality of king salmon bound for the Kenai River during periods of low returns, potentially delaying recovery, and provisions could impact nonlocal stocks.

Option 2C – Restrict to nonretention

Specific Action: Board restricts the Cook Inlet summer and (or) winter marine king salmon sport fisheries to nonretention by regulation. This would be based on preseason forecasts because inriver projections are not available early in the season when most of the harvest of late-run Kenai River king salmon occurs in this fishery. The department could use EO authority to further restrict but not liberalize.

Benefits: This action would allow some saltwater opportunity for anglers and businesses.

Detriments: In years of forecasted low king salmon runs, it may be desirable to eliminate all possible causes of mortality and maximize the number of spawners in the escapement. Allows an unknown level of Kenai River late-run king salmon mortality, potentially delaying recovery.

Option 2D –Reduce the king salmon sport fishing season

Specific Action: Board action reduces days per week to fishing for the Cook Inlet summer and (or) winter marine king salmon sport fisheries. This would be based on preseason projections because inriver projections are not available early in the season when most of the harvest of late-run Kenai River king salmon occurs in this fishery. The department could use EO authority to further restrict but not liberalize.

Benefits: This action would allow some saltwater opportunity for anglers and businesses. Providing dates preseason would allow anglers and businesses to plan their season.

Detriments: This action would still allow an unknown level mortality of Cook Inlet king salmon bound for the Kenai River during periods of low returns, potentially delaying recovery.

Option 2E – Reduce the king salmon sport fishing area

Specific Action: Board action reduces waters open to sport fishing for the Cook Inlet summer and (or) winter marine king salmon. Current regulations include Conservation Zones in the Special King Salmon Management Area (includes marine waters of Cook Inlet north of Bluff Point) that extend along the shoreline north and south of the Anchor, Stariski, and Ninilchik Rivers and one mile from shore and that are closed to all fishing. This would be based on preseason projections because inriver projections are not available early in the season when most of harvest of late-run Kenai River king salmon occurs in this fishery. The department could use EO authority to further restrict but not liberalize.

Benefits: This action allows some saltwater opportunity for anglers and businesses. Providing dates preseason would allow anglers and businesses to plan their season.

Detriments: This action would still allow an unknown level of mortality of Cook Inlet king salmon bound for the Kenai River during periods of low returns, potentially delaying recovery.

Option 2F – Close Cook Inlet marine king salmon sport fishery

Specific Action: Cook Inlet marine summer and (or) winter king salmon sport fisheries would be closed to sport fishing for king salmon, including nonretention, until the Kenai River late-run king salmon are no longer designated as a stock of concern.

Benefits: Provides the most consistent management option and eliminates release mortality in this sport fishery.

Detriments: There would be no opportunity to fish for Cook Inlet king salmon until conditions of the Action Plan are met. This action eliminates opportunity for gear type that allows for selective harvest.

COMMERCIAL FISHERIES

3. Central District Drift Gillnet

Objective: Reduce mortality of Kenai River late-run king salmon in the Central District drift gillnet commercial fishery.

Option 3A – Status quo

The fishery will continue to be managed as directed in the *Kenai River Late-Run King Salmon Management Plan and Central District Drift Gillnet Fishery Management Plan*. Commercial fishing closures would be dependent on paired sport fishing management actions, and EO authority would be used to close waters along the Kenai Peninsula shoreline to drift gillnetting.

Specific Action: When the Kenai River late-run king salmon sport fishery is closed, use EO authority to close waters along the Kenai Peninsula shoreline to drift gillnet commercial fishing within one and one-half miles of the shoreline south of the Kenai River and within one mile of the shoreline north of the Kenai River from June 20 to August 15.

Benefits: The current KRLKSMP has been effective at reducing the harvest of late-run Kenai River king salmon in the commercial fishery. Drift gillnet harvest numbers have been low since the current plan was adopted (Table 3). The department will continue to implement the management plan in the same manner, which provides consistency over time for stakeholders.

Detriments: Following the current management plan results in foregone sockeye salmon harvest and has resulted in exceeding the Kenai and Kasilof Rivers sockeye salmon inriver and escapement goals. Reducing the available nearshore area for drift gillnet commercial fishing will decrease potential harvest of salmon species other than king salmon by an unknown amount. This action allows an unknown level of Kenai River late-run king salmon mortality and potentially delays recovery.

Option 3B – Prohibit CDDGN fishery within 2 miles of shore

Specific Action: CDDGN would be prohibited from fishing within 2 miles of the Kenai Peninsula shoreline until king salmon management objectives have been met.

Benefits: This action allows opportunity for commercial harvest of sockeye, chum, pink, and coho salmon. This action aligns conflicting regulations in the Upper Subdistrict between the KRLRKSMP and 5.AAC 21.310 *Fishing Seasons*, when set gillnet fishing has not opened for a given season. This action allows consistent and predictable management that guarantees minimized mortality of Kenai River late-run king salmon in the UCI commercial fisheries.

Detriments: This action further limits opportunity for commercial harvest of sockeye, chum, pink, and coho salmon for an unknown conservation benefit. This action allows an unknown level of Kenai River late-run king salmon mortality.

Option 3C – Close CDDGN fishery in state waters

Specific Action: CDDGN in state waters would be closed. It may remain open in adjacent federal waters (EEZ waters) pending adoption of a federal fisheries management plan for the EEZ in UCI.

Benefits: This action eliminates any Kenai River late-run king salmon mortality in state waters of this fishery.

Detriments: This action eliminates opportunity for commercial harvest of sockeye, chum, pink, and coho salmon for a unknown conservation benefit. This action may lead to foregone sockeye salmon harvest and could result in exceeding the Kenai and Kasilof Rivers sockeye salmon inriver and escapement goals more frequently.

4. Upper Subdistrict Set Gillnet (ESSN)

Option 4A – Status quo

Specific actions: The fishery will continue to be managed as directed in the *Kenai River Late-Run King Salmon Management Plan* (KRLKSMP). Commercial fishing restrictions and closures would be dependent on paired sport fishing management actions and EO authority would be used to modify time, area, and legal gear for set gillnet fishing in the ESSN fishery.

Benefits: The current KRLKSMP has been effective at reducing harvest of king salmon in the commercial fishery. Exploitation rates have been low since the current plan was adopted and the department will continue to implement the management plan in the same manner, which provides consistency over time for fisheries stakeholders.

Detriments: Following the current management plan results in foregone sockeye salmon harvest and has resulted in some years exceeding the Kenai and Kasilof Rivers sockeye salmon inriver and escapement goals. This action allows an unknown level of Kenai River late-run king salmon mortality, potentially impacting recovery.

Option 4B – Allow restrictive ESSN opportunity when preseason and inseason projections of Kenai River king salmon escapement are above 13,500 large fish and below 15,000 large fish

Specific actions: When preseason forecasts and inseason projections of Kenai River large late-run king salmon escapements are within the SEG (13,500–27,000 large fish) but below the OEG (15,000–30,000 large fish), the Upper Subdistrict set gillnet commercial fishery (ESSN fishery) may be opened with restrictive gear as follows between June 20 and August 15:

- If Kenai River late-run king salmon are projected to exceed an escapement of 13,500 large fish, then the commissioner may
    - limit commercial fishing periods to X YY-hour periods per week with or without closed window limitations.
    - restrict legal gear in commercial fishing periods under this section up to X set gillnets that are each not more than XX fathoms in length and XX meshes in depth.
    - The commissioner may restrict the open area to within XXX ft from shore.

- require full retention king salmon and observers to ensure accurate harvest number

Benefits: This would allow the ESSN fishery participants some opportunity to harvest salmon and provide the department with harvest potential towards achieving inriver and escapement sockeye salmon goals.

Detriments: Some unknown number of Kenai River late-run king salmon would be harvested by the set gillnet commercial fishery when the OEG is not projected to be achieved. This action allows an unknown level of Kenai River late-run king salmon mortality, potentially slowing recovery.

Option 4C – Allow ESSN opportunity when preseason and inseason projections of Kenai River king salmon escapement are above 13,500 large fish and below 15,000

Specific actions: When the inseason projection of Kenai River large king salmon escapement is within the SEG (13,500–27,000 large fish) but below the OEG (15,000–30,000 large fish), the Upper Subdistrict set gillnet fishery (ESSN fishery) may be opened as follows between June 20 and August 15:

- If Kenai River late-run king salmon inseason projection is 13,500–15,000 large fish, the set gillnet fishery in the Upper Subdistrict of the Central District may
  - be open for two 12-hour periods per week for a maximum of 4 periods opened by the commissioner to maximize sockeye harvest.
  - require retention of king salmon (all sizes) in the commercial fishery.
  - require observers to verify king salmon mortality.
- The Commissioner may
  - establish legal gear in commercial fishing periods under this section by restricting up to X set gillnets that are each not more than XX fathoms in length and XX meshes in depth.
  - restrict the open area to within XXX ft from shore.
  - require full retention of king salmon and observers to ensure accurate harvest numbers.

Benefits: If the SEG was projected to be achieved, this would allow the ESSN permit holders to have 4 fishing periods to harvest salmon, reduce inriver sockeye salmon abundance, and provide the department with data on king salmon harvest in the ESSN fishery.

D**etriments:** Some unknown number of Kenai River late-run king salmon would be harvested during the set gillnet commercial fishery when the OEG is not projected to be achieved, potentially slowing recovery.

Option 4D – Allow dip nets to be legal commercial fishing gear in UCI and create specified commercial dip net zones or times in the Kenai and Kasilof Rivers. Allow use of beach seines in the ESSN area by UCI set gillnet permit holders

Specific Action:

- Add nonlethal gear types (i.e., dip nets and beach seines) as legal commercial fishing gear in UCI using existing dip net specifications and to be determined by the board specification for beach seines.

- When the ESSN fishery is closed for king salmon conservation
  - commercial fishing with dip nets is open with mandatory release of king salmon by emergency order to include the Kasilof Special Harvest Area (KSHA)
  - beach seines are allowed within the Upper Subdistrict of the Central District with beach seine specifications to be determined by board and user group input
  - additional open waters are established for commercial fishing near the mouth of the Kenai River that allow commercial dip net fishing within existing personal use areas or are developed as exclusive inriver commercial dip net areas or times.
  - personal use fisheries are closed X days per week to allow inriver commercial dip net fishing in current personal use fishing area.

Background: Currently, commercial fishing is allowed with drift gillnet, set gillnet, and seine in UCI.

Benefits: Dip nets and beach seines as commercial gear types would allow for harvest of sockeye salmon by commercial permit holders while allowing for live release of king salmon. This shares the burden of conservation more equitably between user groups.

Detriments: Dipnets are a far less effective gear type for harvesting large numbers of sockeye salmon and would require more intensive effort by permit holders as methods are developed for this gear type. Due to proximity and overlap of area, there could be direct conflict between commercial and personal use user groups. It may be necessary to allocate time to each group to avoid conflict and to provide equitable opportunity to harvest sockeye between user groups.

Option 4E – Close ESSN fishery

Specific Action: ESSN fishery would begin closed by general regulation until Kenai River late-run king salmon management objectives have been met.

Benefits: This action allows consistent and predictable management that guarantees no mortality of Kenai River late-run king salmon in the ESSN fishery.

Detriments: Denies all opportunity for commercial harvest of sockeye, chum, pink, and coho salmon for a conservation benefit for late-run king salmon. This would also remove one of the department's primary tools for controlling sockeye salmon escapement in the Kenai and Kasilof Rivers. This will result in foregone sockeye salmon harvest and likely result in exceeding the Kenai and Kasilof Rivers sockeye salmon inriver and escapement goals. Sport and personal use fisheries under current management do not have the harvest capacity to control average to large Kenai and Kasilof River sockeye salmon runs and achieve management objectives. The ESSN fishery harvests fish that are several days to over a week away from Kenai and Kasilof inriver assessment projects.

Objective: Increase harvest of Kasilof River sockeye salmon in the ESSN fishery to reduce the likelihood of exceeding the sockeye salmon BEG.

Option 4X – Allow opening of Kasilof River Special Harvest Area (KRSHA) when ESSN is closed for king salmon conservation to target Kasilof River sockeye salmon

Specific Action:

1. Open KRSHA by emergency order in XX-hour increments when Kasilof River sockeye salmon abundance is projected to exceed the upper end of the BEG. Existing regulations regarding closed period windows would remain in place, and gear would be limited as described in 5AAC 21.365 (f)(2-9).

Background: The KRSHA is currently closed when the stipulations of the KRLRKSMP close the Upper Subdistrict of the Central District to set gillnet fishing.

Benefits: The KRSHA would allow some opportunity for commercial permit holders to harvest Kasilof River sockeye salmon surplus to escapement while minimizing harvest of Kenai River king salmon.

Detriments: The KRSHA is a small and difficult area to commercial fish and does not allow for all permit holders to participate. Additionally, some unknown but likely small amount of Kenai River king salmon would be harvested along with a larger amount of the unmonitored Kasilof River king salmon stock. This action allows an unknown level of Kenai River late-run king salmon mortality.

PERSONAL USE FISHERIES

5. Kenai River Dipnet Fishery

Objective: Reduce mortality of Kenai River late-run king salmon in Kenai River dip net fishery

Option 5A – Status quo

Specific Action: Follow the current management plan and use EO authority to prohibit the retention of king salmon in the Kenai River personal use dip net fishery when the use of bait is prohibited in the inriver sport fishery.

Benefits: Benefits of continuing to manage the Kenai River dip net king salmon harvest with EO authority include keeping regulations consistent while retaining the ability to provide some opportunity based on inseason conditions and assessment.

Detriments: Prohibiting retention of king salmon is done by EO.

Option 5B – Allow retention of king salmon less than 20 inches in the personal use fishery

Specific Action: Board action regulates harvest of king salmon less than 20 inches; for example, action allows harvest of 10 king salmon under 20 inches in length as part of the household limit.

Benefits: This action eliminates the need to use EO authority to close the retention of king salmon in the personal use fishery and provides harvest opportunity of king salmon less than 20 inches for Alaska residents. This action would prevent personal use dipnetters from being cited for retaining king salmon less than 20 inches in length.

Detriments: This action reduces the potential contribution to production by king salmon 20 inches or less (but this size is not included in the SEG for large king salmon).

Option 5C – No retention of king salmon in the personal use fishery

Specific Action: Board action regulates nonretention of king salmon.

Benefits: This action eliminates the need to use EO authority to close the retention of king salmon in the personal use fishery.

Detriments: Alaskans could be cited for retaining misidentified king salmon less than 20 inches in length while participating in the personal use fishery.

Option 5D – Restrict time or close Personal Use Fishery

Specific Action: Board action reduces the days or hours of the personal use fishery or closes the fishery.

Benefits: This action reduces or eliminates harvest or mortality of Kenai River late-run king salmon in the personal use dip net fishery.

Detriments: Limiting time may increase effort during open periods. Closing the fishery would forgo annual harvest of 300,000 (2013–2022 average) Kenai River sockeye salmon harvested with a gear that allows selective harvest.

Objective: Increase harvest of Kenai and Kasilof River sockeye salmon in the personal use dipnet fisheries to reduce the likelihood of exceeding the sockeye salmon BEGs.

Option 5X – Increase area of Kenai and Kasilof Rivers personal use dipnet fishery

Specific Action: Board action increases the upriver boundary of the Kenai and Kasilof Rivers personal use dipnet fisheries for boat and (or) shore fishers.

Benefits: This action would allow additional harvest by anglers throughout the run. This action with selective gear would result in minimal impact to king salmon.

Detriments: Depending on the reach, this board action could conflict with other inriver users and increase the frequency of catching king salmon

Option 5Y – Increase time of Kenai and Kasilof Rivers personal use dipnet fishery

Specific Action: Board extends the season of the Kenai (July 10–July 31) and Kasilof (June 25–August 7) Rivers personal use dipnet fisheries.

Benefits: This action would allow additional harvest by Alaskans. Extending the date in the Kenai River would help align the fishery with the later run timing of sockeye salmon documented in recent years. This action with selective gear would result in minimal impact to other salmon.

Detriments: Later fishery dates would potentially overlap with coho salmon runs. This would require working with the City of Kenai to ensure amenities are available.

6. Kasilof River Personal Use Set Gillnet Fishery

Objective: Reduce mortality of Kenai River late-run king salmon in Kasilof River personal use set gillnet fishery

Option 6A – Status quo

Specific Action: Use EO authority to reduce hours in the Kasilof River personal set gillnet fishery.

Benefits: Benefits of continuing to manage the Kasilof River personal use gillnet fishery with EO authority include keeping regulations consistent while retaining the ability to provide harvest opportunity on Kasilof River sockeye and king salmon.

Detriments: Management can change inseason, making it difficult for Alaskans to plan their personal use fishing trips. Gillnets set at the mouth of the Kasilof River will harvest an unknown but likely small number of Kenai River late-run king salmon. Gillnets are a nonselective gear.

Option 6B – Restrict time or close personal use fishery

Specific Action: Board action reduces days or hours of the personal use fishery or closes it outright.

Benefits: This action eliminates or reduces any harvest or mortality of Kenai River late-run king salmon in the Kasilof River personal use set gillnet fishery. Gillnets set at the mouth of the Kasilof River will harvest an unknown but likely small number of Kenai River late-run king salmon. Gillnets are a nonselective gear.

Detriments: Limiting time may increase effort during open periods. Closing the fishery would forgo annual harvest of 18,000 (2013–2022 avg) Kasilof River sockeye salmon.

Objective: Increase harvest of Kasilof River sockeye salmon in the Kasilof River personal use gillnet fishery.

Option 6X – Reduce legal mesh size of Kasilof River personal use gillnets

Specific Action: Board action reduces legal gillnet mesh size from 6 to 4.75 inches to more effectively target Kasilof River sockeye salmon.

Benefits: Smaller mesh size will increase sockeye salmon harvest efficiency, reducing the amount of time needed to harvest the number of fish desired. The smaller mesh size is also less likely to catch large king salmon. Alaskans would still be able to participate in this unique personal use fishery and harvest Kasilof River sockeye salmon.

Detriments: In years of low king salmon runs, it may be desirable to eliminate all possible causes of Kenai River late-run king salmon mortality and maximize the potential number of spawners in the escapement. Gillnets set at the mouth of the Kasilof River will harvest an unknown but likely small number of Kenai River late-run king salmon. Gillnets are nonselective gear.

RESEARCH AND MONITORING PLAN

CURRENT MONITORING PROJECTS

Current inseason monitoring of Kenai River late-run Chinook salmon consists of inriver sonar, inriver test netting, an inseason creel survey, and catch sampling of the ESSN fishery, including annual collection of genetic samples from lower river creel, inriver test netting, and the ESSN fishery for genetics.

Postseason monitoring consists of final sonar counts and harvest estimates from subsistence, commercial, personal use, and sport fisheries. Sonar counts provide a final end-of-season inriver abundance, which is used for estimating final escapement. Commercial harvest estimates from fish tickets of total king salmon harvest are used along with genetic estimates of proportional harvest

of Kenai River king salmon. Sport and subsistence harvests upstream of the sonar site are estimated and then subtracted from the sonar index to calculate final escapement.

KING SALMON MONITORING PROJECT HISTORY

Late-run king salmon are harvested by commercial, sport, subsistence, and personal use fisheries. Sonar estimates of inriver king salmon passage provide the basis for estimating spawning escapement and implementing management plans that regulate harvest in the competing fisheries for this stock and have a long history of refinement.

From 1987 through 2011, the Alaska Department of Fish and Game (ADF&G) used dual-beam (1987–1994) and then split-beam (1995–2011) side-looking sonar technology to estimate king salmon passage in the Kenai River at river mile (RM) 8.6. These technologies relied on target strength (loudness of returning echoes) and range (distance from shore) thresholds to differentiate between sockeye (*Oncorhynchus nerka*) and king (Chinook; *O. tshawytscha*) salmon. These criteria were based on the premise that sockeye salmon are smaller and migrate primarily near shore, whereas king salmon are larger and tend to migrate up the middle of the river. However, subsequent studies showed that these criteria can lead to inaccurate estimates (Burwen et al. 1998; Hammarstrom and Hasbrouck 1999). Extensive research was conducted at the Kenai RM 8.6 king salmon sonar site toward improving our ability to identify species from split-beam sonar data (Burwen et al. 1998; Burwen et al. 2003; Miller et al. 2010). Beginning in 2002, ADF&G evaluated the potential for dual-frequency identification sonar (DIDSON) to provide improved discrimination of larger king salmon from smaller species of salmon based on size measurements taken directly from high-resolution images of migrating salmon (Burwen et al. 2007). Split-beam estimates were found to be inaccurate (Miller et al. 2013), and they were discontinued following the 2011 season (Miller et al. 2015). DIDSON-based estimates continued to be produced at the RM 8.6 site through 2014.

The RM 8.6 site was originally selected in 1985, based primarily on its suitability for operating a dual-beam (and subsequently a split-beam) sonar system, which required a near-perfect linear bottom profile over the entire insonified zone or, in this case, from the nearshore region to the thalweg. However, the RM 8.6 site had many disadvantages, primarily related to its location within tidal influence, including (1) incomplete coverage of the river during high tides that flood the region behind the transducers, (2) milling fish behavior related to tidal flux, (3) physical risk to gear by large debris carried by extreme tidal fluxes, and (4) lack of legal access to the property on one bank. It became evident that relocating the site farther upriver could improve the estimates of king salmon passage by minimizing or eliminating these negative factors.

In 1999, ADF&G evaluated a second sonar site at RM 13.2 for use of split-beam sonar to assess fish passage, but the bottom topography was less acoustically favorable and fish were more difficult to detect due to increased background noise levels from bottom irregularities and boat traffic (Burwen et al. 2000). Because DIDSON multibeam technology was better able to insonify irregular bottom profiles, the search for a site above tidal influence was resumed in 2011. A potential new site at RM 13.7 was identified and evaluated during a 2-week period in 2012 using the newest generation of DIDSON technology, referred to as Adaptive Resolution Imaging Sonar (ARIS). One of the main advantages of the RM 13.7 site is the potential to achieve bank-to-bank coverage of the river with sonar, which was not possible at the RM 8.6 site. ADF&G operated a full-scale experimental project at the RM 13.7 site using ARIS during 17 May–17 August 2013

(Miller et al. 2016a) and again during 16 May–15 August 2014 while also continuing to operate the DIDSON at the RM 8.6 site (Miller et al. 2016b; Key et al. 2016).

Estimates of king salmon abundance require information on king salmon size, which has been obtained historically from an inriver gillnetting program operated at RM 8.6. Historically, netting at RM 8.6 was restricted to a midriver corridor that approximately matched the cross-sectional area insonified by the DIDSON. In 2012, king salmon sampled at the RM 8.6 netting project and at upstream tributary weirs differed in size, raising the possibility that king salmon sampled midriver at RM 8.6 were not representative of the entire run. Auxiliary nearshore sonar deployments at RM 8.6 in 2011 and 2012 confirmed that some king salmon were migrating between the DIDSON transducers and shore (Miller et al. 2014; Miller et al. 2015). In response, the netting program at RM 8.6 was expanded in 2013 to include experimental nearshore drifts (Perschbacher 2015).

In addition, following the 2012 season, a state space model (SSM) was fitted to sonar, netting, catch rate, and capture–recapture data; historical abundance was reconstructed; and sustainable escapement goals were recommended in preparation for the 2013 season (Fleischman and McKinley 2013; McKinley and Fleischman 2013). This modeling exercise, which synthesized information from all applicable data, estimated that the proportion of king salmon migrating midriver (pMR) and detected by sonar and nets at RM 8.6 was 0.65 during the early run and 0.78 during the late run.

In 2013 and 2014, to account for incomplete detection at RM 8.6 due to large tidal fluctuations, DIDSON estimates of inriver abundance were expanded by 1.55 (1/0.65) during the early run and 1.28 (1/0.78) during the late run and used inseason to assess achievement of the new escapement goals. Sonar operations were discontinued at the RM 8.6 site following the 2014 season in favor of abundance estimates produced at the RM 13.7 site where near bank-to-bank coverage eliminates uncertainty resulting from spatial expansions of passage estimates.

Estimates of small king salmon are produced by mixture model analysis that requires fish size data from nets drifted at the RM 8.6 site, and such estimates can be sensitive to details of how the netting data are used. In 2015, inseason estimates used for managing the fishery required substantial postseason revisions, largely because inseason procedures adopted to accommodate sparse netting data proved biased under some circumstances (Key et al. 2017).

Beginning in 2017, king salmon stock assessment and management were based on direct sonar counts of fish 75 cm or longer as measured by ARIS length (AL) at the RM 13.7 site. Fish 75 cm AL or longer (equivalent to 75 cm or longer mid eye to tail fork [METF]) are composed almost entirely of king salmon. Based on a spawner–recruit analysis conducted by Fleischman and Reimer (2017), ADF&G recommended a sustainable escapement goal (SEG) of 13,500–27,000 for Kenai River late-run king salmon 75 cm METF and longer. From 2017 to 2023, the RM 13.7 project operated from 16 May through approximately 20 August. Abundance estimates of all king salmon (regardless of size) were also generated postseason using mixture model analyses that combined RM 13.7 sonar data and RM 8.6 netting data. In addition, the department collects genetic samples from lower river creel, inriver netting, and ESSN for genetics every year.

POTENTIAL FUTURE MONITORING

Assessment of this stock is very thorough compared to most king salmon stocks in Alaska. However, staff are continually refining sampling and estimation procedures for preseason forecasts, sonar assessment, inseason creel, inriver netting, and commercial catch sampling.

Potential future monitoring efforts include the following:

1) catch sampling of the king salmon harvest in the Upper Cook Inlet drift fishery
2) catch sampling of king salmon in the Kasilof River Personal Use gillnet fishery
3) tracking of juvenile king salmon inriver via sonic tags to identify overwintering areas
4) tracking of king salmon smolt via sonic tags out of the Kenai River and through Cook Inlet waters

ASSESSMENT OF SELECTIVE HARVEST METHODS

Selective harvest is one way to reduce harvest of KRLRKS while harvesting other species, notably sockeye salmon in the ESSN fishery. Preliminary work conducted this past year (e.g., the Kintama study) forms the basis for further work in this area. This work should be continued and expanded in future years, including options on net selectivity, net size and type, and depths fished. Also, alternative gear types such as dip nets and beach seines should be evaluated.

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TABLES

Table 1.–Kenai River late-run large king salmon escapement goal history, 2017–2023.

Year	Escapement	SEG	OEG
2017	20,583	**13,500–27,000**	–
2018	17,405	**13,500–27,000**	–
2019	11,709	**13,500–27,000**	–
2020	11,854	13,500–27,000	**15,000–30,000**
2021	12,238	13,500–27,000	**15,000–30,000**
2022	13,911	13,500–27,000	**15,000–30,000**
2023[a]	14,502	13,500–27,000	**15,000–30,000**

Note: Large fish are king salmon that are 75 cm from mid eye to tail fork in length or longer. **Bold** font indicates the escapement goal for management, and shading indicates that the goal was achieved.

[a] Project operations in 2023 extended past August 20 until 3 days of <1% passage occurred.

Table 2.–All-fish stock compositions and stock-specific harvest estimates for king salmon harvested in the Eastside set gillnet (ESSN) fishery, Upper Cook Inlet, Alaska, 2010, 2011, and 2013–2022.

	Reporting group							
	Kenai River tributaries		Kenai River mainstem		Kasilof River mainstem		Cook Inlet other	
Year	Stock comp.[a]	Stock-specific harvest	Stock comp.[a]	Stock-specific harvest	Stock comp.[a]	Stock-specific harvest	Stock comp.[a]	Stock-specific harvest
2010	0.01	78	0.64	4,534	0.33	2,301	0.02	147
2011	0	7	0.68	5,228	0.32	2,448	0	14
2013	0	4	0.77	2,289	0.21	637	0.02	57
2014	0	4	0.61	1,400	0.39	892	0	4
2015	0	19	0.77	5,988	0.2	1,564	0.03	211
2016	0	24	0.74	4,972	0.25	1,667	0.01	96
2017	0.01	43	0.79	3,762	0.19	905	0.01	69
2018[b]	0.03	77	0.75	1,710	0.19	428	0.03	69
2019	0.02	49	0.65	1,458	0.32	714	0.01	25
2020	0.03	21	0.66	561	0.19	163	0.13	107
2021	0	4	0.7	909	0.13	166	0.17	217
2022	0.01	2	0.64	219	0.2	67	0.15	53
Average	0.01	28	0.7	2,752	0.24	996	0.05	89
Minimum	0	2	0.61	219	0.13	67	0	4
Maximum	0.03	78	0.79	5,988	0.39	2,448	0.17	217

Source: Eskelin and Barclay (2023)

Note: The 90% credibility intervals of stock compositions and stock-specific harvest estimates for prior years can be found in previous reports (Eskelin et al. 2013; Eskelin and Barclay 2015, 2016, 2017a, 2017b, 2018-2022).

[a] "Stock comp." means stock composition relative to the total harvest.

[b] Stock composition and stock-specific harvest estimates for 2018 do not include 28 fish harvested from Kasilof River special harvest area (KRSHA).

Table 3.–Kenai River late-run large (≥75 cm METF) king salmon harvest, catch-and-release mortality, inriver run, escapement, total run and harvest rate, 1986–2023.

Year	Cook Inlet marine harvest[a]	Eastside setnet harvest[b,c]	Drift gillnet harvest[d]	Subsis. or Edu. harvest[e]	Personal use dipnet harvest[f]	Inriver sport harvest[g]	Inriver sport catch-and-release mortality[g]	Inriver run[h]	Spawning escapement[h]	Total run[h]	Harvest rate
1986	45	9,750	902	0	0	8,940	286	58,428	49,197	69,188	0.29
1987	93	11,760	2,530	0	187	12,801	121	61,051	48,096	75,846	0.37
1988	114	7,526	1,309	0	0	19,417	174	61,638	42,003	70,691	0.41
1989	105	6,034	0	17	0	9,505	87	36,430	26,852	42,598	0.37
1990	107	1,688	253	8	0	5,886	59	30,471	24,496	32,514	0.25
1991	123	2,409	121	203	0	7,334	14	36,442	29,076	39,342	0.26
1992	158	5,604	322	300	0	7,255	225	45,289	37,788	51,689	0.27
1993	214	8,022	436	22	0	17,207	463	56,042	38,346	64,711	0.41
1994	139	9,005	268	325	0	17,051	547	49,005	31,400	58,798	0.47
1995	144	6,002	295	2	506	11,218	420	42,697	31,022	49,767	0.38
1996	147	5,993	202	1	218	7,525	313	38,309	30,453	44,874	0.32
1997	218	5,913	327	15	271	12,151	543	37,445	24,734	44,260	0.44
1998	116	2,173	143	1	155	6,289	498	40,218	33,381	42,828	0.22
1999	67	4,446	270	3	328	11,556	580	40,912	28,769	46,006	0.37
2000	73	1,856	136	4	295	13,611	446	40,441	26,331	42,826	0.39
2001	61	1,952	201	4	296	13,974	700	42,675	27,895	45,147	0.38
2002	30	3,522	154	3	322	11,278	595	54,878	42,940	58,965	0.27
2003	13	4,546	381	5	446	13,713	1,459	66,994	51,862	72,422	0.28
2004	109	10,021	510	7	523	14,622	858	86,094	70,617	97,329	0.27
2005	76	9,909	884	7	643	17,153	1,193	74,315	55,764	85,879	0.35
2006	63	3,173	887	5	471	13,602	714	55,247	40,911	59,872	0.32
2007	53	4,196	310	3	733	9,759	572	41,629	31,276	46,981	0.33
2008	36	3,535	301	10	896	10,015	333	40,468	30,001	45,202	0.34
2009	16	1,336	205	1	405	7,460	517	28,807	20,807	30,785	0.32
2010	35	2,384	193	11	444	5,774	212	19,403	13,425	22,502	0.40
2011	56	2,499	243	3	728	5,964	388	22,880	16,541	26,411	0.37
2012	0	334	103	0	27	86	79	23,571	23,427	24,038	0.03
2013	25	679	104	2	3	821	41	13,727	12,719	14,542	0.13
2014	41	706	112	0	0	287	38	11,903	11,584	12,776	0.09
2015	92	2,808	184	5	31	2,997	154	20,010	16,857	23,139	0.27

-continued-

Table 3.–Page 2 of 2.

Year	Cook Inlet marine harvest[a]	Eastside setnet harvest[b,c]	Drift gillnet harvest[d]	Subsis. or Edu. harvest[e]	Personal use dipnet harvest[f]	Inriver sport harvest [g]	Inriver sport catch and release mortality [g]	Inriver run [h]	Spawning escapement [h]	Total run [h]	Harvest rate
2016	80	2,906	242	3	364	5,576	228	21,422	15,652	25,023	0.37
2017	61	2,998	144	7	928	5,857	196	26,595	20,583	30,734	0.33
2018	11	555	106	0	2	97	198	17,691	17,405	18,364	0.05
2019	34	613	58	0	14	857	92	12,637	11,709	13,360	0.12
2020	0	166	35	1	6	0	163	12,014	11,854	12,226	0.03
2021	28	217	40	0	13	141	117	12,489	12,238	12,794	0.04
2022	0	41	53	0	2	0	92	13,981	13,911	14,078	0.01
2023 [i]	0	0	35	0	0	0	0	14,502	14,502	14,537	0.00
Average											
1986–2023	73	3,876	342	–	244	8,099	361	37,072	28,590	41,659	0.27
2016–2023	27	937	89	2	166	1,566	136	16,416	14,732	17,640	0.12

[a] Estimates derived from SWHS, mean values of Kenai mainstem proportion (0.078; Schuster et al. 2021), and percent large in lower Kenai River late run creel survey by year.

[b] 1986–2009 estimates derived from mean 2010–2021 Kenai River mainstem proportion in ESSN (0.70; Eskelin and Barclay 2022) and fraction large in ESSN samples by year; 2010–2022 are point estimates from Eskelin and Barclay (2016–2023).

[c] Harvest estimate does not include the Kasilof River terminal fishery.

[d] Estimates derived from mean Kenai River mainstem proportion in ESSN (0.70; Eskelin and Barclay 2022), fraction large in ESSN samples by year, and reported commercial drift gillnet harvest by year.

[e] Kenaitze education and federal subsistence fisheries; estimates derived from total reported harvest and fraction large in ESSN samples by year.

[f] Estimates derived from fraction large in ESSN samples by year and reported Kenai River personal use harvest.

[g] Creel survey estimates used for RM 5-21, SWHS and or guide logbook estimates used for RM 21-50, and fraction large from RM 5-21 creel survey by year. Assumes 0.76 catch-and-release mortality rate (Bendock and Alexandersdottir 1992).

[h] 1986–2021 posterior medians of state space model; 2022 and 2023 are point estimates.

[i] These estimates are preliminary until biometrically reviewed and published.

Table 4.–Upper Subdistrict set gillnet fishing hours allowed beyond regular periods or hours used by emergency order.

Year	Kasilof Section	Kenai Section	East Forelands
2017	139	53	53
2018	96	60	0
2019	153	119	49
2020	161	84	84
2021	184	96	96
2022	84	24	24
2023	0	0	0

Table 5.–History of Kenai River sockeye salmon personal use or subsistence, educational, and sport harvest and escapement goals 2003–2023.

Year	Personal use and educational harvest [a]	Sport harvest below sonar [b]	Kenai River sonar count [c]	Sport harvest above sonar	Total sport harvest	Total inriver harvest	Spawning escapement	Actual run size (millions)	Inriver goal (thousands)	BEG/SEG (thousands)	OEG (thousands)
2003	227,207	60,722	1,181,309	253,734	314,456	541,663	927,575	3.8	750-950	500-800	**500-1,000**
2004	266,937	62,397	1,385,981	254,836	317,233	584,170	1,131,145	5.0	850-1,100	500-800	**500-1,000**
2005	300,105	58,017	1,376,452	254,818	312,835	612,940	1,121,634	5.6	850-1,100	500-800	**500-1,000**
2006	130,486	30,964	1,499,692	172,638	203,602	334,088	1,327,054	2.5	750-950	500-800	**500-1,000**
2007	293,941	60,623	867,572	265,718	326,341	620,282	601,854	3.4	750-950	500-800	**500-1,000**
2008	236,355	46,053	614,946	208,526	254,579	490,934	406,420	2.3	650-850	500-800	**500-1,000**
2009	343,302	45,868	745,170	241,999	287,867	631,169	503,171	2.4	650-850	500-800	**500-1,000**
2010	393,317	59,651	970,662	256,624	316,275	709,592	714,038	3.3	750-950	500-800	**500-1,000**
2011	543,043	92,225	1,599,217	318,542	410,767	953,810	1,280,675	6.2	1,100-1,350	700-1,200	**700-1,400**
2012	530,128	102,376	1,581,555	368,720	471,096	1,001,224	1,212,835	4.7	1,100-1,350	700-1,200	**700-1,400**
2013	350,302	78,837	1,359,893	379,685	458,522	808,824	980,208	3.5	1,000-1,200	700-1,200	**700-1,400**
2014	384,018	78,057	1,520,340	301,998	380,055	764,073	1,218,342	3.3	1,000-1,200	700-1,200	**700-1,400**
2015	384,095	83,112	1,709,051	309,004	392,116	776,211	1,400,047	3.9	1,000-1,200	700-1,200	**700-1,400**
2016	264,901	79,465	1,383,692	263,704	343,169	608,070	1,119,988	3.5	1,000-1,350	700-1,200	**700-1,400**
2017	304,632	67,233	1,308,498	237,434	304,667	609,299	1,071,064	4.6	1,000-1,300	**700-1,200**	Repealed
2018	169,553	41,122	1,035,761	149,000	190,122	359,675	886,761	1.6	900-1,100	**700-1,200**	
2019	338,952	103,700	1,849,054	392,023	495,723	834,675	1,457,031	3.9	1,000-1,300	**700-1,200**	
2020	263,133	62,665	1,814,252	208,625	271,290	534,423	1,605,627	2.5	1,000-1,200	**700-1,300**	
2021	335,396	138,740	2,441,825	435,535	574,275	909,671	2,006,290	3.8	1,000-1,200	**700-1,300**	
2022	288,455	100,802	1,570,395	364,392	465,194	753,649	1,206,003	2.5	1,000-1,400	**700-1,300**	
2023	ND	ND	2,343,976	ND	ND	ND	ND	3.8	1,000-1,400	**700-1,300**	
5yr avg											
2008-2013	409,229	69,235	1,102,310	278,882	348,117	757,346	849,558	3.8			
2013-2017	337,590	77,341	1,456,295	298,365	375,706	713,295	1,157,930	3.8			
2018-2022	279,098	89,406	1,742,257	309,915	399,321	678,419	1,432,342	2.9			

Note: ND = no data available. **Bold** font indicates the escapement goal for management, and shading indicates that the goal was achieved.

[a] From 1999 to present, personal use harvest is from Kenai River dipnet fishery and the educational harvest is from the Kenaitze educational fishery after July 1.

[b] In 1994 and 1995 a creel survey was conducted to estimate harvest below the sonar. In 1994, 49.7% of the harvest below Soldotna Bridge was taken below the sonar. In 1995, 68.6% was taken below the sonar. The average of these 2 percentages is applied to all other years' below-bridge harvest to estimate the harvest below the sonar.

[c] Bendix sonar counts for 1999–2010; DIDSON counts beginning in 2011.

Table 6.–Estimated escapement and escapement goals (BEG, OEG) for sockeye salmon in the Kasilof River, 2003–2023.

Year	Escapement	BEG or OEG	Goal range	% Above	Result
2003	359,633	BEG	150,000–250,000	44%	Above
2004	577,581	BEG	150,000–250,000	131%	Above
2005	348,012	BEG	150,000–250,000	39%	Above
2006	368,092	OEG	150,000–300,000	23%	Above
2007	336,866	BEG	150,000–250,000	12%	Above
2008	301,469	OEG	150,000–300,000	0%	Above
2009	297,125	OEG	150,000–300,000	NA	Within
2010	267,013	BEG	150,000–250,000	7%	Above
2011[a]	245,721	BEG	160,000–340,000	NA	Within
2012	374,523	BEG	160,000–340,000	10%	Above
2013	489,654	BEG	160,000–340,000	44%	Above
2014	439,997	BEG	160,000–340,000	29%	Above
2015	470,677	BEG	160,000–340,000	38%	Above
2016	239,981	BEG	160,000–340,000	NA	Within
2017	358,724	OEG	160,000–390,000	NA	Within
2018	394,309	OEG	160,000–390,000	1%	Above
2019	378,416	BEG	160,000–340,000	11%	Above
2020	545,654	BEG	140,000–320,000	71%	Above
2021	521,859	BEG	140,000–320,000	63%	Above
2022	968,148	BEG	140,000–320,000	203%	Above
2023	932,896	BEG	140,000–320,000	192%	Above
Average					
2003–2010	356,974				
2011–2023	489,274				

	Comparison of escapement to escapement goals	
	Years	%
Below goal	0	0%
Within goal	4	19%
Above goal	17	81%
Totals	21	

Note: NA means not applicable.

[a] 2002–2010 are Bendix sonar estimates; 2011–2023 are DIDSON estimates.

Table 7.–Summary of potential management options if projecting to achieve the SEG.

	Sport Fisheries		Commercial Fisheries		Personal Use dip net	Personal Use setnet
	(1) Kenai inriver	(2) Cook Inlet Marine	(3) Central Drift	(4) ESSN	(5) Kenai/Kasilof	(6) Kasilof
Management options to decrease mortality of Kenai River late-run king salmon						
A	Status quo	Status quo	Status quo	Status quo	Status quo	Status quo
B	Nonretention	Modify UCISSWKSMP	Prohibit < 2 miles	Opportunity/13,500-15,000	Retention < 20 in	Reduce time or close
C	Reduce days/week	Nonretention	Close State waters	4 periods/13,500-15,000	Nonretention	
D	Opportunity/13,500-15,000	Reduce season		Nonlethal gear/dip nets	Restrict time/close	
E	Close king fishery	Reduce area		Close ESSN		
F	August no bait	Close UCI				
Management options to increase harvest of sockeye salmon in the Kenai and Kasilof Rivers inriver fisheries						
X	Increase sockeye bag limit			Fish KSHA	Increase area	Reduce mesh size
Y					Increase time/season	

FIGURES

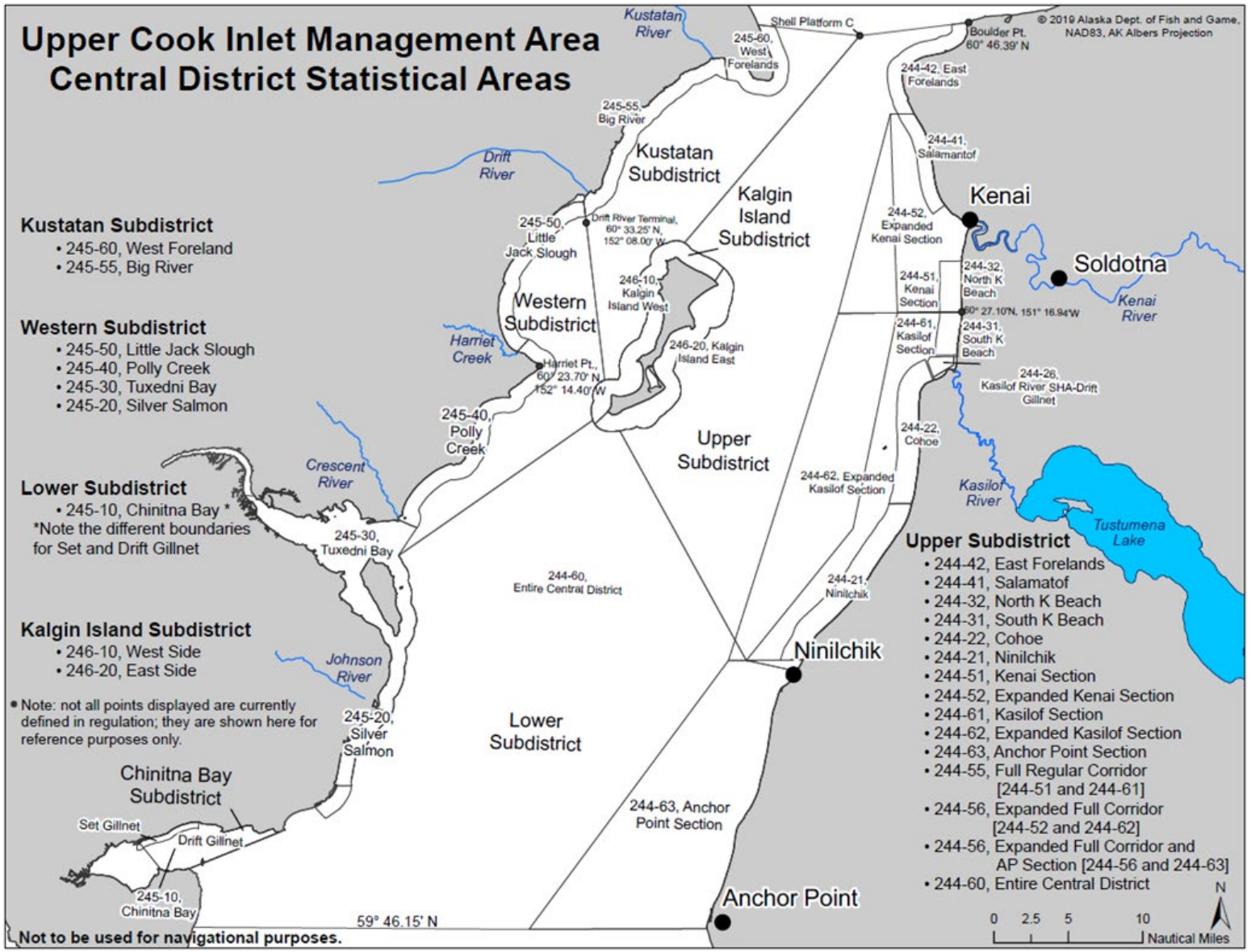

Figure 1.–UCI Central District commercial salmon districts, sections, and statistical area.

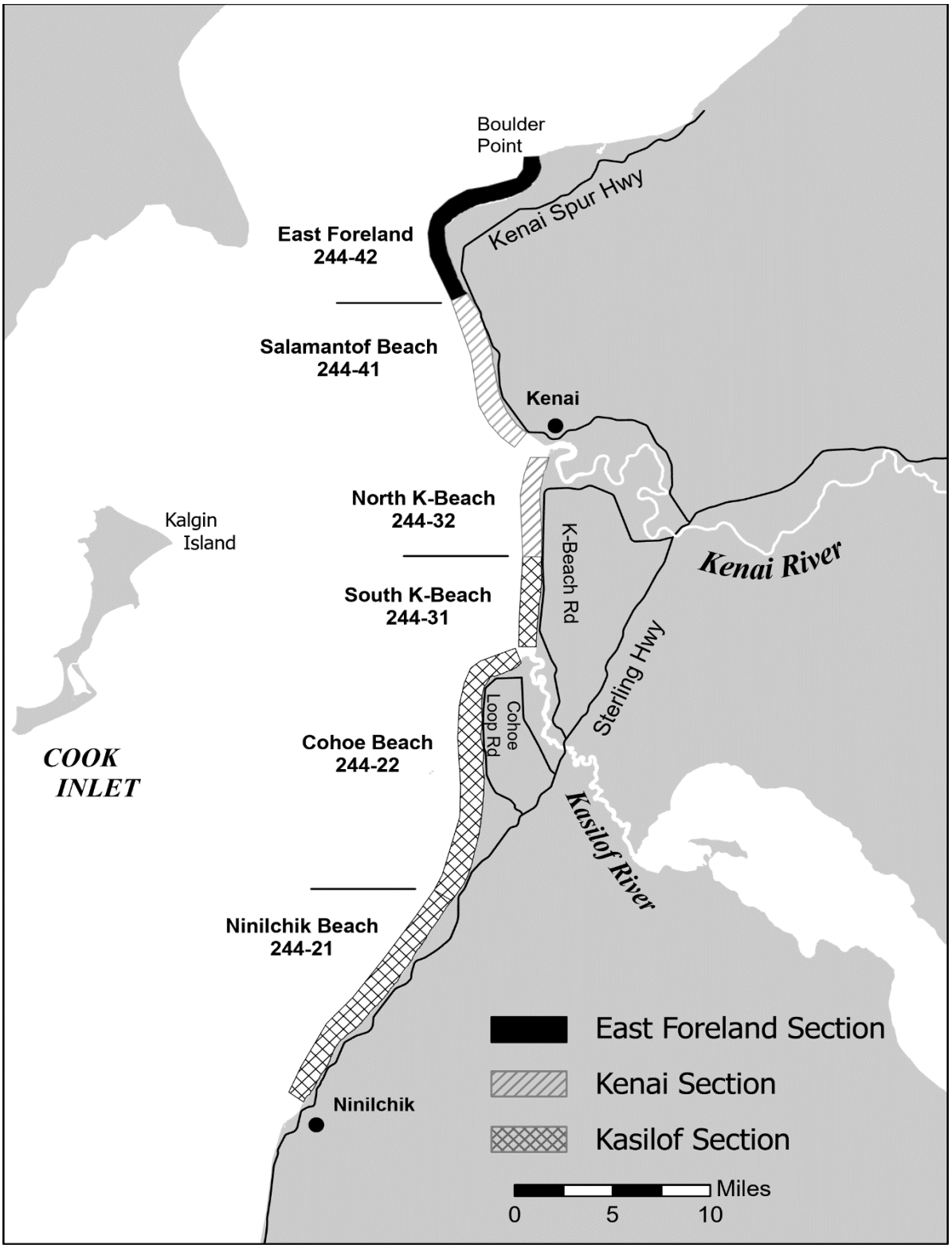

Figure 2.–Map of Upper Cook Inlet Upper Subdistrict set gillnet (ESSN) commercial fishing statistical areas.

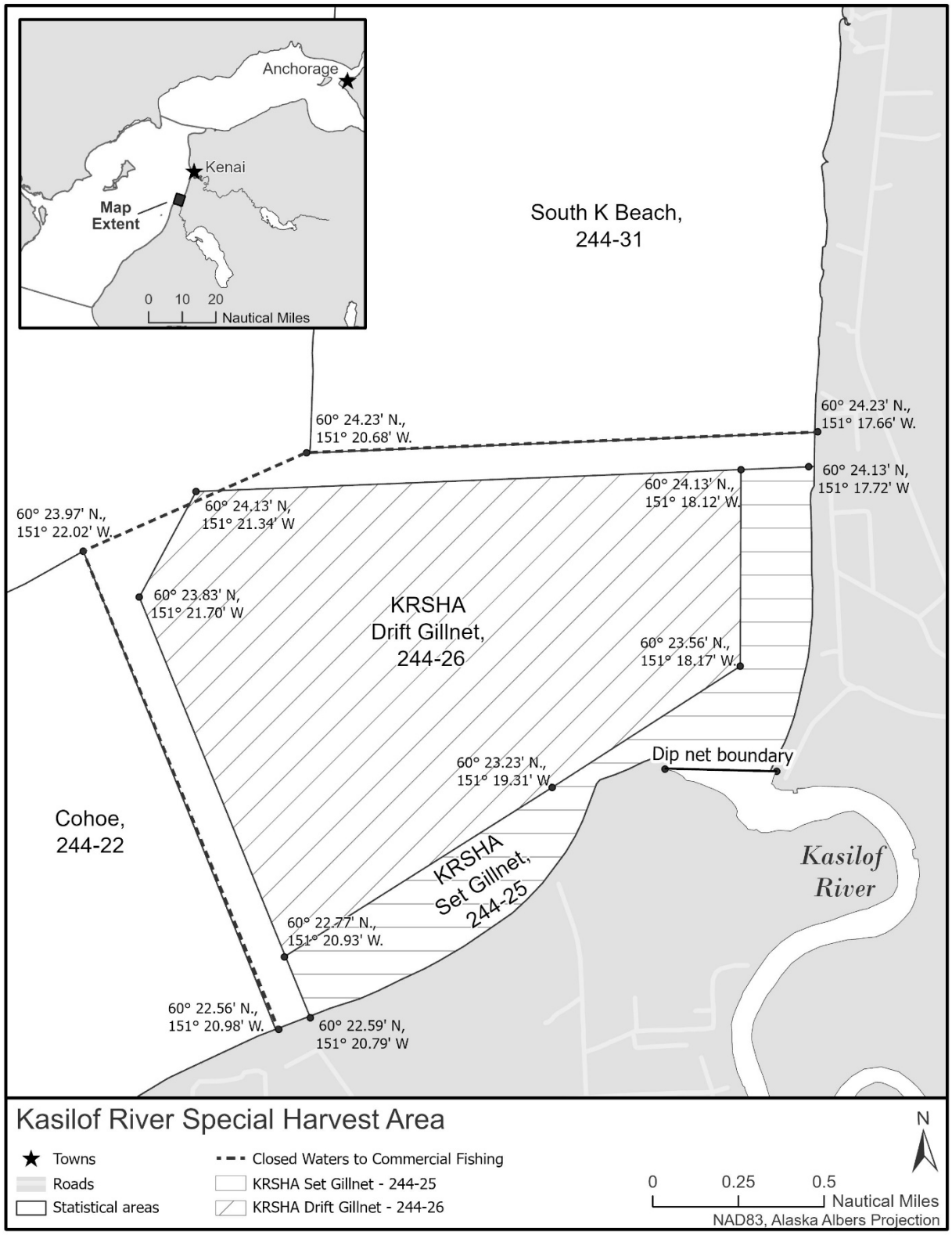

Figure 3.–Upper Cook Inlet Central District Kasilof Special Harvest Area.