

Report to the Alaska Board of Fisheries

DRAFT: Unuk River King Salmon Stock Status and Action Plan, 2018.

By

Divisions of Sport Fish and Commercial Fisheries, Southeast Alaska Region

December 2017

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



REPORT TO THE ALASKA BOARD OF FISHERIES

**DRAFT UNUK RIVER KING SALMON STOCK STATUS AND ACTION
PLAN, 2018**

by

Alaska Department of Fish and Game,
Divisions of Sport Fish and Commercial Fisheries,
Southeast Alaska Region

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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 the Unuk River king salmon (*Oncorhynchus tshawytscha*) stock be designated as a “stock of management concern.” A “management concern” is defined as “a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds of the SEG [sustainable escapement goal], BEG [biological escapement goal], OEG [optimum escapement goal], or other specified management objectives for the fishery.” Escapement of Unuk River king salmon has fallen below the lower bound of the existing BEG (1,800 to 3,800) in 5 of the past 6 years (2012 to 2016), including the preliminary estimate for 2017 (1,203). Since 2014, the department has implemented conservative management measures to reduce harvest of Unuk River king salmon and increase escapement. These management actions have thus far proven insufficient to consistently achieve the BEG.

Key words: king salmon, *Oncorhynchus tshawytscha*, Unuk River, Southeast Alaska, stock of concern, fishing, sustainable salmon fisheries policy, Alaska Board of Fisheries.

INTRODUCTION

The *Policy for Management of Sustainable Salmon Fisheries* (SSFP; 5 AAC 39.222) directs the Alaska Department of Fish and Game (department) to provide the Alaska Board of Fisheries (board) with reports on the status of salmon stocks and identify any salmon stocks that present a concern related to yield, management, or conservation during regularly-scheduled board meetings. At the October, 2017 Work Session meeting, the department recommended that the board declare Unuk River king salmon as a stock of management concern at the upcoming regulatory meeting for the Southeast Alaska (SEAK) and Yakutat Management Area in January, 2018. This recommendation was based on guidelines established in the SSFP, which describes a management concern as “a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds” of the established escapement goal whether it be a sustainable escapement goal (SEG), biological escapement goal (BEG), or optimal escapement goal (OEG), or other specified management objective. Chronic inability is further defined in the SSFP as the “continuing or anticipated inability to meet escapement thresholds over a 4 to 5-year period, which is approximately the generation time of most salmon species.” Unuk River king salmon escapements were below the lower bound of the current BEG range of 1,800 to 3,800 large fish (king salmon \geq 660 mm mid-eye to fork of tail length, primarily age 1.3 and older), in 5 out of the past 6 years from 2012 to 2017.

This action plan provides the department’s assessment of Unuk River king salmon *Oncorhynchus tshawytscha* as a stock of management concern, summarizes historical assessments of annual run sizes, and describes the existing regulations and emergency order (EO) authority that the department follows to manage for the Unuk River king salmon escapement goal. The plan lists potential management actions for the sport, commercial, and personal use fisheries, and research projects for this stock. Criteria that must be met for future removal of the stock of concern designation are also outlined.

This action plan is being presented to the board and public as a final review draft at the 2018 Alaska Board of Fisheries meeting on Southeast and Yakutat Finfish and Shellfish. Immediately following the meeting, the department will finalize this report and include descriptions of any management measures or recommendations from the board related to the Unuk River king

salmon Stock of Concern. This final action plan will be published in the Regional Informational Report series in early 2018.

STOCK ASSESSMENT BACKGROUND

The Unuk River is a glacial system which flows into Behm Canal near Ketchikan, Alaska (Figure 1). The Unuk River is one of 4 SEAK king salmon stocks for which a full stock assessment is performed on an annual basis by the department. This includes coded-wire-tagging juveniles and smolt, which provide estimates of smolt abundance and estimates of harvest by gear, area, and time in mixed stock commercial and sport fisheries. Coded-wire tagging of this stock has occurred from 1982 to 1986 and 1992 to present. These data, when paired with spawning abundance estimates, allow estimating marine (smolt-to-adult) survival, total return (escapement plus harvest by age), and calendar year harvest and brood year exploitation rates for the Unuk River stock.

Estimates of escapement are germane to large spawners and are based on mark–recapture (MR) estimates of total escapement from 1997 to 2009 and in 2011, and expanded observer index counts using helicopter and foot surveys from 1977 to 1996 and from 2010 to present. Radio telemetry studies conducted in 1994 and 2009 indicated that aerial and foot surveys covered 80% of the spawning area. Seven years of concurrent MR estimates and survey counts were used to estimate a survey expansion factor of 4.83 (SE = 0.59) (Hendrich et al. 2008).

Coded-wire tag recoveries of this stock indicate that fish rear in a wide geographic area, including SEAK, Gulf of Alaska, Bering Sea, and to a lesser extent in Northern British Columbia. The waters of Behm Canal adjacent to the Unuk River are currently closed to king salmon fishing by both sport and commercial fisheries. Immature and mature fish are harvested in marine mixed stock fisheries in SEAK and northern British Columbia (Table 1).

Escapement

From 1977 to 2011, the Unuk River met or exceeded the lower bound of the BEG every year. From 2012 to 2017, the Unuk River missed the lower bound of the BEG in 5 of the last 6 years, despite restrictive actions taken in the sport and commercial fisheries since 2014 (Table 1).

Harvest

Unuk River king salmon are harvested in various commercial and sport fisheries. Over the 10-year period 2007–2016, the average harvest rate of Unuk River king salmon was 41% (range 21–71%; Table 1). Average harvest rate broken down by fishery was 26% commercial troll, 10% commercial net, and 5% sport for the same 10-year period. If harvest rates were more consistent to those seen for other SEAK wild king stocks (i.e., ~20%), escapement would have been achieved 4 out of the past 5 years (2012–2016). The commercial harvest (all fisheries combined) over the last 10 years (2007–2016) was dominated by commercial troll fisheries including winter, spring, and summer fishing periods. Most troll harvest occurs in the spring fishery. The commercial net fisheries include Southeast gillnet and purse seine fisheries. The sport harvest occurs primarily from May through July, except in recent years (2014 to 2016) when restrictive measures were in place for the sport fishery in terminal areas near Ketchikan, which lowered the average sport harvest rate to 3% during this timeframe.

ESCAPEMENT GOAL EVALUATION

ESCAPEMENT GOAL HISTORY

The *Policy for Statewide Salmon Escapement Goals* (SSEGP; 5 AAC 39.223), adopted by the board in 2001, established the formal process for setting escapement goals. Prior to this the department escapement goal policy required publication of the goals (Fried 1994). In 1994, the department established an escapement goal of 875 large spawners based on peak observer index counts. In 1997, the escapement goal was revised to an escapement goal range of 650 to 1,400 large spawners (McPherson and Carlile 1997) based on peak observer index counts. Using more robust methods and a longer time series of spawner and recruit data including the 1982 to 2001 brood years (Hendrich et al. 2008), the current BEG range of 1,800 to 3,800 large spawners was established and adopted by the department in 2009.

SPAWNER DATA AND BEG ANALYSIS

The SSEGP along with the SSFP require the department to report on salmon stock status and escapement goals to the board on a regular basis, document and review existing salmon escapement goals, establish goals for stocks for which escapement can be reliably measured, and prepare scientific analyses with supporting data when goals are created, modified, or recommended for elimination.

Escapement Goal Recommendation

The department has reviewed salmon escapement goals every 3 years prior to the Southeast and Yakutat board meeting and has not changed the Unuk River king salmon escapement goal since 2009 (Der Hovanisian et al. 2011; Heintz et al. 2014; Heintz et al. *In press*).

STOCK OF CONCERN RECOMMENDATION

Inseason management actions were taken annually since the 2014 fishing season to reduce harvests of Unuk River king salmon and to pass fish to escapement; however, these efforts proved insufficient to achieve the BEG such that escapements have fallen below the BEG in 5 of the past 6 years. Therefore, in October 2017, the department recommended that the board designate the Unuk River king salmon a stock of management concern at the regulatory meeting for Southeast and Yakutat in January, 2018.

OUTLOOK

The department produces preseason forecasts by December 1 for the Situk, Chilkat, Taku, Stikine, and Unuk river stocks of king salmon in SEAK. For the Unuk River stock of king salmon in 2018, the forecast uses sibling models in which the 2016 and 2017 estimated total returns of fish from brood years 2012 and 2013 were used to predict the returns of age-1.5 (BY2013) and age-1.6 (BY2012) fish in 2018. The forecast uses the relationships observed in Unuk River king salmon age classes over the past 9 years. The Unuk River total run forecast is 863 large fish, which, even if no fish are harvested, is below the lower bound of the escapement goal range of 1,800 to 3,800 large spawners.

HABITAT ASSESSMENT

The Unuk River originates in a heavily glaciated area of northern British Columbia and flows for 129 km where it empties into Alaska at Burroughs Bay, 85 km northeast of Ketchikan. The Unuk

River drainage encompasses an area of approximately 2,570 km² (Geospatial Data Gateway. <http://datagateway.nrcs.usda.gov> [Accessed 11/13/2017]). There is no road access to any portion of the watershed, restricting anthropogenic impacts. The lower 39 km of the Unuk River are in Alaska. The U.S. portion of the Unuk River contains 6 tributaries in which more than 80% of the king salmon spawning occurs. The entire U.S. portion of the Unuk River watershed is within the Misty Fjords National Monument Wilderness. This land-use designation contributes to the pristine condition of the watershed and salmonid habitat still observed today in the U.S. portion. The anadromous portions of the 6 primary king salmon spawning tributaries were surveyed using standardized habitat surveys developed by the U.S. Forest Service (USFS), and modified by the Sport Fish Division in 2002–2004 (Nichols et al. 2013). These surveys characterized the geomorphic, fluvial, and riparian attributes of the primary spawning areas in the lower portion of the watershed as baseline information to be compared with other surveyed systems throughout SEAK.

The British Columbia portion of the watershed similarly hosts mostly pristine habitat, terrestrial and aquatic. One currently planned development project, the Kerr-Sulphurets-Mitchell (KSM) mine, is currently being evaluated. The mine could have future impacts on downstream water quality and other components of anadromous habitat (e.g., water flow, physical habitat, etc.). The proponents of this project propose to mine the Sulphurets, Kerr, Mitchell, and Iron Cap deposits, establish mine support facilities in the non-fish bearing Mitchell and McTagg Creek valleys, and store and treat contact water before discharging the effluent into Sulphurets Creek, which drains into the Unuk River. Alaska and British Columbia have different regulatory measures in place to protect fish habitat, including water quality, riparian habitat, and other components. At this time, it would be impossible to estimate the potential effects of this specific project on the Unuk River king salmon population; however, efforts are currently being proposed to collect baseline water quality and quantity data, including a desire to implement periodic monitoring efforts in the watershed to gauge any impacts due to this mining project.

FISHERY MANAGEMENT OVERVIEW AND BACKGROUND

The Southeast Alaska Chinook salmon fishery is managed to achieve the annual all-gear Pacific Salmon Commission allowable catch associated with the preseason abundance index (AI) generated by the Chinook Technical Committee Chinook Model each spring. The catch is allocated through regulations established by the BOF among troll, net, and sport fisheries (Table 2).

SPORT FISHERIES

Unuk River king salmon are caught in the sport fishery throughout marine waters of SEAK, primarily in the Ketchikan area. King salmon fishing in freshwater is prohibited in all of SEAK east of the longitude of Cape Fairweather. Southeast Alaska regional marine sport king salmon regulations are set annually by EO as specified in the *Southeast Alaska King Salmon Management Plan* (5 AAC 47.055). These regional regulations can be modified to comply with management plans, allow increased opportunity for king salmon of Alaska hatchery origin or establish conservative regulations for the protection of wild Alaska king salmon stocks. Current sport fishing regulations protect Unuk River king salmon with a year-round closure to salmon fishing in northeastern Behm Canal and contiguous bays, combined with a seasonal salmon fishing closure in southeastern Behm Canal from May 1 to August 14.

After meeting the escapement goal for 35 consecutive years, escapements were below the goal in 5 out of the last 6 years (2012–2014, 2016–2017). In an effort to reduce harvest of Unuk River king salmon, management measures have been implemented annually since 2014 in the Ketchikan area sport fisheries. These management measures include expanding the time and area closures in West and East Behm Canal that are currently restricted by regulation, reducing the bag and possession limit in West Behm Canal to one fish through June 30, and postponing liberalization of the Ketchikan Sport THA until July 1. In 2015, time restrictions were extended an additional 2 weeks through July 15 and after meeting the escapement goal, management measures were relaxed slightly in 2016. The escapement goal was missed again in 2016 and in response, bag and annual limits were reduced, and time restrictions were substantially extended from April 1 through August 14, 2017. Harvest rates in the Ketchikan area sport fishery on the Unuk stock of king salmon were 1%, 6% and 0% in 2015, 2016 and 2017, respectively. Despite the use of even more conservative measures in 2017, preliminary Unuk River king salmon escapement (1,203 fish) again fell below the lower bound of the BEG.

Past Sport Fishery Management Actions

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

Below is a synopsis of sport fisheries management measures implemented to reduce harvest of Unuk River king salmon from 2012 to 2017:

2012:

- Regional king salmon regulations for SEAK applied as described in the *Southeast Alaska King Salmon Management Plan* (5AAC 47.055).

2013:

- Regional king salmon regulations for SEAK applied as described in the *Southeast Alaska King Salmon Management Plan* (5AAC 47.055).

2014:

- Regional king salmon regulations were a bag and possession limit of 3 fish 28 in or greater in length for residents and a nonresident bag and possession limit of 2 fish in May and June and one fish the remainder of the year 28 in or greater in length, with a 6 fish annual limit. All anglers allowed to use 2 rods from October 1 through March 31.
- EO issued to:
 - close Northern Behm Canal to king salmon fishing May 27 – June 30;
 - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 6 fish 28 in or greater in length from May 27 to June 30;
 - postpone the opening of the Ketchikan Sport THA from June 1 to July 1;
 - open a small terminal area within Herring Bay and Neets Bay June 1– July 31, with a bag and possession limit of 6 fish any size and no nonresident annual limit.

2015:

- Regional king salmon regulations for SEAK were a bag and possession limit of 2 fish 28 in or greater in length for residents and a nonresident bag and possession limit of one fish 28 in or greater in length, with a nonresident 6 fish annual limit. Resident anglers allowed to use 2 rods from October 1 through March 31.
- EO issued to:
 - close Northern Behm Canal to king salmon fishing May 26 – July 15;
 - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 6 fish 28 in or greater in length from May 26 to June 30;
 - postpone the opening of the Ketchikan Sport THA until July 1;
 - open a small terminal area within Herring Bay June 1 – July 31, with a bag and possession limit of 6 fish any size and no nonresident annual limit.

2016:

- Regional king salmon regulations for SEAK were a bag and possession limit of 3 fish 28 in or greater in length for residents and a nonresident bag and possession limit of 2 fish in May and June and one fish the remainder of the year 28 in or greater in length, with a nonresident 6 fish annual limit. All anglers were allowed to use 2 rods from October 1 through March 31.
- EO issued to:
 - close Northern Behm Canal to king salmon fishing May 24 – June 30;
 - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 6 fish 28 in or greater in length, from May 24 to June 30.
- Ketchikan Sport THA opened by regulation.

2017:

- Regional king salmon regulations for SEAK were a bag and possession limit of 2 fish, 28 in or greater in length for residents and a nonresident bag and possession limit of one fish 28 in or greater in length, with an annual limit of 3 king salmon. Resident anglers allowed to use 2 rods from October 1 through March 31.
- EO issued to:
 - close Northern Behm Canal and East Behm Canal to king salmon fishing April 1 – August 14;
 - reduce the bag and possession limit in West Behm Canal to one fish for all anglers with a nonresident annual limit of 3 fish 28 in or greater in length, from April 1 to August 14;
 - EO issued to restrict the bag and possession limit in the Ketchikan Sport THA from April 1 to June 30 to one fish for all anglers and a nonresident annual limit of 3 fish 28 in or greater in length;
 - open a small terminal area within Herring Bay June 1– July 31, with a bag and possession limit of 6 fish any size and no nonresident annual limit.

COMMERCIAL FISHERIES

Purse Seine fishery – Regulations allow purse seine fishing in Districts 1 (Sections 1-C, 1-D, 1-E, and 1-F only), 2, 3, 4, 5, 6 (Sections 6-C and 6-D only), 7, 9, 10, 11 (Sections 11-A and 11-D only), 12, 13, and 14. Purse seine fishing is also allowed in hatchery THAs at Neets Bay, Kendrick Bay, Anita Bay, Deep Inlet, and Hidden Falls (Figure 2). Although the areas specified above are designated purse seine fishing areas, specific open areas and fishing times are established in season by EO.

Drift gillnet fishery – The 5 traditional drift gillnet fishing areas (Figure 3) are: Tree Point and Portland Canal (District 1); Prince of Wales (District 6); Stikine (District 8); Taku/Snettisham (District 11); and Lynn Canal (District 15). In addition, drift gillnet fisheries occur in several THAs adjacent to hatchery facilities and at remote release sites throughout the region. Although the THAs are designated drift gillnet fishing areas, specific open areas and fishing times are established in season by EO.

Troll fishery - The commercial troll fishery in Southeast Alaska and Yakutat (Region 1; Figure 4) occurs in State of Alaska waters and in the Federal Exclusive Economic Zone (EEZ) east of the longitude of Cape Suckling (5 AAC 29.010 and 5 AAC 29.020). All other waters of Alaska are closed to commercial trolling.

There are 3 commercial troll seasons in Southeast Alaska, winter, spring, and summer. The winter troll fishery is managed for a guideline harvest level (GHL) of 45,000 non-Alaska hatchery-produced king salmon, with a guideline harvest range of 43,000–47,000 non-Alaska hatchery-produced fish, plus the number of Alaska hatchery-produced king salmon harvested during the winter fishery, and is conducted from October 11 through April 30 or until the GHL is harvested. Following the closure of the winter troll fishery, and prior to June 30, spring troll fisheries open by EO to target Alaskan hatchery-produced king and chum salmon and are conducted along migration routes or adjacent to hatchery release sites (Figure 5). Terminal area fisheries occur directly in front of hatcheries or at remote release sites. The majority of the annual troll king salmon harvest is taken during the general summer troll fishery, beginning July 1, when salmon may be taken throughout most of the Southeast Alaska/Yakutat region, including the outside waters of the EEZ. The summer troll king salmon harvest is divided into 2 retention periods. The first retention period targets 70% of the remaining annual troll king allocation, after winter and spring troll non-Alaska hatchery-produced harvests are subtracted. Following the first retention period, any remaining portion of the annual troll allocation is harvested in a second king retention period, which typically occurs in mid-August, and follows any closure of the troll fishery for coho salmon (*O. kisutch*) conservation.

Past Commercial Fishery Management Actions

Below is an outline of significant changes to commercial fisheries that may have affected harvest and escapement of king salmon returning to Unuk River, 2012–2017:

2012:

- Fisheries were managed as outlined in the purse seine, gillnet, and troll management plans.

2013:

- Fisheries were managed as outlined in the purse seine, gillnet, and troll management plans.

2014:

- Spring Troll:
 - Closed the West Behm Canal, Point Alava, and Clarence Strait fisheries.
 - Closed a large portion of Ketchikan area fishery and divided the remaining open waters into 3 sub-areas (Ketchikan area, Mountain Point, and West Clarence Strait) to increase level of detail in stock composition data.
 - Ketchikan area and West Clarence Strait fisheries each reduced by a total of 7 days during June, compared to previous year.
 - Mountain Point area reduced by 5 total days open in June from previous year.
 - Sumner Strait fishery divided into 2 sub-areas (North Sumner Strait and South Sumner Strait) to increase level of detail in stock composition data.
 - North Sumner Strait and South Sumner Strait areas reduced by 5 total days open in June from previous year.
 - Steamer Point area openings reduced by 17 days in June from previous year.

2015:

- Neets Bay THA net rotational fishing schedule modified to account for the period when Unuk River king salmon transit the area, based on coded-wire tag data. The THA closed to net gear for 4 days in statistical weeks (SW) 24–25. Expansion of the THA delayed from the second Sunday in June to July 1, which affected all gear groups.
- Spring Troll:
 - With preseason forecast to the Unuk River at lower end of the escapement goal range, no additional actions beyond 2014 restrictions added in 2015, number of days open during June for specified fisheries remained at 2014 level.
 - Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Shoreline) area for duration of spring.

2016:

- Neets Bay THA closed to net gear for 5 days in SWs 24–26. The THA closed west of the mid-bay line beginning July 1, which affected all gear groups.
- Spring Troll:
 - With preseason forecast to the Unuk River within the escapement goal range, no additional conservation restrictions beyond 2014–2015 actions added in 2016.
 - Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Shoreline) area for duration of spring.

2017:

- Neets Bay THA closed to net gear for 6 days in SWs 24–26. The THA closed to net gear on June 27 and troll gear on June 30.
- Purse Seine closed to the retention of king salmon 28 in or greater for the rest of the season beginning August 12 in all districts.

- Spring Troll:
 - Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Shoreline) area for duration of spring.
 - Kendrick Bay reduced opening lengths to maximum of 3 days/week through SW 21.
 - Stone Rock Bay reduced to 1 day/week through SW 21.
 - Mountain Point reduced to 4 days/week for SWs 18–21, and reduced area beginning June 15.
 - Ketchikan Area reduced to 3 days/week in SWs 18–21.
 - With exception of Mountain Point, all spring fisheries located in Districts 1 and 2 closed during SWs 22–26 (May 29–June 30).
 - In addition to area specific management measures during spring, a closure of all Southeast Alaska/Yakutat spring troll fisheries implemented May 29–June 14.
- Summer Troll:
 - King salmon retention in all troll fisheries closed for the season on August 10, and no second summer troll king retention period.

PERSONAL USE FISHERIES

The Unuk River lies in the Ketchikan Nonsubsistence Area and is subject to personal use regulations. In Southeast Alaska, permits are not issued for the personal use taking of king salmon, but king salmon caught incidentally during permitted personal use fishing are legally taken and possessed. The possession limit for king salmon is 2 fish. There is no personal use harvest of king salmon on record for the Unuk River. The only personal use fishery that occurs in the waters of East or West Behm Canal that takes any measurable king salmon is the McDonald Lake sockeye salmon (*O. nerka*) fishery, in Yes Bay. The Yes Bay personal use harvest averaged 10 king salmon per year since 1998, and 6 king salmon per year since 2008. This fishery is unique as fishermen target McDonald Lake sockeye salmon with gillnets in saltwater in the mouth of the inlet, well away from the mouth of the stream.

Past Personal Use Fishery Management Actions

There have been no conservative management actions taken in the personal use fisheries that may have affected harvest and escapement of king salmon returning to Unuk River, 2012–2017.

MANAGEMENT ACTION PLAN OPTIONS FOR ADDRESSING STOCK OF CONCERN

ACTION PLAN GOAL

The goal of this plan is to rebuild Unuk River king salmon runs to consistently achieve escapements within the escapement goal range and to consistently provide harvestable yield.

ACTION PLAN ALTERNATIVES

The benefits and detriments described below are intended to reflect only those related to the goal of rebuilding king salmon to levels that achieve the current BEG range for Unuk River.

ACTION #1 – SPORT FISHERY

Objective: Reduce the sport harvest of Unuk River king salmon.

Background: Unuk River king salmon are harvested throughout the marine waters of SEAK, primarily in the Ketchikan area. Regionwide regulations for king salmon in the marine sport fisheries in SEAK vary annually. Bag and possession limits and other management measures are set annually as directed by the *Southeast Alaska King Salmon Management Plan* according to the preseason king salmon abundance index as determined by the Chinook Technical Committee of the Pacific Salmon Commission.

The Division of Sport Fish used commissioner’s EO authority to restrict time and area, reduce bag and possession limits and close areas to sport fishing in the Ketchikan management area from 2014–2017.

Option A – Status Quo

Continue to use department EO authority to implement conservative king salmon regulations in the Ketchikan area identical to those implemented in 2017 (Figure 6).

Specific Action to Implement the Objective: Use EO authority to restrict the king salmon sport fishery preseason by implementing closures and reduce limits in the Ketchikan area as follows:

North Behm Canal: Closed to salmon fishing from April 1 to August 14 in Behm Canal and the contiguous bays enclosed to the north by a line from Point Lees to Elsie Point and a line from Elsie Point to the longitude of the outlet of Long Lake, and to the south by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point (Figure 6).

West Behm Canal: From April 1 to August 14, the bag and possession limit is one king salmon 28 in or greater in length for all anglers; nonresident annual limit of 3 king salmon 28 in or greater in length in the waters of West Behm Canal enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island and a line from Fin Point to Dress Point, and to the south by a line from Niblack Point to South Vallenar Point, and Tongass Narrows north of the latitude of Lewis Reef light (Figure 6).

Southeast Behm Canal: Salmon fishing is closed from April 1 through August 14 in southeast Behm Canal and the contiguous bays between a line from Point Eva to Cactus Point and a line from the latitude of Point Nelson (Figure 6).

Herring Bay THA: Postpone liberal king salmon regulations in a majority of the THA until July 1 by implementing king salmon regulations of a one fish bag and possession limit for all anglers and a nonresident annual limit of 3 fish April 1 through June 30. On July 1, king salmon regulations revert to the Herring Bay THA king salmon regulations of 6 fish any size with no annual limit. In Herring Bay west of a line from the southernmost entrance of the Hole-In-The-Wall harbor to ADF&G markers located ½ mile north of Whitman Creek, to the fresh/salt water

boundary signs located at the mouth of Herring Cove Creek, the Herring Bay THA king salmon regulations apply June 1 through July 31.

Remainder of Ketchikan area: Regional king salmon regulations set under the *Southeast Alaska King Salmon Management Plan* apply.

Benefits: These management actions can be accomplished through emergency order authority and allow the department to retain the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting. The proposed closure dates and areas are specific to the majority of Unuk River stocks migration through these areas and allow sport fish opportunity outside those dates.

Detriments: The harvest of king salmon would still occur and may not be lower than historical harvest rate ranges. More restrictive options reduce levels of sport fishing opportunity and have economic impacts on the charter fleet.

Option B – Reduce Area Open to Sport Fishing for King Salmon, Restrict Bag Limits and Reduce Size of THA

Expand sport fishing closures in north and northeast Behm Canal, implement non-retention in West Behm Canal, southeast Behm Canal and southern Revillagigedo Channel, implement a one fish bag limit in the remaining waters of the Ketchikan area, significantly reduce the size of the Ketchikan sportfish THA to Herring Bay only and expand limits inside Neets Bay (Figure 7).

Specific Action to Implement the Objective: Implement actions by EO or by regulation:

North and Northeast Behm Canal: Closed to salmon fishing year-round in Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point to a line from Cactus Point to Point Eva (Figure 7).

West Behm Canal: Closed to king salmon retention from April 1 through August 14 in West Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point, and to the south by a line from Indian Point to Mike Point (Figure 7).

Southeast Behm Canal and Southern Revillagigedo Channel: Closed to king salmon retention from April 1 through August 14, in the waters of southern Revillagigedo Channel enclosed from a line from Lucky Point to Middy Point, continuing to the latitude of Beaver Point, and from Point Rosen to Quadra Point, and in southeast Behm Canal from Cactus Point to Eva Point (Figure 7).

Remainder of Ketchikan: From April 1 through August 14 the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king salmon in the marine waters of Ketchikan north and east from the International Boundary Line at Dixon Entrance from 54°42.48' N. lat., 130°36.92' W. long to 54°40' N. lat., 131°45' W. long, continuing north to Niblack Point and enclosed to the north by a line from Indian Point to Mike Point and to the southeast from Lucky Point to Middy Point, continuing to the latitude of Beaver Point, and from Point Rosen to Quadra Point (Figure 7).

Herring Bay THA: In the waters of Herring Bay west of a line from the southernmost entrance of Hole-In-The-Wall harbor to ADF&G markers located ½ mile north of Whitman Creek to the fresh/salt water boundary signs located at the mouth of Herring Cove Creek, June 1 through July 31, the bag and possession limit is 6 king salmon, with no size limit and no annual limit (Figure 7).

Neets Bay: East of the longitude of the eastern most tip of Bug Island the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king salmon (Figure 7).

Benefits: These management actions can be accomplished through emergency order authority and allow the department to retain the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting. This option will reduce harvest of king salmon returning to the Ketchikan area to a lower level than in Option A while providing harvest opportunity for sport anglers to target hatchery kings returning to Whitman Lake Hatchery, Neets Bay Hatchery, Deer Mountain Hatchery and the Carroll Inlet remote release site.

Detriments: The harvest of king salmon may still occur. More restrictive options reduce levels of sport fishing opportunity and have economic impacts on the charter fleet.

Option C – Expand Area Closed to Salmon Fishing, Further Reduce Area Open to Sport Fishing for King Salmon, Restrict Bag Limits and Reduce Size of THA

Expand sport fishing closures in north and northeast Behm Canal and expand to include Southeast Behm Canal, implement non-retention in all of west Behm Canal, and southern Revillagigedo Channel, implement a one fish bag limit in the remaining waters of the Ketchikan area, significantly reduce the size of the Ketchikan sportfish THA to Herring Bay only and expand limits inside Neets Bay (Figure 8).

Specific Action to Implement the Objective: Implement actions by EO or by regulation:

North, Northeast and Southeast Behm Canal: Closed to salmon fishing year-round in Behm Canal and the contiguous bays enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point to a line from Point Alava to Point Sykes (Figure 8).

West Behm Canal and South Revilla Channel: Closed to king salmon retention from April 1 through August 14, in West Behm Canal enclosed to the north by a line from the western entrance of Bailey Bay to the northern tip of Hassler Island, and a line from Fin Point to Dress Point, and to the south by a line from Survey Point to Caamano Point and in South Revillagigedo Channel and the contiguous bays enclosed by a line from Carroll Point to Reef Point and continuing southeast to the latitude of Beaver Point, and from Point Rosen to Quadra Point and at the mouth of southeast Behm Canal from Point Alava to Point Sykes (Figure 8).

Remainder of Ketchikan: From April 1 through August 14, the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king in the marine waters of Ketchikan north and east from the International Boundary Line at Dixon Entrance from 54°42.48' N. lat., 130°36.92' W. long to 54°40' N. lat., 131°45' W. long, continuing north to Niblack Point, and enclosed to the northeast by a line from Caamano Point to Survey Point and

to the southeast from Carroll Point to Reef Point, and from the south at the latitude of Beaver Point, and from Point Rosen to Quadra Point (Figure 8).

Herring Bay THA: In the waters of Herring Bay west of a line from the southernmost entrance of Hole-In-The-Wall harbor to ADF&G markers located ½ mile north of Whitman Creek, to the fresh/salt water boundary signs located at the mouth of Herring Cove Creek, June 1 through July 31, the bag and possession limit is 6 king salmon, with no size limit and no annual limit (Figure 8).

Neets Bay: From April 1 through August 14, East of the longitude of the eastern most tip of Bug Island the bag and possession limit is one king salmon 28 in or greater in length for all anglers; annual limit of 3 king salmon (Figure 8).

Benefits: These management actions can be accomplished through emergency order authority and allow the department to retain the ability to return to more liberal fisheries if king salmon runs rebuild prior to the next board meeting. This option will reduce harvest of king salmon returning to the Ketchikan area to a lower level than in Option A and B, while providing harvest opportunity for sport anglers to target hatchery king salmon returning to Whitman Lake Hatchery, Neets Bay Hatchery, Deer Mountain Hatchery and the Carroll Inlet remote release site.

Detriments: The harvest of king salmon may still occur. More restrictive options reduce levels of sport fishing opportunity and have economic impacts on the charter fleet.

ACTION #2 – COMMERCIAL FISHERY

Objective: Reduce the commercial harvest of Unuk River king salmon.

Background: The approach taken by the department to date has been to shape the spring troll fishery in a manner that reduces time and area in the immediate vicinity of the Unuk River and other spring troll areas where coded-wire tag recoveries of Unuk River king salmon have occurred. In addition to area specific management measures during spring, a closure of all Southeast Alaska/Yakutat spring troll fisheries was implemented from May 29 through June 14, 2017, and king salmon retention in all troll fisheries closed for the season on August 10, 2017 and no second summer troll king retention period was opened. Measures taken in the purse seine and gillnet fisheries have been limited to time and area restrictions in the Neets Bay THA based on Unuk River king salmon tag recoveries and regional non-retention of king salmon over 28 in in length in the purse seine fishery.

Option A – Status Quo

Specific Action to Implement the Objective:

1. Net Gear:
 - Close Neets Bay THA for 6 days during SWs 24–27.
 - Regional non-retention of king salmon over 28 in in length for purse seine fisheries.
2. Spring Troll:
 - Continued closure of West Behm Canal, Point Alava, Clarence Strait, and a portion of former Ketchikan (Gravina Shoreline) area for duration of spring.
 - Kendrick Bay reduced opening lengths to maximum of 3 days/week through SW 21.
 - Stone Rock Bay reduced to 1 day/week through SW 21.
 - Mountain Point reduced to 4 days/week for SWs 18–21, and reduced area open beginning June 15.

- Ketchikan Area reduced to 3 days/week in SWs 18–21.
- With exception of Mountain Point, all spring fisheries located in Districts 1 and 2 closed during SWs 22–26 (May 29–June 30).

Benefits: These management actions can be accomplished through EO authority and the user groups are accustomed to the actions. The restrictions are directly related to historical coded-wire tag data. The fisheries impacted by these restrictions experience minimal disruption.

Detriments: Since 2014 for troll and 2015 for the net gear when these management actions were implemented, the Unuk River king salmon escapement goal has only been met in 2015. In the remaining 3 years, under a progressively more conservative management regime harvest rates remained near or above the 10-year average, and king salmon escapements have fallen below the escapement goal range.

Option B – Combination of Shaping and Closures

Specific Action to Implement the Objective:

1. Net Gear:
 - Close Neets Bay THA for 6–8 days in SWs 24–27. THA not expanded (per regulation) until July 1.
 - Regional non-retention of king salmon over 28 in in length for purse seine fisheries.
2. Winter Troll:
 - Notwithstanding any remaining seasonal guideline harvest level, the winter troll fishery will close in all waters of Southeast Alaska/Yakutat on March 15.
3. Spring Troll:
 - Opportunities during May and June spring troll king salmon fisheries will be limited to THAs, waters in close proximity to hatchery facilities or release sites, and in areas that have been identified as having low proportional harvests of wild stock Southeast Alaska/Yakutat king salmon. Spring troll chum fisheries, as provided for in the *District 12 and District 14 Enhanced Chum Salmon Troll Fisheries Management Plan*, will begin June 15, with retention of king salmon prohibited.
4. Summer Troll:
 - The first retention period for king salmon during the general summer troll fishery will be delayed by a week, and will open to target 70% of the remaining troll king salmon annual allocation, minus the number of treaty king salmon harvested in winter and spring troll fisheries, on July 8.

Benefits: These management actions can be accomplished through EO authority. The restrictions are directly related to historical coded-wire tag data.

Detriments: Harvest opportunity for species other than king salmon may be lost due to king salmon restrictions.

Option C – Wide Scale Troll and THA Closures

Specific Action to Implement the Objective:

1. Net Gear:

- Modify the Neets Bay THA management plan to allow very limited net openings at the end of June. The area open for net fisheries would be limited to the inner portion of the waters of Neets Bay east of Clam Island. Cost recovery would be delayed until July 1 and open in the waters of Neets Bay east of Clam Island.
 - Regional non-retention of king salmon over 28 in in length for purse seine fisheries.
2. Winter Troll:
 - Notwithstanding any remaining seasonal guideline harvest level, the winter troll fishery will close in all waters of Southeast Alaska/Yakutat on March 15.
 3. Spring Troll:
 - Close spring troll season.
 4. Summer Troll:
 - Delay summer troll season until July 15.

Benefits: These management actions can be accomplished through EO authority. The restrictions are directly related to historical coded-wire tag data.

Detriments: Harvest opportunity for species other than king salmon may be lost due to king salmon restrictions. Excess fish returning to the Neets Bay hatchery could cause operational problems. Closures in the THA could create foregone harvest opportunity with both terminal fisheries and hatchery cost recovery. Delayed harvest of returning hatchery fish could also cause economic loss due to the loss of fish quality.

ACTION #3 – PERSONAL USE FISHERY

Objective: Reduce the personal use harvest of Unuk River king salmon.

Background: The Unuk River lies in the Ketchikan Non-Subsistence Area and has no record of king salmon harvest taken incidentally during permitted personal use fishing. The only personal use fishery in Behm Canal takes place in Yes Bay and has harvested between 2 and 11 king salmon since 2005.

Option A –

Specific Action to Implement the Objective:

1. Prohibit the retention of king salmon in the Yes Bay and Unuk River personal use fisheries.

Benefits: Ensure that no king salmon are harvested as incidental catch.

Detriments: This action will provide little gain in escapement.

CONDITIONS FOR REDUCING MANAGEMENT RESTRICTIONS OR DELISTING A STOCK OF CONCERN

1. If the lower bound of the biological escapement goal range is met or exceeded in 3 consecutive years or is met in 4 out of 6 consecutive years, the department will recommend removing Unuk River king salmon as a stock of management concern at the first Southeast and Yakutat board meeting after this condition is met.

2. Management measures could be relaxed in specific areas if updated stock composition and harvest data indicates areas where restrictions are no longer needed to ensure the escapement goal is met.
3. In the event that two consecutive years of escapements are near the upper bound of the escapement goal range or above the range, management restrictions may be relaxed or set aside using EO authority.

Stock status, action plan performance (including information on harvest rate, distribution, and timing in commercial fisheries), and escapement goal review will be updated in a report to the board at the 2021 Southeast and Yakutat meeting.

2018 ALASKA BOARD OF FISHERIES REGULATORY PROPOSALS AFFECTING UNUK RIVER KING SALMON

- Proposal 133 – Base duration of commercial salmon troll and drift gillnet gear spring openings on pre-season king salmon abundance projections.
- Proposal 137 – Increase the regional resident king salmon possession limit when the Southeast Alaska Area pre-season king salmon abundance index is greater than 2.0.
- Proposal 139 – Eliminate provisions for a rotational fishery in Southeast Cove Terminal Harvest Area and allow the department to manage the fishery in consultation with the hatchery operator.
- Proposal 140 – Prohibit use of drift gillnet gear for commercial salmon fishing in the Anita Bay THA during the 2018–2020 fishing seasons.
- Proposal 141 – Modify net rotation schedules for the commercial drift gillnet gear and purse seine gear salmon fisheries at Deep Inlet and Anita Bay terminal harvest areas..
- Proposal 148 – Expand the Herring Bay Sportfish Terminal Harvest Area to provide for additional sport fishing opportunity for hatchery-produced king salmon.
- Proposal 151 – Establish a terminal harvest area and management plan for Carroll Inlet.
- Proposal 152 – Update area description and coordinates of the Anita Bay Terminal Harvest Area boundaries.
- Proposal 160 – Allow commercial fishing for salmon in waters near selected streams in Boat Harbor, Anita Bay, Deep Inlet, and Nakat Inlet Terminal Harvest Areas up to a straight line between the seaward extremities of the exposed tideland banks.
- Proposal 172 - Remove restrictions on harvesting non-Alaska hatchery-produced salmon in the spring commercial salmon troll fishery on the Gravina Island shore.
- Proposal 174 - Establish commercial fisheries targeting enhanced chum salmon using troll gear in portions of Districts 9 and 10.
- Proposal 175 - Implement a king salmon possession restriction for vessels participating in the enhanced chum salmon troll fishery.

- Proposal 179 - Adopt measures to reduce harvest rate in the winter commercial salmon troll fishery during times of high king salmon abundance.
- Proposal 180 - Reduce triggers in the Southeastern Alaska Area spring commercial salmon troll fishery by five percent in years of high king salmon abundance.
- Proposal 181 - Reduce the percentage of remaining commercial king salmon troll fishery harvest taken during the initial summer king salmon retention period from 70% to 60% during years of high king salmon abundance.
- Proposal 182 - Establish a starting date for the reopening the summer commercial king salmon troll fishery.
- Proposal 185 - Increase opportunity to harvest salmon and allow additional gear types in the Southeastern Alaska Area personal use salmon fishery.

RESEARCH PLAN

PAST AND CURRENT RESEARCH PROJECTS FOR THE UNUK RIVER

The department has conducted extensive research and monitoring projects on the Unuk River related to king salmon, beginning with coded-wire-tagging efforts implemented in 1982. These efforts continued through 1986, and then again from 1992 to present. The Unuk River king salmon stock is an escapement and exploitation rate indicator stock recognized by the Pacific Salmon Commission and the Chinook Technical Committee. Pacific Salmon Treaty obligations include producing the full suite of stock assessment data: smolt production, overwinter and marine survival, harvest (calendar year) and exploitation (brood year) rates, and estimates of escapement as well as the age-sex-length composition of those escapements. The following research programs have been and are being conducted to gather detailed information about Unuk River king salmon stocks:

1. The Unuk River stock is part of the coastwide king salmon genetic baseline (Gilk-Baumer et al. *In press*); however, identifying wild Unuk River king salmon is convoluted because these fish are used as brood stock for hatchery releases in SEAK.
2. Standardized aerial and foot escapement surveys since the 1970s (Richards and Frost 2017)
3. Mark-recapture studies (Johnson 2013).
4. Age, sex, and length composition, coded wire tag and escapement sampling (Richards and Frost 2017)
5. Marine harvest sampling of the commercial and sport fisheries is conducted by the department annually throughout SEAK and these programs include varying study designs to estimate biological parameters associated with age, sex, length, fishing effort, and catch, harvest and coded wire tag sampling (Jaenicke et al. 2015; Buettner et al. 2017).

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Table 1.–Unuk River large king salmon escapement and harvest rate estimates of \geq age-1.2 fish, 2007–2016.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	5-year Average	10-year Average
Escapement ^a	5,668	3,104	3,157	3,835	3,195	956	1,135	1,691	2,623	1,463	1,574	2,683
Harvest	2,293	809	1,133	1,577	1,491	2,354	1,436	1,343	3,384	1,359	1,975	1,718
Total Run	7,961	3,913	4,290	5,412	4,686	3,310	2,571	3,034	6,007	2,822	3,549	4,401
Harvest Rate:												
Troll Winter	0.02	0.04	0.02	0.10	0.03	0.35	0.01	0.04	0.02	0.07	0.10	0.07
Troll Spring	0.08	0.06	0.11	0.08	0.17	0.11	0.19	0.19	0.21	0.14	0.17	0.13
Troll Summer R1 ^b	0.08	0.03	0.05	0.03	0.01	0.03	0.01	0.04	0.06	0.02	0.03	0.04
Troll Summer R2 ^b	0.02	0.0	0.01	0.0	0.01	0.01	0.15	0.0	0.04	0.0	0.04	0.02
Troll All	0.20	0.14	0.19	0.21	0.22	0.50	0.36	0.28	0.32	0.23	0.34	0.26
Sport Early ^c	0.03	0.01	0.06	0.06	0.04	0.08	0.05	0.03	0.01	0.06	0.05	0.04
Sport Late ^c	0.01	0.0	0.0	0.01	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Sport All	0.04	0.01	0.06	0.07	0.06	0.08	0.05	0.03	0.01	0.06	0.05	0.05
Net All	0.03	0.05	0.02	0.01	0.03	0.14	0.15	0.13	0.23	0.19	0.17	0.10
U.S. All	0.28	0.21	0.26	0.29	0.31	0.71	0.56	0.44	0.56	0.48	0.55	0.41
Canada All	0.01	0.0	0.0	0.0	0.01	0.0	0.0	0.0	0.0	0.0	0.0	0.00
Total	0.29	0.21	0.26	0.29	0.32	0.71	0.56	0.44	0.56	0.48	0.55	0.41

Note: Gray cells indicate the escapement for a given year was below the lower bound of the BEG.

^a The BEG range for the Unuk River is 1,800 to 3,800 large adult king salmon. Gray cells in this row indicate escapements below the lower bound of the BEG for that particular year.

^b Troll Summer R1 occurs in July of the current year; Troll Summer R2 occurs from August through September of the prior year.

^c Sport Early occurs April through July of the current year; Sport Late occurs in August of the prior year.

Table 2.—Southeast Alaska aggregate abundance-based management (AABM) preseason abundance indices (AI) and allowable catches (AC) for commercial and sport fisheries, 2012–2017.

Year	Preseason			Total	
	AI	Net	Troll	Sport	AC
2012	1.52	20,210	197,272	49,318	266,800
2013	1.20	13,672	129,862	32,466	176,000
2014	2.57	32,637	325,411	81,353	439,400
2015	1.45	18,064	175,149	43,787	237,000
2016	2.06	26,603	263,197	65,799	355,600
2017	1.27	16,098	154,881	38,720	209,700

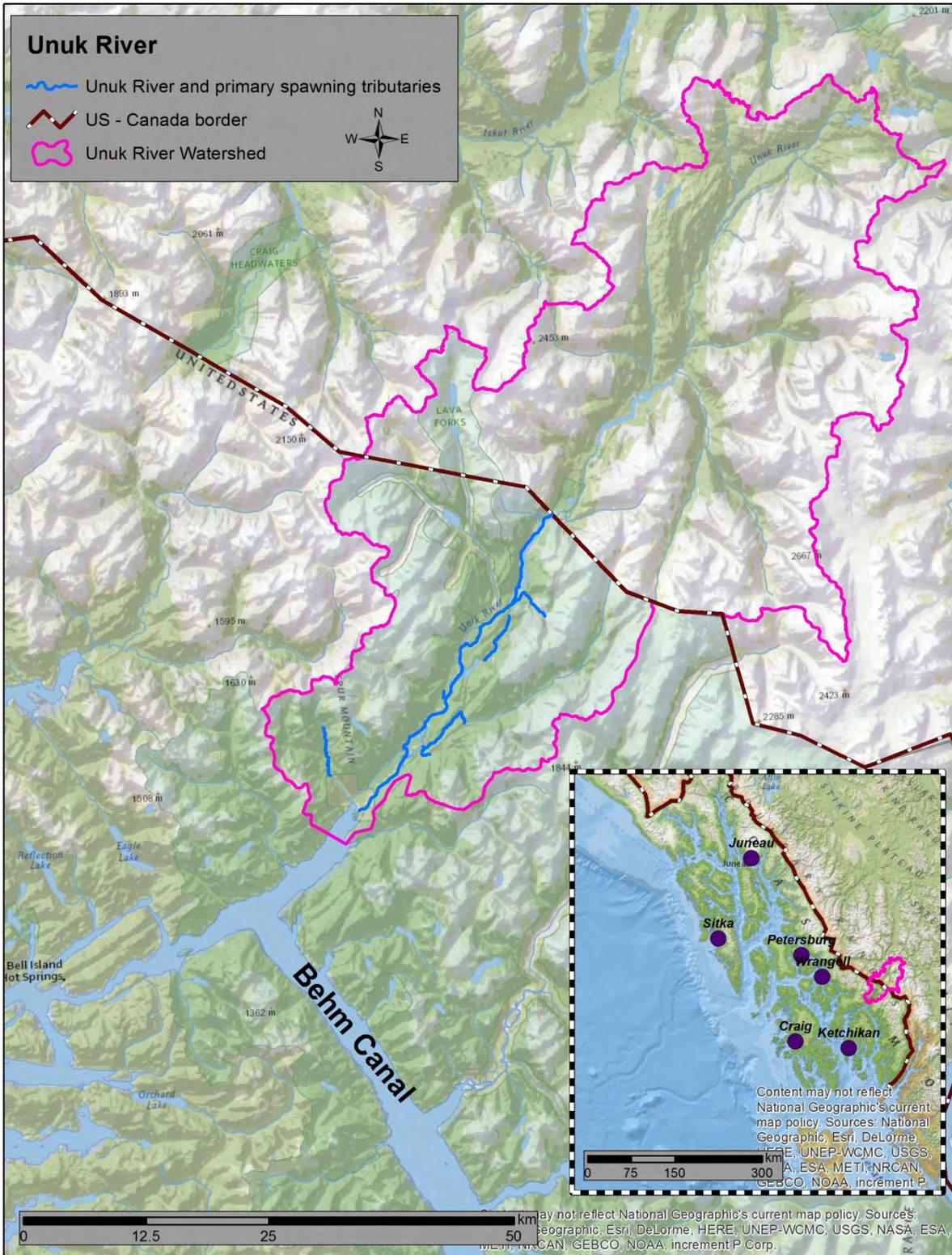


Figure 1.—Map of the Unuk River watershed and primary king salmon spawning tributaries in the Alaska portion of the watershed.



Figure 2.—Map of Southeast Alaska purse seine fishing areas.

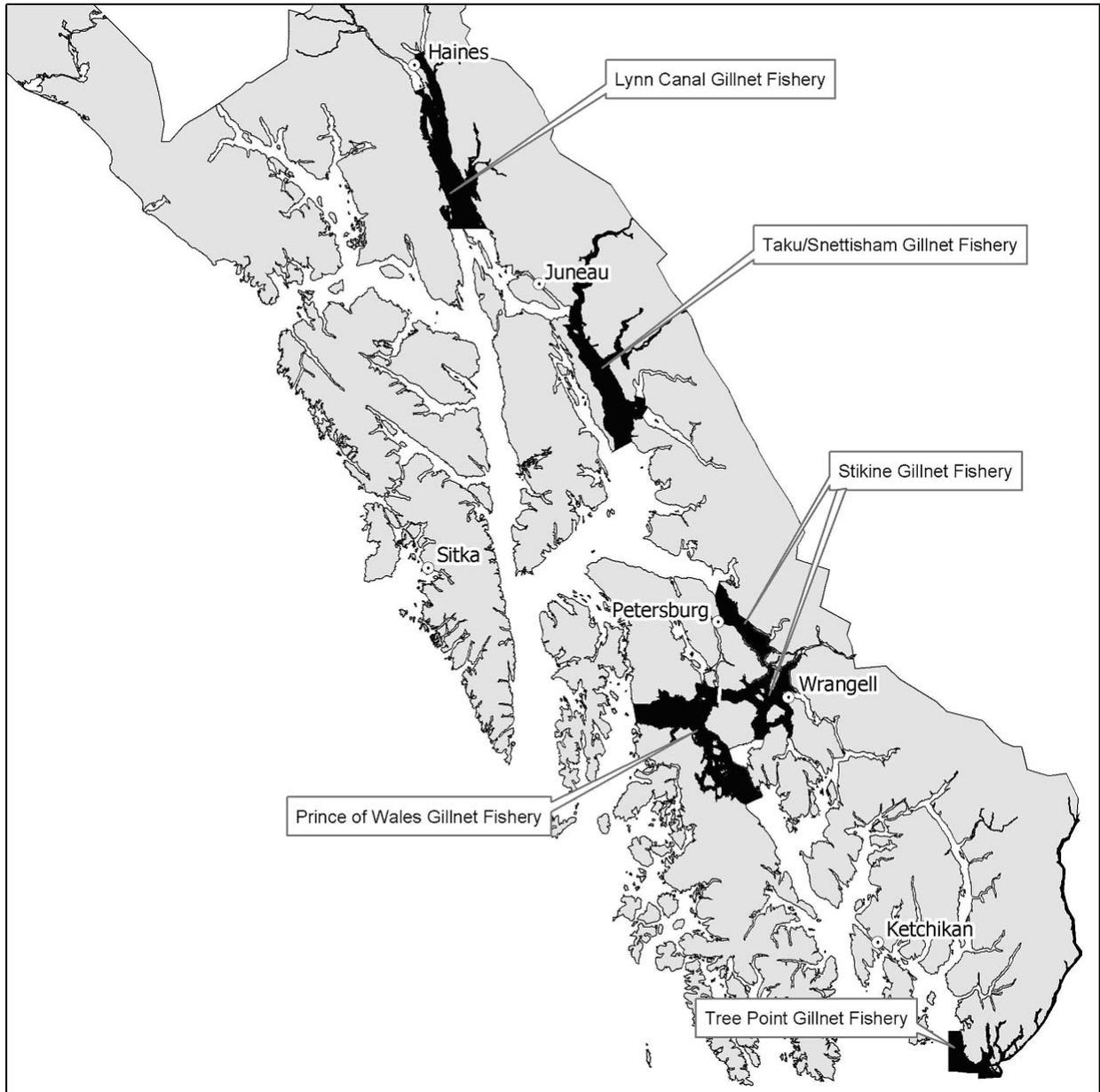


Figure 3.—Map of traditional drift gillnet fishing areas in Southeast Alaska.

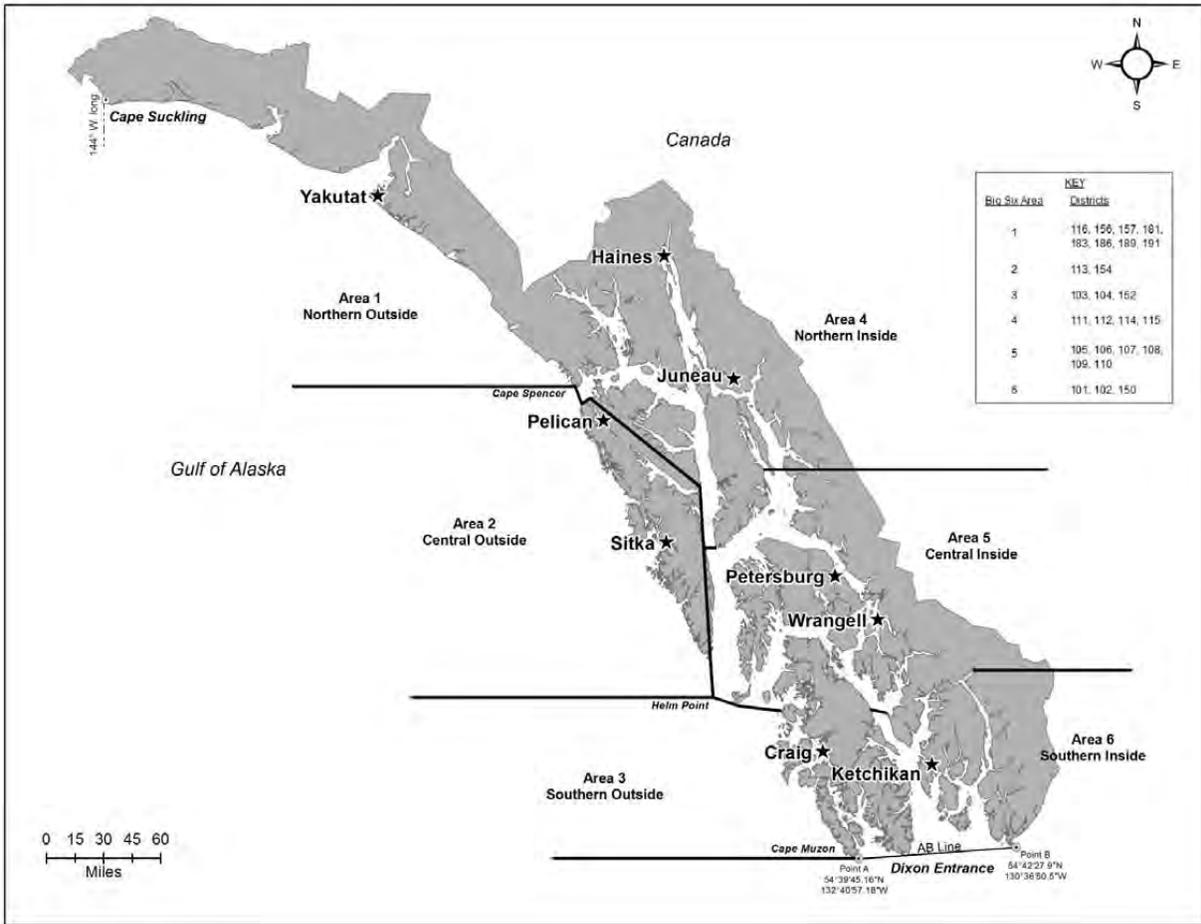


Figure 4.—Map of Southeast Alaska commercial troll fishing and Big Six management areas, Cape Suckling to Dixon Entrance.

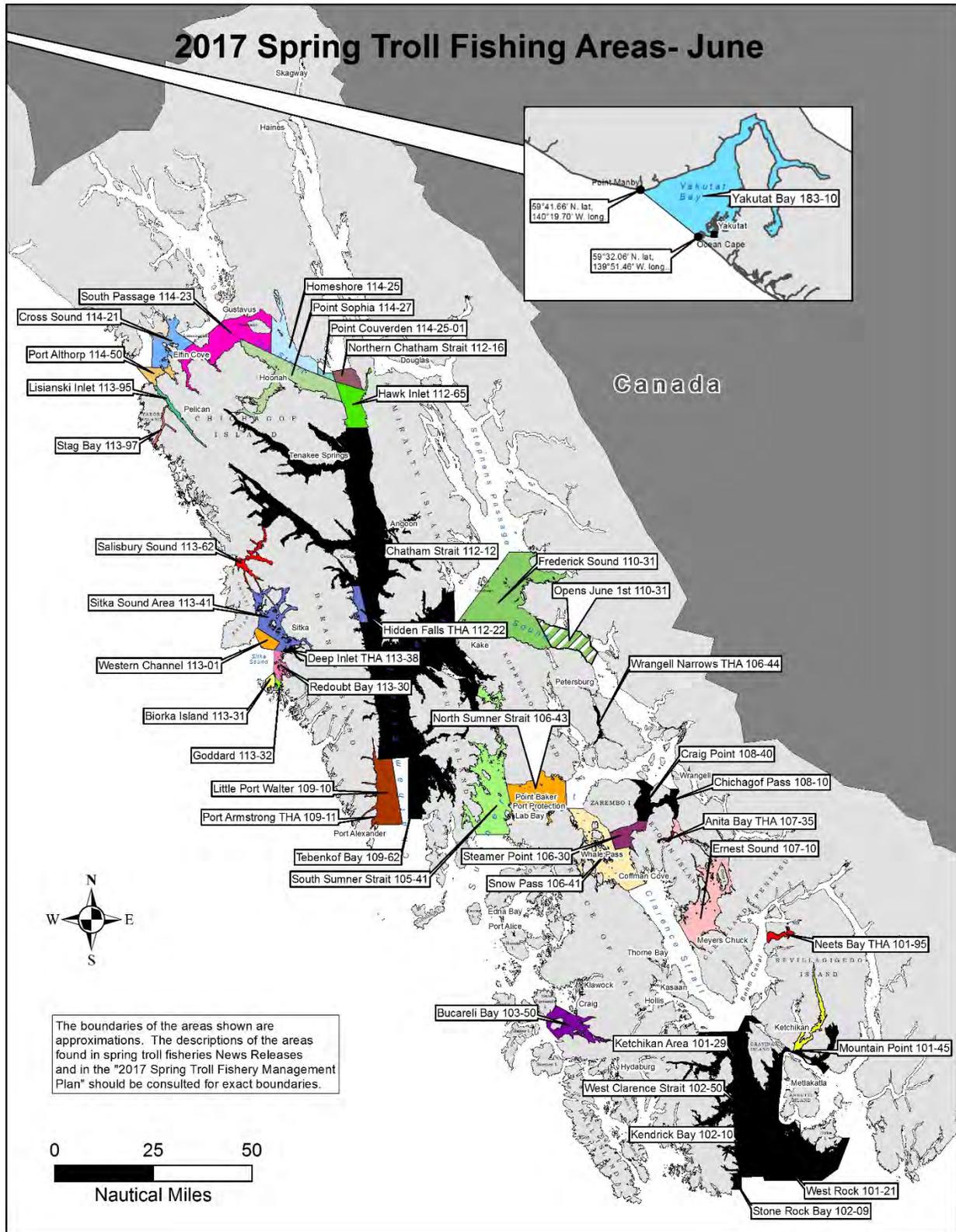


Figure 5.—Map of spring commercial troll fishing areas in Southeast Alaska.

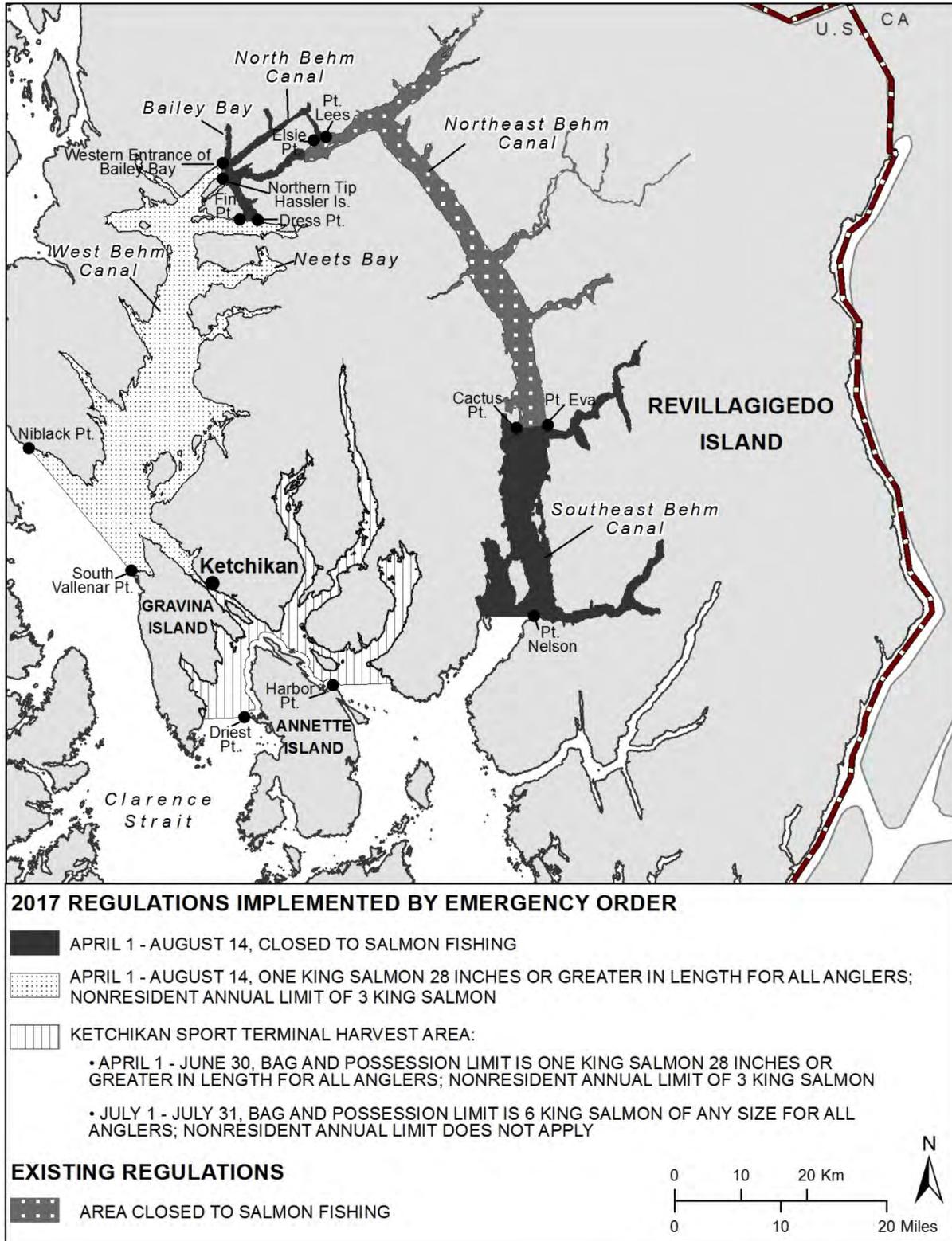


Figure 6.—Map depicting the 2017 regulations implemented by EO and proposed sport fishery regulations and boundaries under Option A to protect Unuk River king salmon.

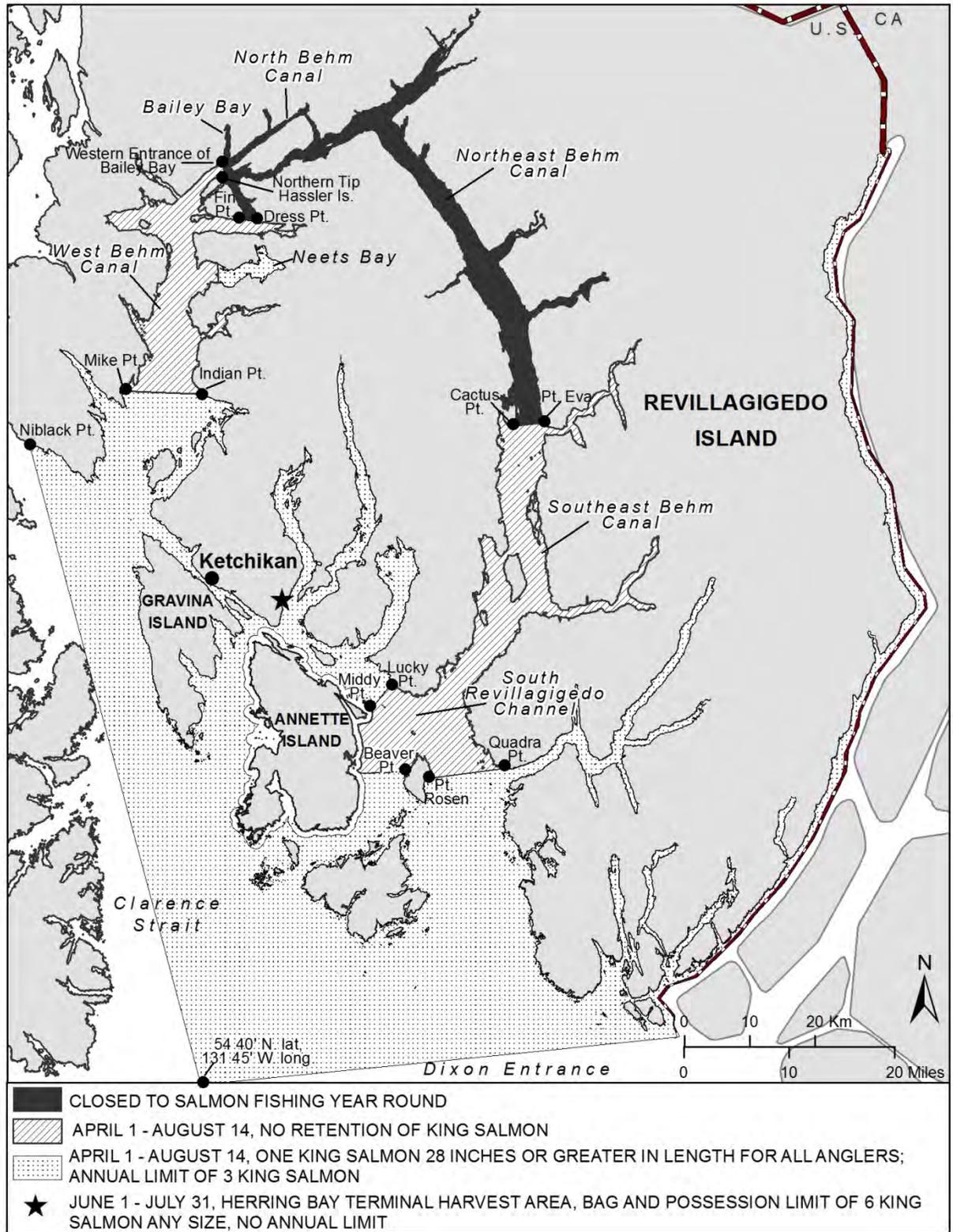


Figure 7.—Map depicting proposed sport fishery regulations and boundaries under Option B to protect Unuk River king salmon.

