

FRASER CHINOOK FISHERY MORTALITY INDEX 2014 - 2020

PRESENTED TO THE FRASER AND APPROACH SALMON FORUM

JANUARY 19, 2022



Image credit: <https://www.aquablog.ca/2016/09/changing-tides-new-assessments-for-chinook-and-coho-salmon/>

INTRODUCTION

- This presentation compiles information to support Southern BC Chinook harvest planning, specifically fisheries that impact Fraser River Chinook Management Units (MUs).
- Represents the work of biologists from across the Pacific Region and include updated data and results to that which was presented at meetings in 2020 and early 2021.
- Many of the results presented rely on monitoring programs that are implemented in partnership with First Nations and stakeholders (e.g. the 'Avid Angler' program).
- **Estimates are considered preliminary and are subject to change**

MANAGEMENT OBJECTIVES

Spring 4₂, Spring 5₂, and Summer 5₂ Chinook:

- Manage Canadian fisheries in a highly precautionary manner to allow as many fish to pass through to the spawning grounds as possible
- Note: Fishery impacts are expected to include incidental Chinook mortalities in Fraser River Chinook and Sockeye test fisheries, Chinook retention or bycatch retention in First Nation FSC fisheries, release mortalities, and incidental mortalities during Chinook-directed fisheries in mixed stock fisheries.

Summer 4₁ Chinook:

- No biological management objective outlined for the aggregate in the IFMP. Precautionary reduction in marine fishery mortalities by at least 25% compared to the 2013-2016 average to support increased availability of Summer 4₁ Chinook for Chinook-directed First Nations FSC fisheries.
- Lower Shuswap River indicator stock to reach the Pacific Salmon Treaty (PST) biologically-based escapement goal of 12,300 spawners.

Fall 4₁ Chinook:

- Harrison River indicator stock to reach the PST biologically-based escapement goal of 75,100 spawners.
- To achieve this goal, the Department aimed to reduce Canadian fishery mortalities by at least 25%.

MANAGEMENT ACTIONS TO MEET OBJECTIVES (2019/2020)

General overview of management measures (See maps in Appendix for detailed measures by Pacific Fisheries Management Area):

Recreational fisheries:

- Chinook restrictions were implemented in most South Coast areas to address conservation concerns for Fraser River Chinook salmon.
- Chinook non-retention beginning April 19 (2019)/April 1 (2020) in most South Coast waters with exception of WCVI waters inside 1nm from the surfline;
- No fishing for Chinook beginning April 19 (2019)/April 1 (2020) in marine approaches to Fraser River; and,
- No fishing for salmon at mouth of Fraser and within Fraser in effect beginning January 1

Commercial troll fisheries:

- Area F (Northern BC) – Chinook non-retention until August 20 (2019)/August 15 (2020); (additional objective to pass more Summer 4₁ Chinook to Fraser River)
- Area G (WCVI) – Delayed start until August 1

MANAGEMENT ACTIONS TO MEET OBJECTIVES (2019/2020)

First Nations fisheries:

- Fraser River First Nations FSC fisheries opportunities were limited to unplanned events or first fish ceremonies into July, followed by opportunities to target healthy Summer 4₁ Chinook, primarily in August. Limited directed opportunities on stream-type Chinook in terminal areas without access to abundant Chinook stocks.
- South Coast FSC fisheries opportunities for mixed Chinook stocks were permitted in marine areas, with the exception of the approaches to the Fraser River.
- Five Nations (Ahousaht, Ehattesaht, Hesquiaht, Mowachaht/Muchalaht, and Tla-o-qui-aht) rights-based commercial fishery in 2020 was delayed until July 15 in areas seaward of 1 nautical mile from the surfline on the West Coast of Vancouver Island. A maximum 80 cm size limit was in effect from July 16 to July 31.

EVALUATION OF MANAGEMENT OBJECTIVES

Two methods currently available for determining a fishery mortality index for Fraser Chinook:

- Exploitation Rate Analysis (ERA)
 - Uses CWTs recovered from Canadian and US fisheries to assess fishery mortalities for Chinook indicator stocks
 - Indicator stocks only available for three of five Fraser management units (none for Spring and Summer 5₂ Chinook)
 - Incorporates incidental mortalities
- Run reconstruction plus genetic stock ID (RR+GSI)
 - Developed for reviewing the Fraser Chinook management approach established in 2012 (a.k.a. “5 year review” – [Dobson et al. 2020](#))
 - Combines mortality data from the Fraser River Chinook run reconstruction model with GSI and catch estimates from marine mixed-stock fisheries
 - Does not incorporate incidental mortalities for most fisheries

SOURCES OF UNCERTAINTY

See Dobson et al. (2020) for more detail:

- Biological data: length-at-age and age composition data limited, potential errors in scale analysis
- CWT recoveries and expansions: affected by low sample rates and low contribution of indicator stock to fisheries
- Estimates of smolt-to-age-2 (or 3) survival: Based on single stock, may not adequately represent survival rate of non-indicator stocks; variability in tag loss and/or tagging mortality may contribute to uncertainty
- Limits and uncertainties with GSI: limited baseline data, poor stock ID accuracy due to stock transfers, precision affected by low sample rates, infilling bias, GSI catch samples from landed catch do not represent stock composition of released catch
- Escapement estimates: Methods that generate estimates of relative abundance (e.g. visual surveys) instead of methods that generate true abundance (e.g. mark-recapture).
- Incorrect or missing input data (escapement, kept and released catch) and methods for infilling: affected by survey effort, ability to correctly identify species, variability of fishing effort and CPUE, illegal and unreported fishing

SOURCES OF UNCERTAINTY

Catch included in analysis:

- Majority of Canadian mixed-stock fisheries that intercept Fraser Chinook
- Fraser River tributary fisheries (FSC and recreational)
- Landed catch only (i.e. does not include release mortalities or drop-out mortalities), except SBC recreational

Catch NOT included in analysis:

- Some Southern BC inside area (JSt/SoG/JdF) First Nations Food, Social, and Ceremonial (FSC) fisheries
 - DNA analysis to discern Fraser-origin fish only conducted in 2020
- Midwater groundfish trawl fisheries (limited DNA analysis, monitoring program expanded in 2021)
- Central Coast fisheries – assume minor impact to Fraser stocks based on limited GSI samples and areas fished
- USA fisheries

SOURCES OF UNCERTAINTY

Big Bar landslide mortality estimates

- 2019 mortality estimates are preliminary and subject to change
 - 89% mortality for Spring 5₂ Chinook, 51% mortality for Summer 5₂ Chinook
 - Based on ratio of successful spawners above/below landslide, high uncertainty
 - Alternative method using radio telemetry data suggests similar estimates (90% for Spring 5₂, 50% for Summer 5₂)
- 2020 mortality estimates are preliminary and subject to change
 - More successful passage of Chinook Salmon occurred at higher flow levels in 2020 compared to 2019
 - Prolonged high water levels delayed passage in 2020
 - Preliminary estimates based on radio telemetry data suggest 31% mortality for Spring 5₂, 19% for Summer 5₂
 - Not yet incorporated into analysis; results likely to increase current run size estimates for Spring and Summer 5₂ Chinook, so the RR+GSI FMI may be over-estimated

SOURCES OF UNCERTAINTY

COVID-19 impacts

- In addition to delayed FMI analysis, the pandemic may have affected creel survey analysis
 - e.g. reduced number of people fishing in many areas, which reduced number of interviews and samples obtained
- These impacts add to the uncertainty of the analysis; results (particularly for 2020) may not only represent changes in fishery mortality that occurred due to the management actions

RESULTS

Management Unit (indicator)	2014-2018 Avg. CDN Fishery Mortalities (ERA)	2014-2018 Avg. CDN Fishery Mortalities (RR+GSI)*	2019 CDN Fishery Mortalities (ERA)	2019 CDN Fishery Mortality Index (RR + GSI)*	2020 CDN Fishery Mortalities (ERA)	2020 CDN Fishery Mortality Index (RR + GSI)*
Spring 4 ₂ (Nicola)	18.2%	24.9%	3.5%	6.0%	23.1%	4.5%
Spring 5 ₂ (Indicator in development)	n/a	23.8%	n/a	6.6%	n/a	2.6%
Summer 5 ₂ (Indicator in development)	n/a	25.2%	n/a	14.9%	n/a	12.8%
Summer 4 ₁ (L. Shuswap)	27.6%	43.0%	13.5%	32.0%	13.8%	24.0%
Fall 4 ₁ (Harrison)	22.5%	23.6%	22.2%	18.0%	14.9%	19.0%

* Table of detailed RR+GSI results is in the memo that was distributed Dec. 6, 2021

CONCLUSION

- Based on the RR+GSI method, fishery mortalities on Spring 4₂ and Spring 5₂ Chinook were reduced to low levels, less than 5% in 2020.
- Substantial reductions in fishery impacts on Summer 5₂ Chinook were achieved in 2019 and further in 2020
 - Impacts on Summer 5₂ Chinook remain higher than the impact on the Spring 4₂ and Spring 5₂ MUs. Likely due to the later run timing of the Summer 5₂ MU that coincides with Chinook retention opportunities targeting Summer 4₁ Chinook in August and September.
- Large shift in the proportion of Summer 4₁ Chinook caught by each fishing group; Approximately 60% of the harvest of this MU occurred in First Nations FSC fisheries in the Fraser River in 2020 (compared to 18% in the base period).
- Lower Shuswap escapement objective was met in both 2019 and 2020.
- Fall 4₁ indicator stock did not meet the escapement goal in 2019 or 2020 despite some reduction in harvest. Threats likely contributing most include climate change, ecosystem modifications, pollution, fishing, and competition with hatchery fish.

NEXT STEPS

- DFO memo outlining this analysis was released on December 6, 2021.
- A similar analysis of the 2021 fisheries will occur in 2022 when data are compiled.
- Discussion of the impact of this analysis on 2022 fisheries management measures are ongoing as part of winter and spring consultation meetings with First Nations and stakeholders.
- Further work to be done refining estimates, adding missing data, and using these results to assess performance of pre-season planning tools

DISCUSSION

APPENDIX – FISHERY MANAGEMENT MEASURES – AREA MAPS

Recreational Fisheries (2019) – marine waters

Queen Charlotte through Strait of Georgia – North

- Apr. 19 to Jul. 14 - Chinook non-retention
- Jul. 15 to Jul. 31 - 1 Chinook/day with a maximum size of 80 cm
- Aug. 1 to Aug. 29 - 1 Chinook/day
- Aug. 30 to Dec. 31 - 2 Chinook/day

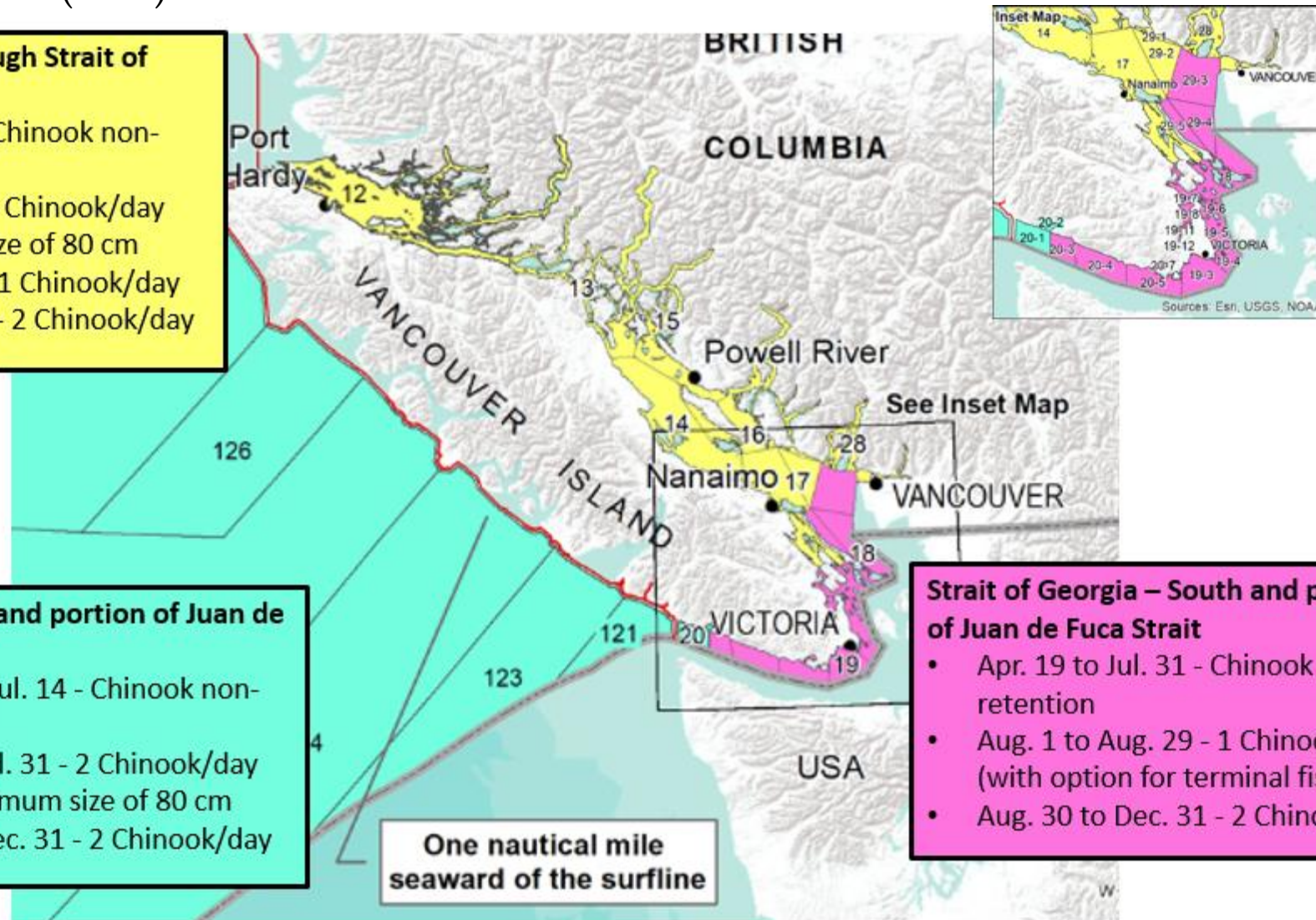
WCVI offshore and portion of Juan de Fuca Strait

- Apr. 19 to Jul. 14 - Chinook non-retention;
- Jul. 15 to Jul. 31 - 2 Chinook/day with a maximum size of 80 cm
- Aug. 1 to Dec. 31 - 2 Chinook/day

One nautical mile seaward of the surfline

Strait of Georgia – South and portion of Juan de Fuca Strait

- Apr. 19 to Jul. 31 - Chinook non-retention
- Aug. 1 to Aug. 29 - 1 Chinook/day (with option for terminal fisheries)
- Aug. 30 to Dec. 31 - 2 Chinook/day



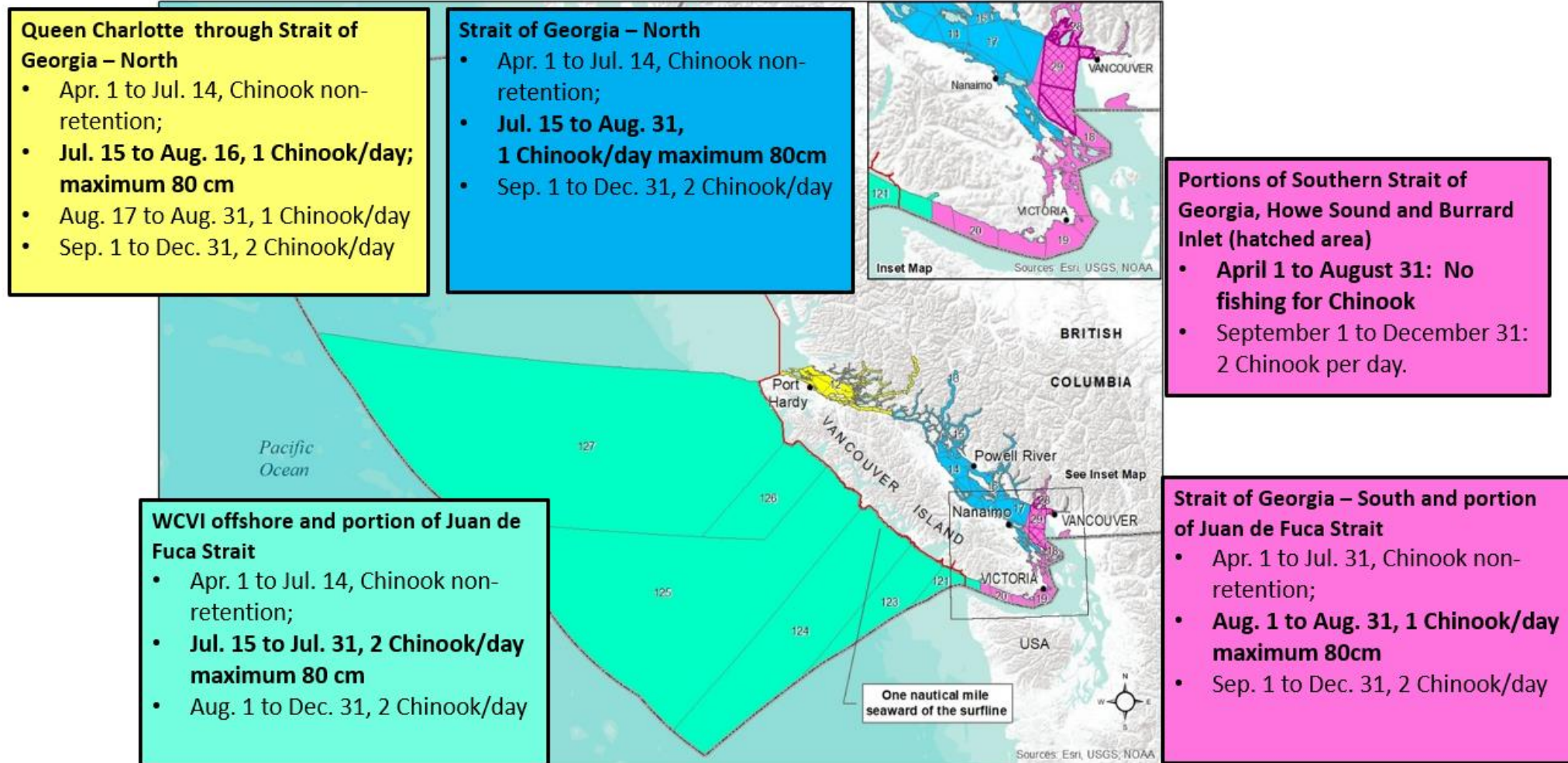
Recreational Fisheries (2019) – Fraser River and approach area



Fraser River tidal waters and non-tidal waters

- Fraser Mouth (29-6, -7, -9 and -10) – Jan. 1 to Dec. 31, fishing for salmon not permitted
- Fraser Tidal waters – Jan. 1 to Sep. 13, fishing for salmon not permitted
- Fraser non-tidal – Region 2: Jan. 1 to Nov. 2, fishing for salmon not permitted
- Some opportunities to harvest Chinook in tributary areas (e.g. to target Summer 4₁ Chinook)

Recreational Fisheries (2020) – marine waters



Recreational Fisheries (2020) – Fraser River and approach area



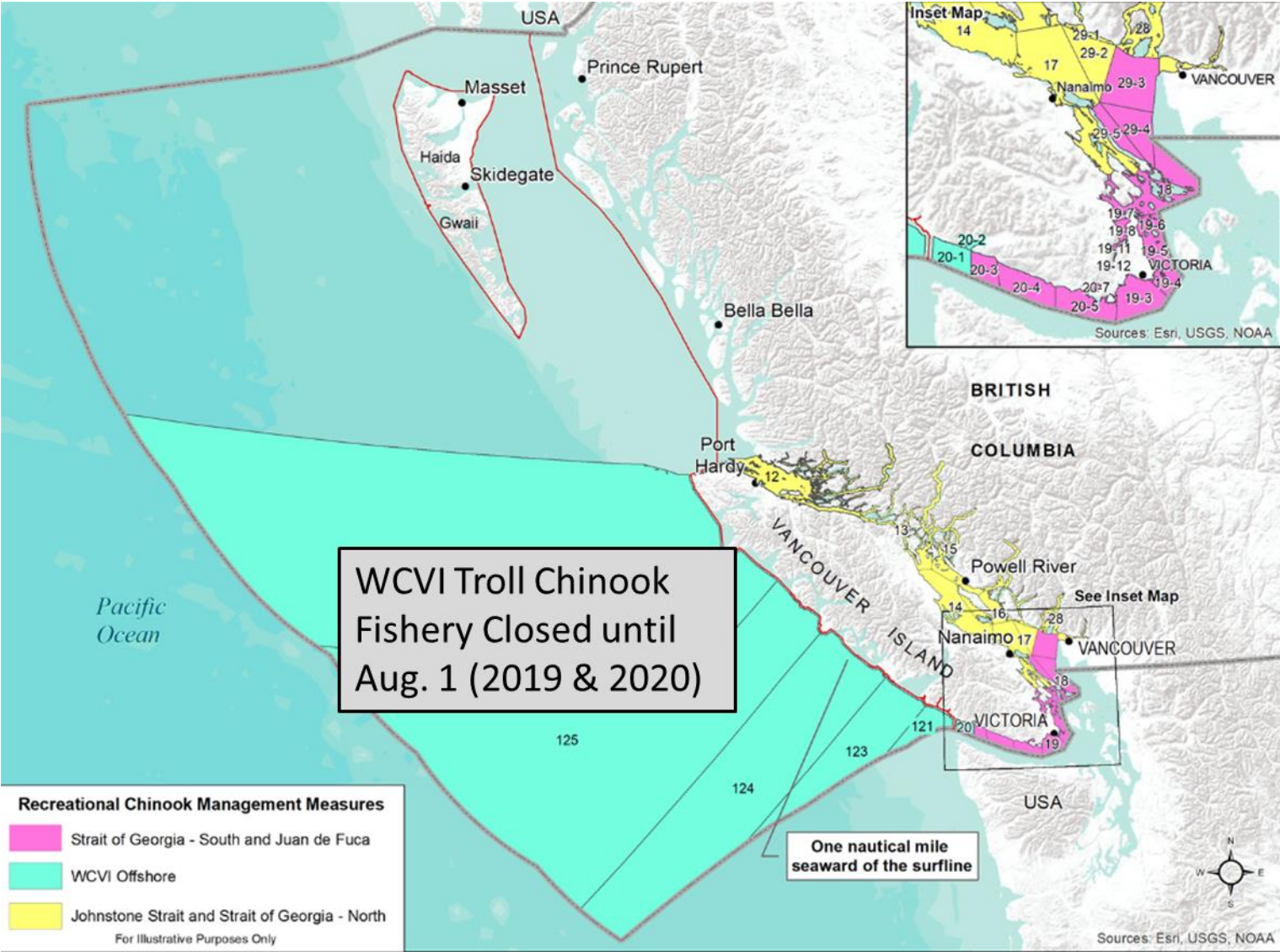
Approaches to Fraser River - Subareas 29-6, 29-7, 29-9 to 29-17 and the non-tidal waters of the Fraser River from Mission Bridge to the confluence with Sawmill Creek:

- Jan. 1 to Nov. 1: No fishing for salmon
- (Fishing opportunities for specific salmon stocks may be considered)

Freshwater Regions 3, 5, 7 & 8 - Year round:

- Closed to fishing for salmon
- (Fishing opportunities for specific salmon stocks may be considered)

Commercial Fisheries (2019/2020)



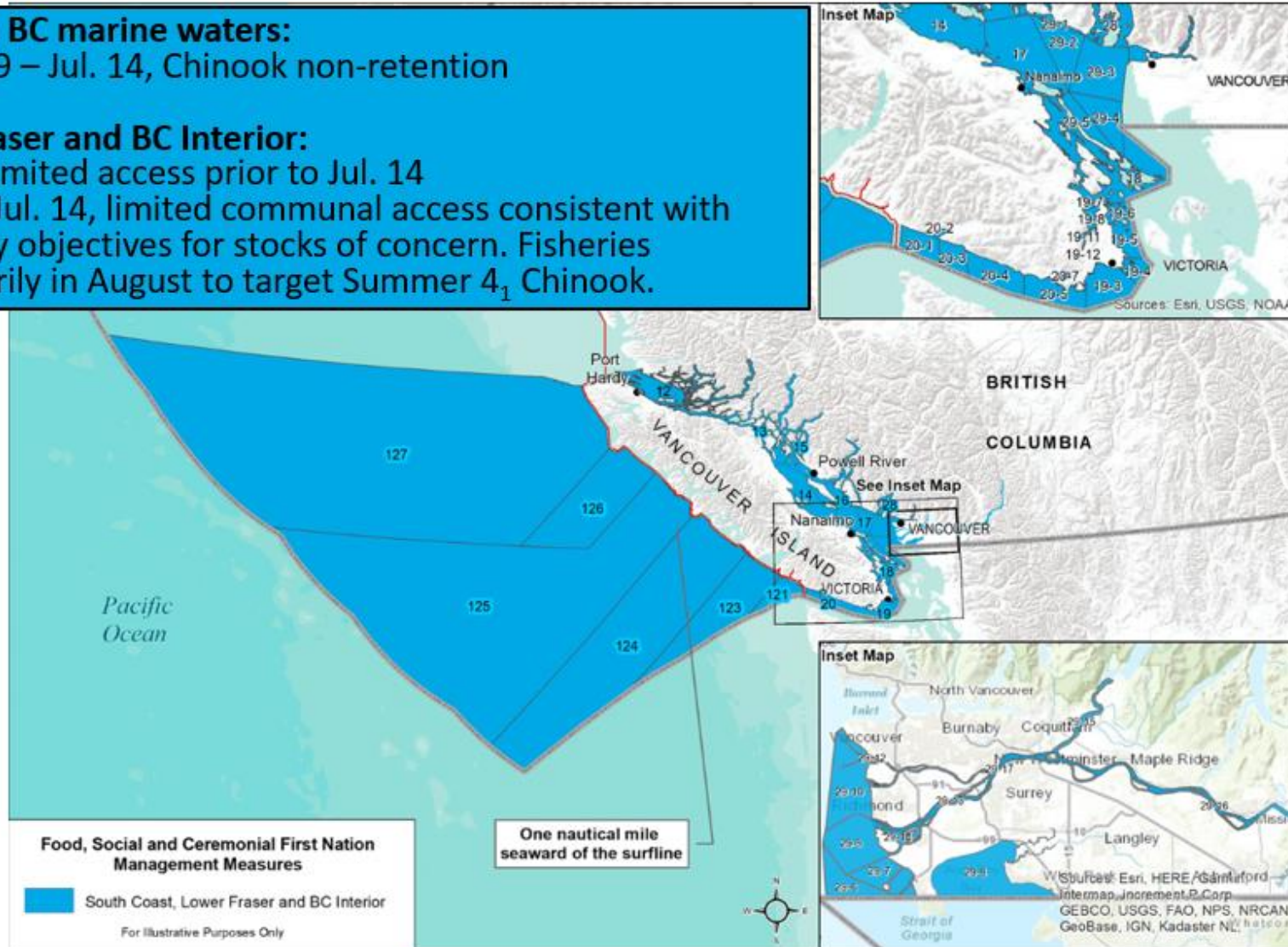
First Nations Food, Social, and Ceremonial Fisheries (2019)

Southern BC marine waters:

- Apr. 19 – Jul. 14, Chinook non-retention

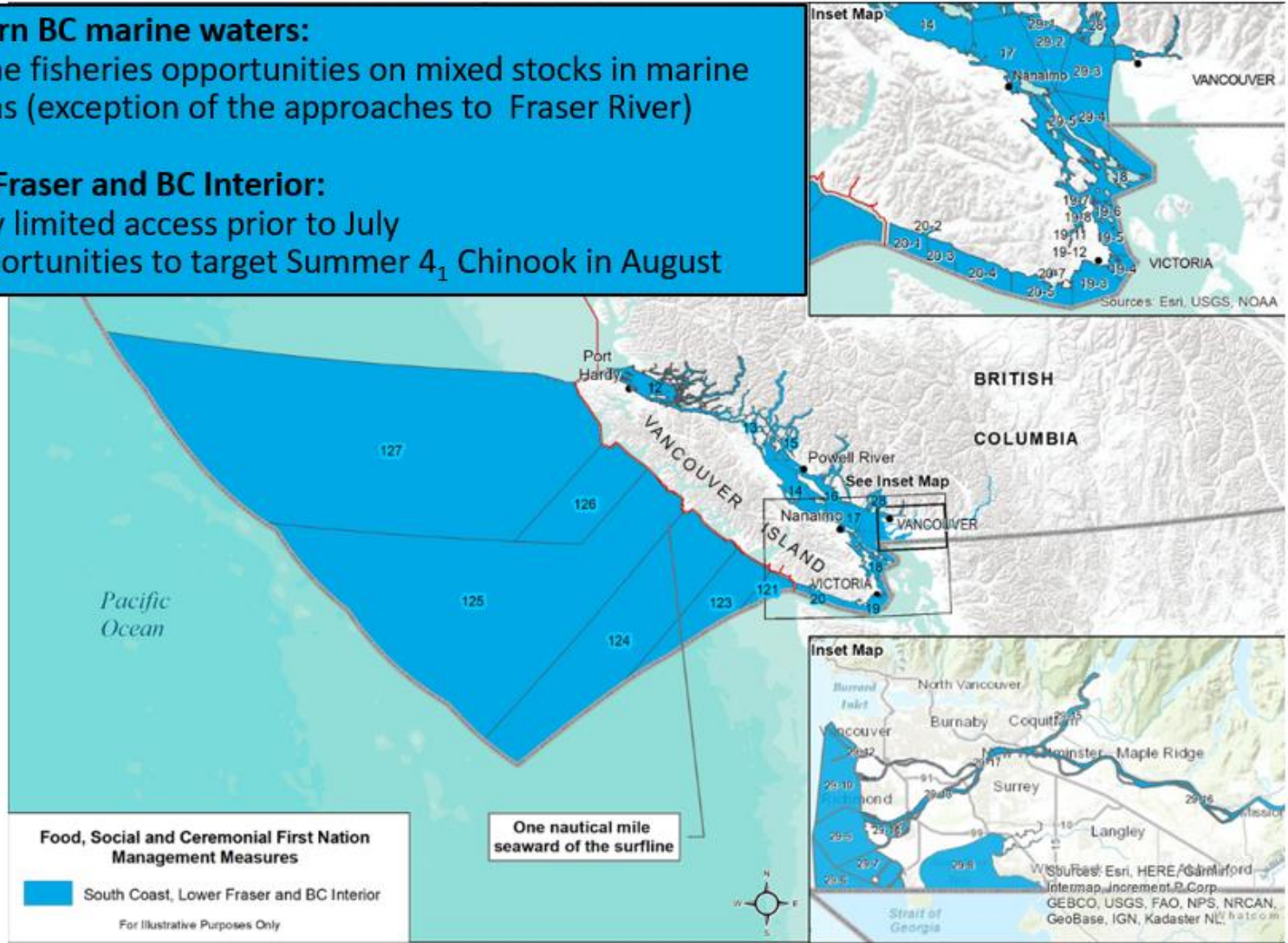
Lower Fraser and BC Interior:

- Very limited access prior to Jul. 14
- After Jul. 14, limited communal access consistent with fishery objectives for stocks of concern. Fisheries primarily in August to target Summer 4₁ Chinook.

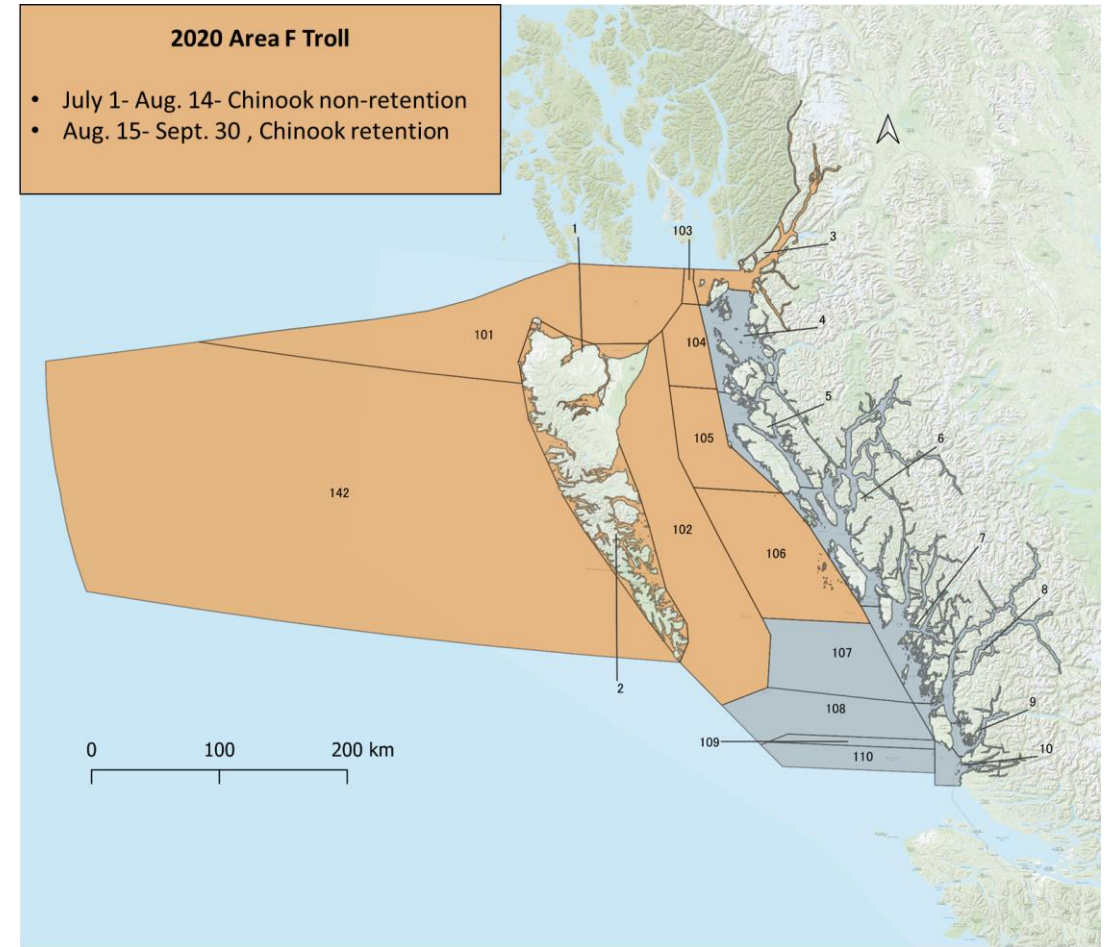
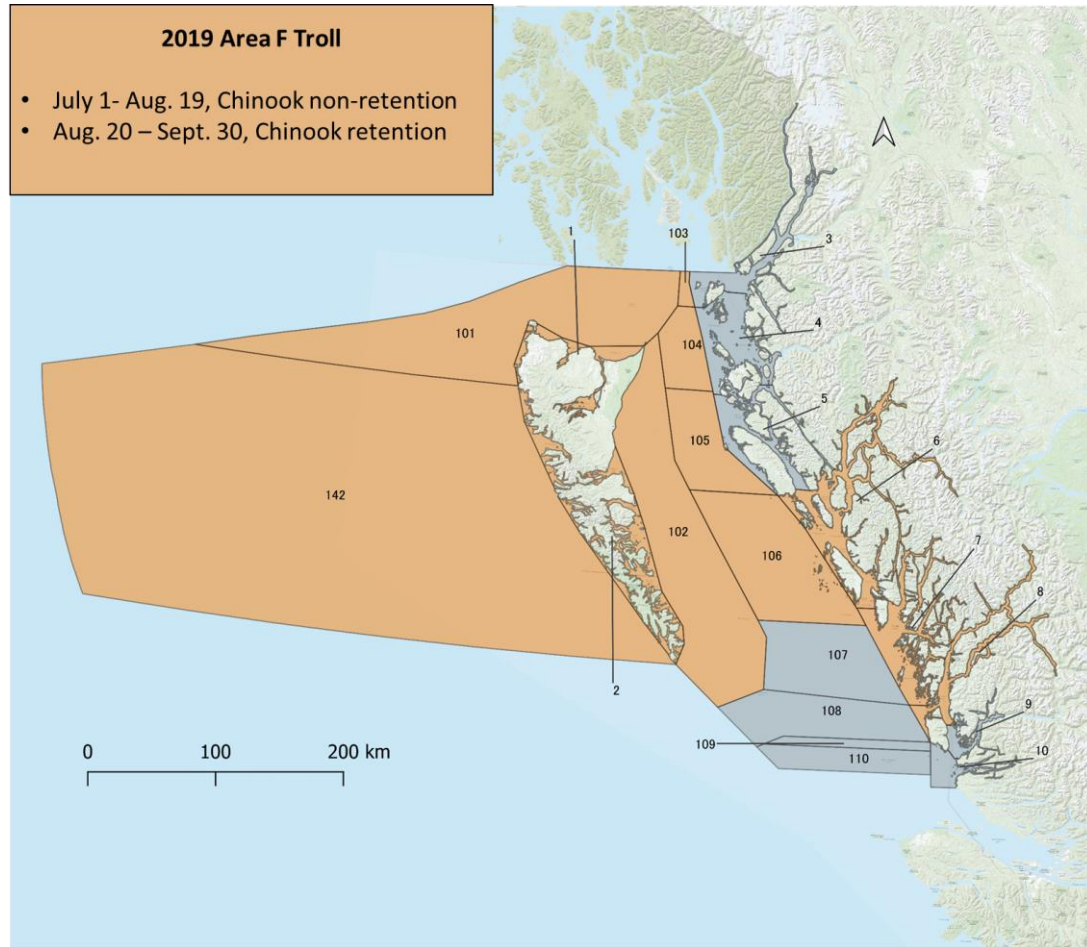


First Nations Food, Social, and Ceremonial Fisheries (2020)

- Southern BC marine waters:**
- Some fisheries opportunities on mixed stocks in marine areas (exception of the approaches to Fraser River)
- Lower Fraser and BC Interior:**
- Very limited access prior to July
 - Opportunities to target Summer 4₁ Chinook in August

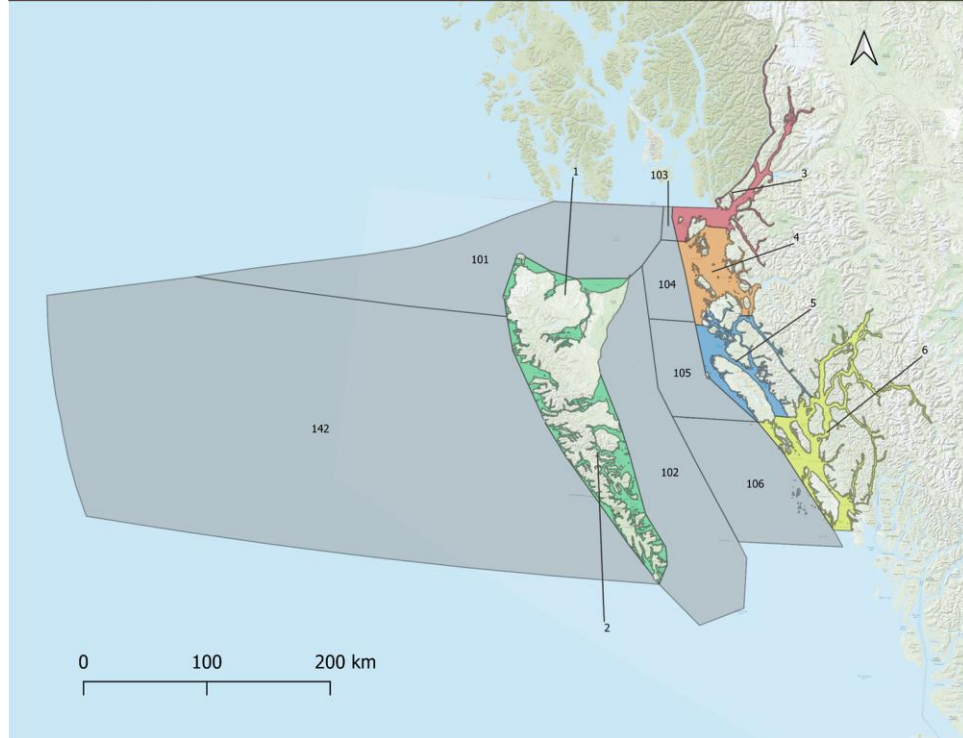


North and Central Coast Area F Troll Fisheries



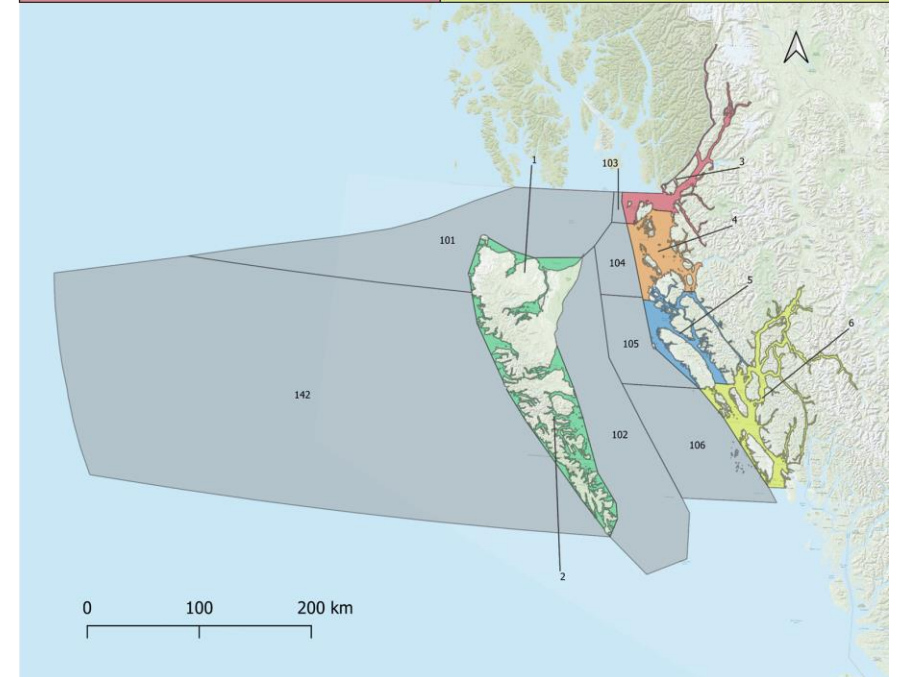
North Coast Fisheries (2019)

<p>Area 1 and 2 Recreational: Apr 1- Mar 31, 2 Chinook/day</p>	<p>Area 4 Recreational: <ul style="list-style-type: none"> Apr.1–July 26; Aug. 6 – Mar. 31, 2 Chinook/day July 27- Aug. 5, 1 Chinook/day </p>
<p>Area 3 Gillnet Fishery: June 17 – July 16, Chinook non-retention Seine Fishery: July 9-22, Chinook non-retention Recreational: <ul style="list-style-type: none"> Apr.1–July 26; Aug. 6 – Mar. 31, 2 Chinook/day July 27- Aug. 5, 1 Chinook/day </p>	<p>Area 5 Recreational: <ul style="list-style-type: none"> Apr.1–July 26; Aug. 6 – Mar. 31, 2 Chinook/day July 27- Aug. 5, 1 Chinook/day </p>
	<p>Area 6 Recreational: Apr 1- Mar 31, 2 Chinook/day</p>



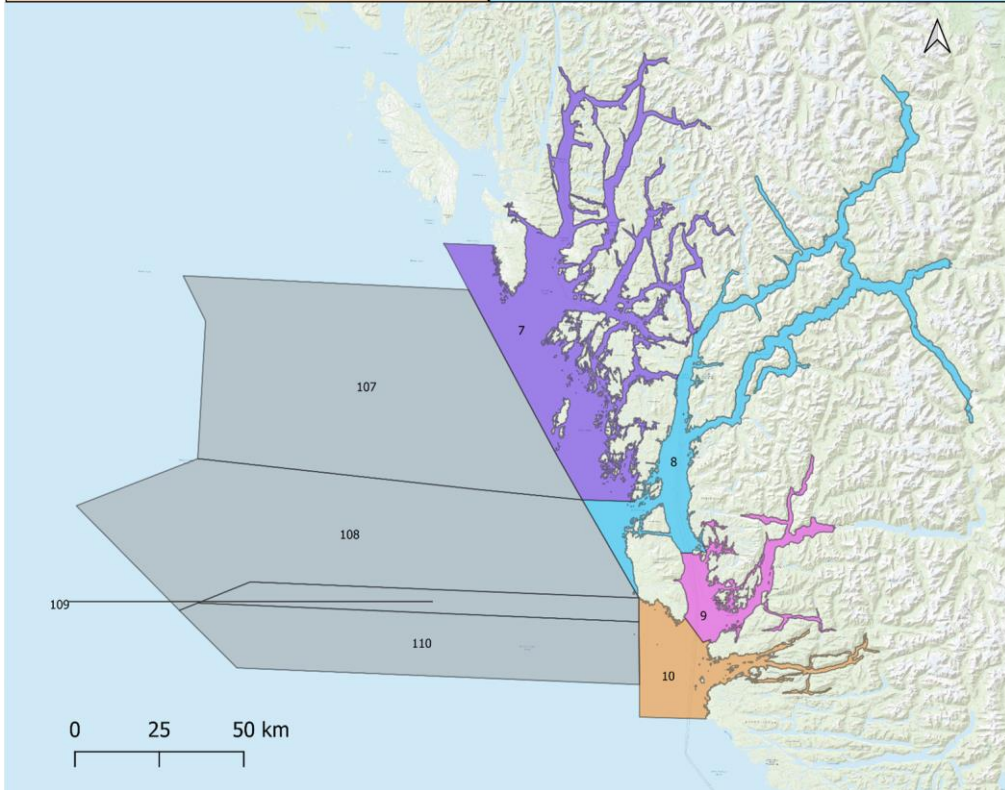
North Coast Fisheries (2020)

<p>Area 1 and 2 Seine Fishery: Aug. 24-31, Chinook non-retention Recreational: Apr 1- Mar 31, 2 Chinook/day</p>	<p>Area 4 Gillnet Fishery: Aug. 6-7, Chinook non-retention Recreational: <ul style="list-style-type: none"> Apr. 1 – May 31; July 15 – Mar. 31, 2 Chinook/day June 1 – July 14, 1 Chinook/day </p>
<p>Area 3 Seine Fishery: July 6, Chinook non-retention Recreational: <ul style="list-style-type: none"> Apr. 1 – May 31; July 15 – Mar. 31, 2 Chinook/day June 1 – July 14, 1 Chinook/day </p>	<p>Area 5 Recreational: <ul style="list-style-type: none"> Apr. 1 – May 31; July 15 – Mar. 31, 2 Chinook/day June 1 – July 14, 1 Chinook/day </p>
	<p>Area 6 Area 6 Seine Fishery: July 29- Aug .10, Chinook non-retention Recreational: Apr 1- Mar 31, 2 Chinook/day</p>



Central Coast Fisheries (2019)

<p>Area 7 Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>	<p>Area 8 Gillnet Fishery: June 3 – July 29, Chinook retention Seine Fishery: July 15 – 29, Chinook non-retention Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>
<p>Area 9 Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>	
<p>Area 10 Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>	



Central Coast Fisheries (2020)

<p>Area 7 Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>	<p>Area 8 Gillnet Fishery: July 15 – 20, Chinook retention Seine Fishery: July 20, Chinook non-retention Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>
<p>Area 9 Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>	
<p>Area 10 Recreational: Apr. 1 – Mar. 31- 2 Chinook/day</p>	

