

# Juvenile salmon migration report; northern Strait of Georgia

— Hakai Institute Juvenile Salmon Program 2021 —

## Aim

To provide a seasonal summary of juvenile salmon migration characteristics and oceanographic conditions in the northern Strait of Georgia region in British Columbia, Canada.

## Background

The Hakai Institute Juvenile Salmon Program was launched in the spring of 2015 in a collaborative partnership with UBC, SFU, University of Toronto, Salmon Coast Field Station, Pacific Salmon Foundation, and Fisheries and Oceans Canada. As of 2020, the program operates in the Discovery Islands (Figure 1) and thus provides information on the health of juvenile salmon after passage through:

- 1) Strait of Georgia – stratified high plankton biomass zone; and
- 2) Discovery Islands – highly-mixed low-plankton-biomass zone, and area of high potential for wild-farmed fish interactions.

## Program Objectives

- 1) Determine migration timing and pathways;
- 2) Migration habitat mapping - oceanographic conditions along the migration route;
- 3) Understand the dynamics of the plankton food-webs that underpin juvenile salmon growth and health;
- 4) Understand parasite and pathogen infection dynamics and their impact on juvenile salmon growth and health.

## Key Parameters Reported

- Catch Statistics
- Lengths
- Parasite Presence
- Oceanographic Conditions

The following plots are subject to change as the underlying data are preliminary and subject to further quality assurance.

Please direct questions or comments to Brian Hunt (B.Hunt@oceans.ubc.ca), Tim van der Stap (Tim.vanderstap@hakai.org), Krystal Bachen (Krystal.Bachen@hakai.org), Natalie Benoit (n.benoit@oceans.ubc.ca) and/or Brett Johnson (Brett.Johnson@hakai.org).

The Hakai Institute embraces an “Open Science Policy”; to that end you can access the data used in this report at <https://github.com/HakaiInstitute/jsp-data>.

See our interactive data explorer for more information <https://hecate.hakai.org/shiny/JSP/>



Figure 1: Salmon sampling locations in the Discovery Islands in 2021.

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## Migration Timing

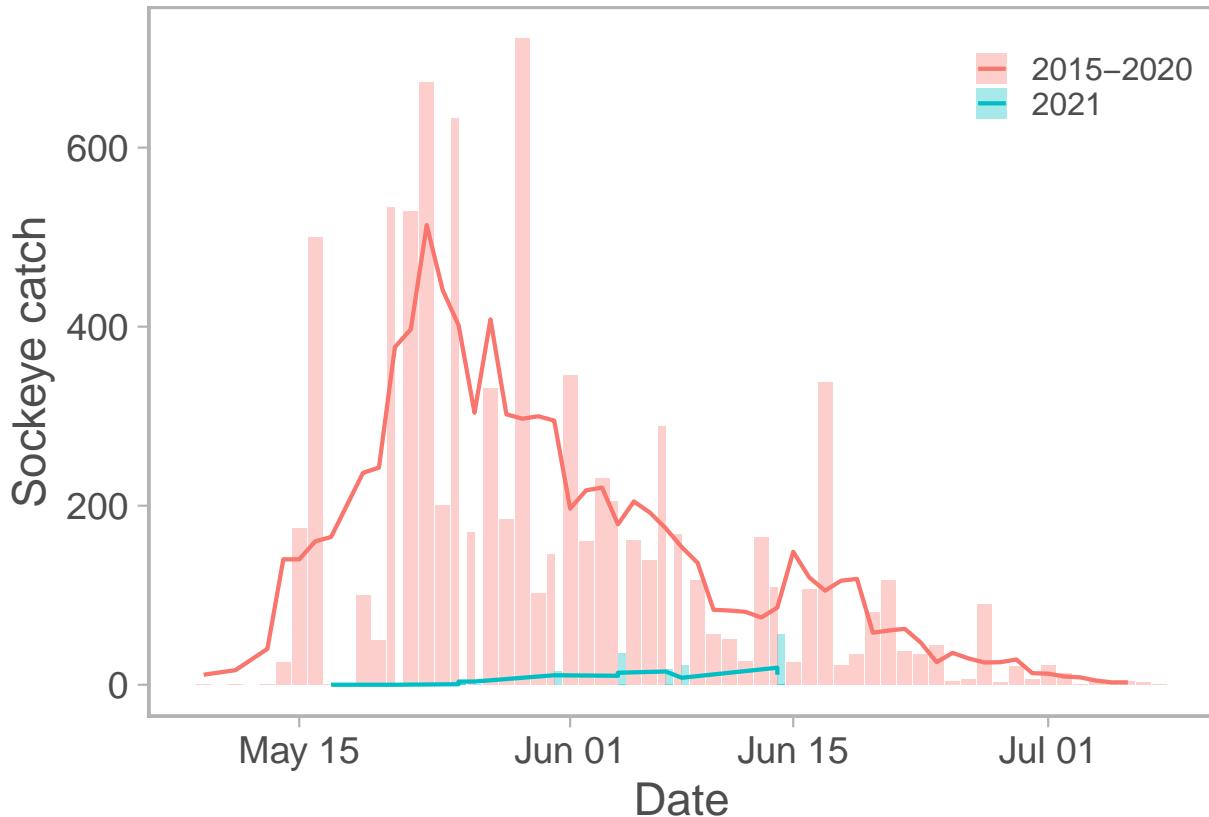


Figure 2: Sockeye catches (bars) and rolling seven day average (lines) in 2021 compared to catches averaged by day across all years

## Catch intensity

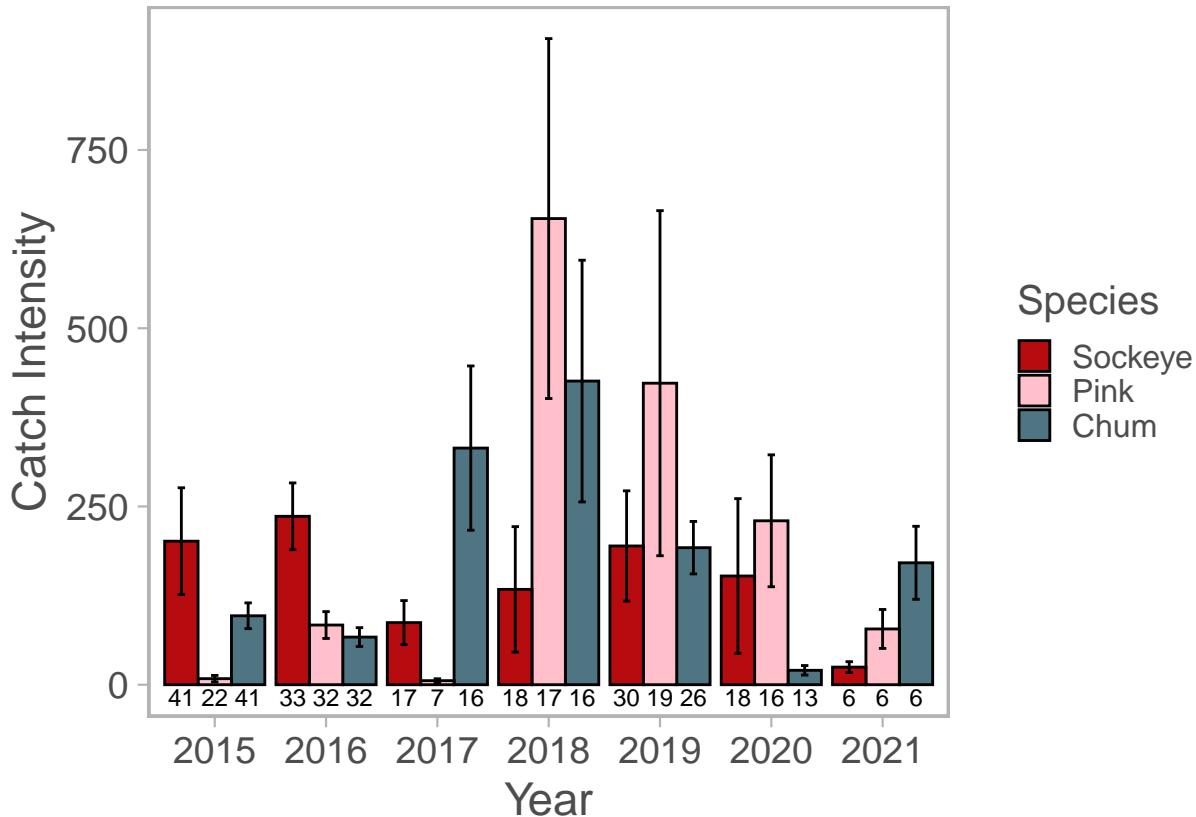


Figure 3: The catch intensity (average number of species  $i$  when  $i > 0$  and when sockeye were also caught) of sockeye, pink, and chum salmon in the Discovery Islands. Numbers under each bar indicate the number of seines in which the species was caught, and error bars indicate 1 standard error.

## Species proportion

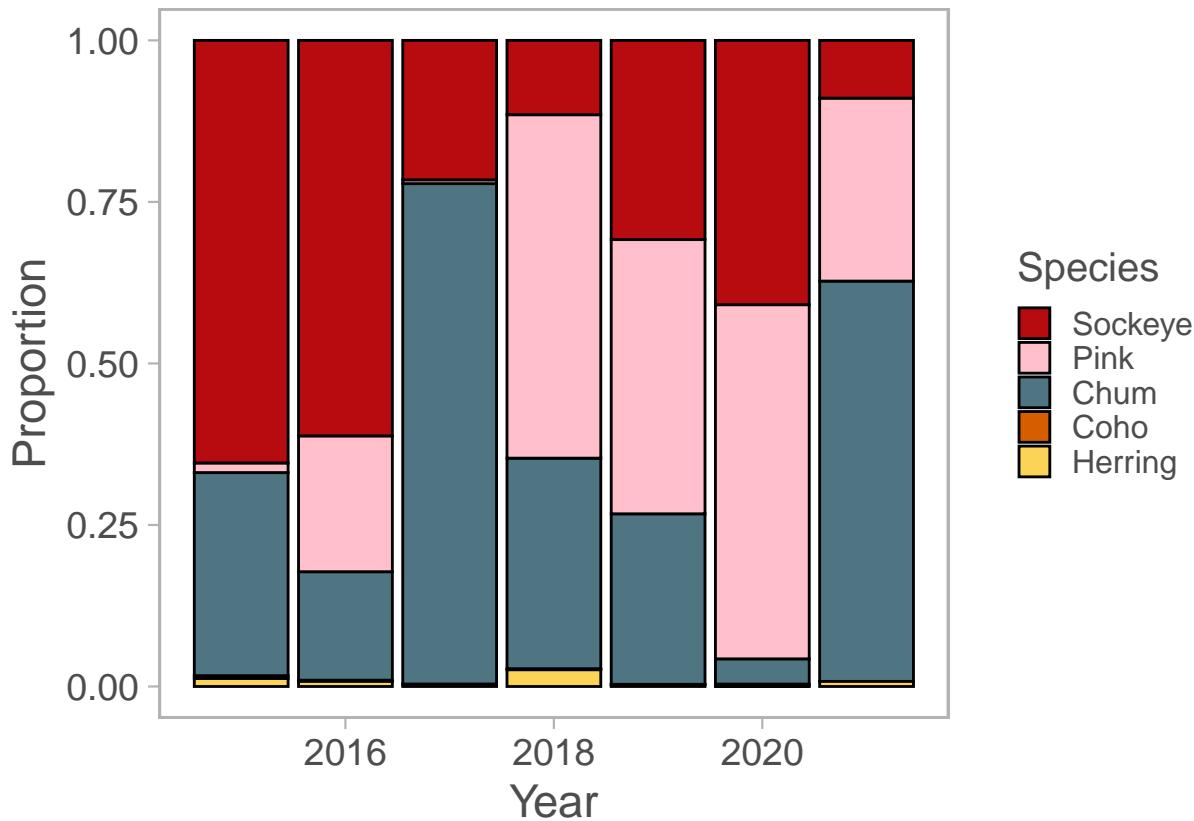


Figure 4: Proportion of juvenile salmon caught in the Discovery Islands in the sampling weeks of May 19, May 26, June 2, and June 9, from 2015-2021.

## Fish lengths

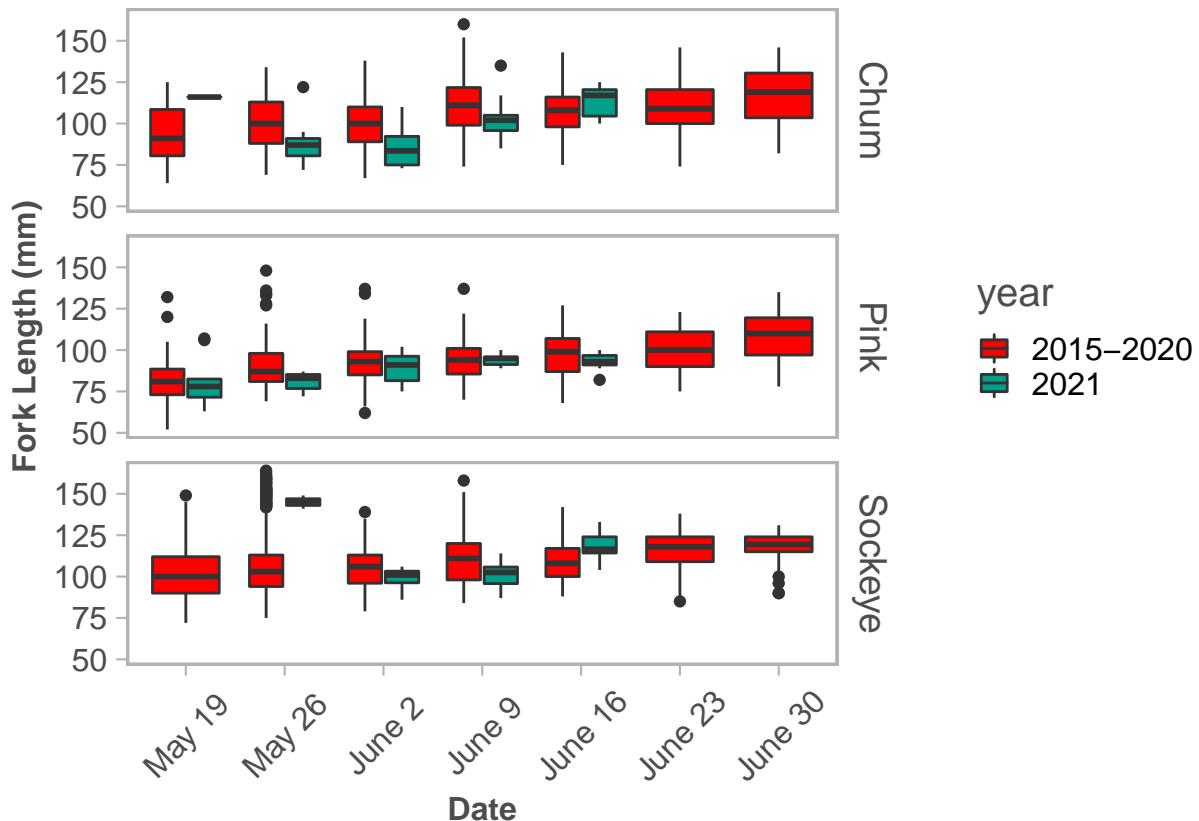


Figure 5: Fork-length boxplots of juvenile salmon in the Discovery Islands in 2021 grouped by week, and represented by the middle day of each week, compared to the average length from 2015–2020.

## Parasite Presence

Juvenile chum, pink, and sockeye were visually inspected for sea lice. Presence of sea lice was reported only for the adult, motile stage, that could be identified with the unaided eye.

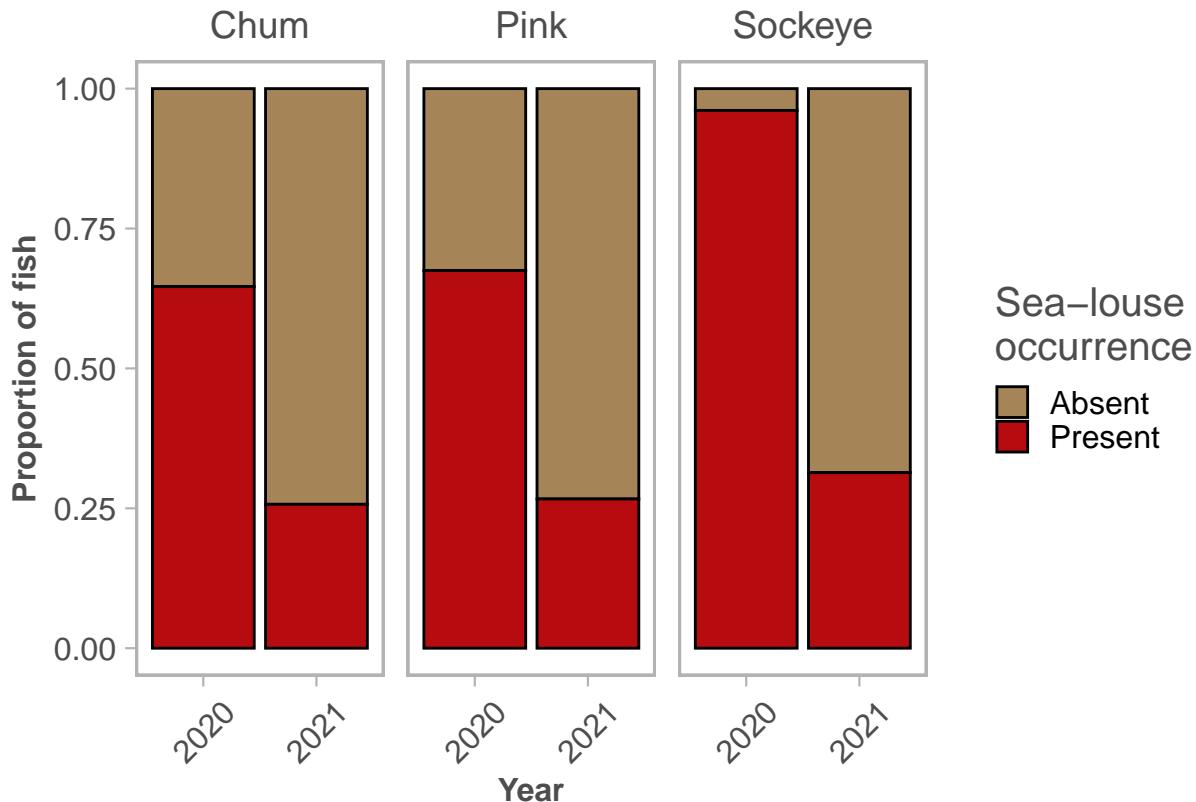


Figure 6: The proportion of juvenile chum, pink, and sockeye infected with at least one sea-louse of either *Lepeophtheirus salmonis* and *Caligus clemensi*, in the three sampling zones within the Discovery Islands, in 2021.

## Oceanography

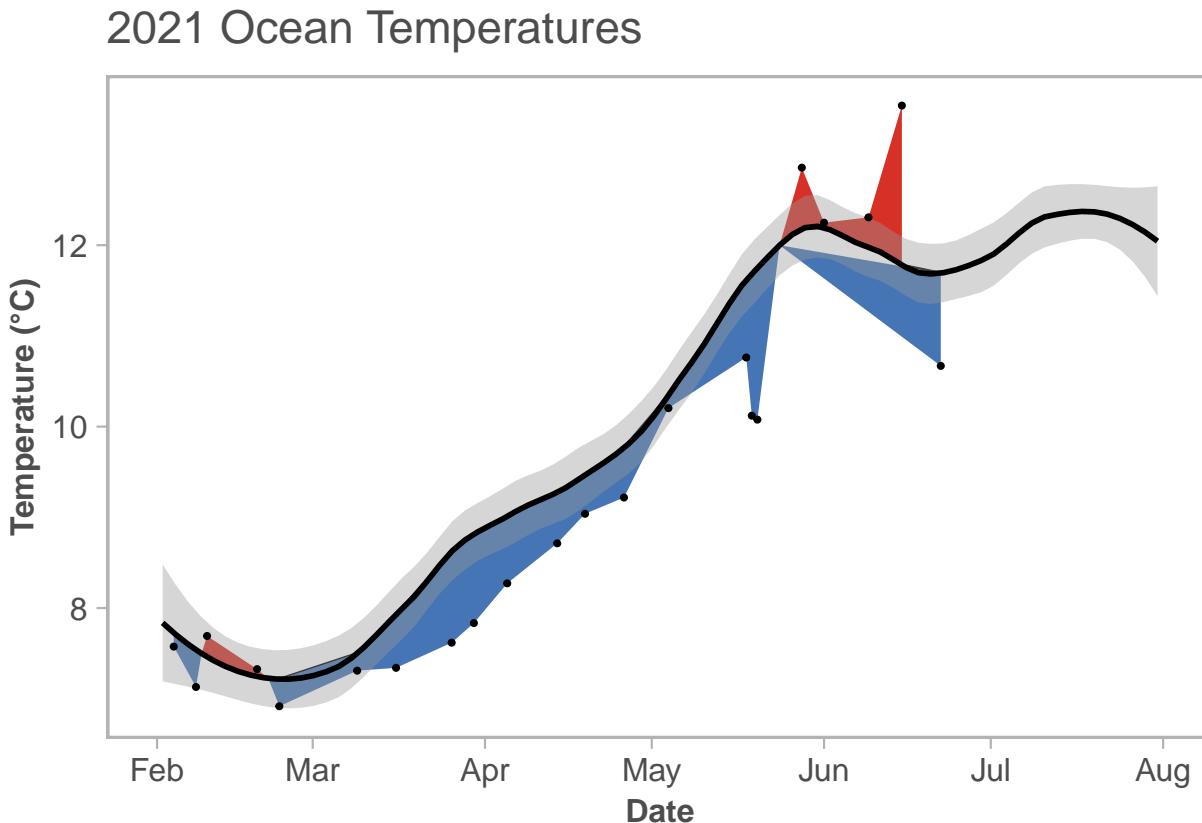


Figure 7: Ocean temperatures (top 30 m) at station QU39 in the northern Strait of Georgia between Quadra and Cortes Island. The solid black line is a LOESS regression based on temperatures from 2015-2020, representing the study period average. The shaded grey area is 1 SE of the LOESS regression. Blue areas represent temperatures from 2021 that are below average and red areas represent above-average temperatures.

## Highlights

- The first sockeye recorded in the Discovery Islands was May 25th – several days later than in all previous sampling years.
- The majority of sockeye caught were infected with at least one sea-louse. Additionally, numerous juvenile, attached sea-lice were observed on the sockeye.
- Spring ocean temperatures are colder than the average over the past five years, but warmer during the month of June.