Juvenile salmon migration report: northern Strait of Georgia to Johnstone Strait 2017

— Hakai Institute Juvenile Salmon Program —

Aim

To provide regular in-season summaries of juvenile Fraser salmon migration catch statistics, health indices, and oceanographic conditions in the northern Strait of Georgia to Johnstone Strait region.

Background

The Hakai Institute Juvenile Salmon Program was launched in the spring of 2015 in a collaborative partnership with UBC, SFU, Salmon Coast, Pacific Salmon Foundation, and DFO. The program operates in the Discovery Islands and Johnstone Strait (Figure 1) and thus provides information on the health of juvenile Fraser River salmon after passage through:

1) Strait of Georgia – stratified high plankton biomass zone; and
2) Discovery Islands & Johnstone Strait – highly-mixed low-plankton-biomass zone, and area of high 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
- Parasite Loads
- Sockeye Length and Weight
- Oceanographic Conditions

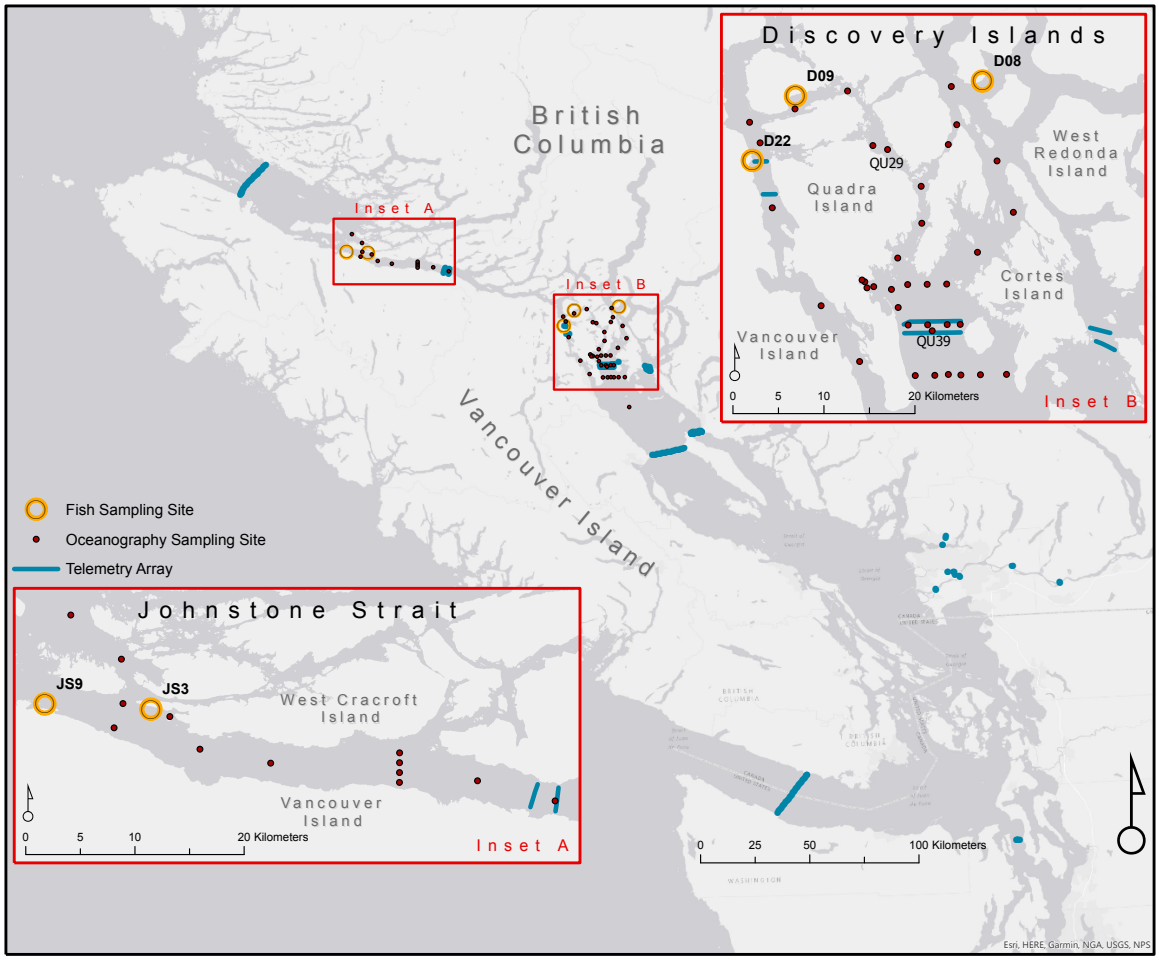

Figure 1: Salmon sampling locations in the Discovery Islands and Johnstone Strait in 2017 (yellow circles).

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

We are endeavouring to provide useful information for the entire salmon research community. As such we welcome any feedback. Please direct questions or comments to Brian Hunt (B.Hunt@oceans.ubc.ca) and/or Brett Johnson (Brett.Johnson@hakai.org).

Report prepared by: Brett Johnson, Carly Janusson, Julian Gan, and Brian Hunt
Updated: 2017-07-31

Catch Statistics

Cumulative Abundance of all Species

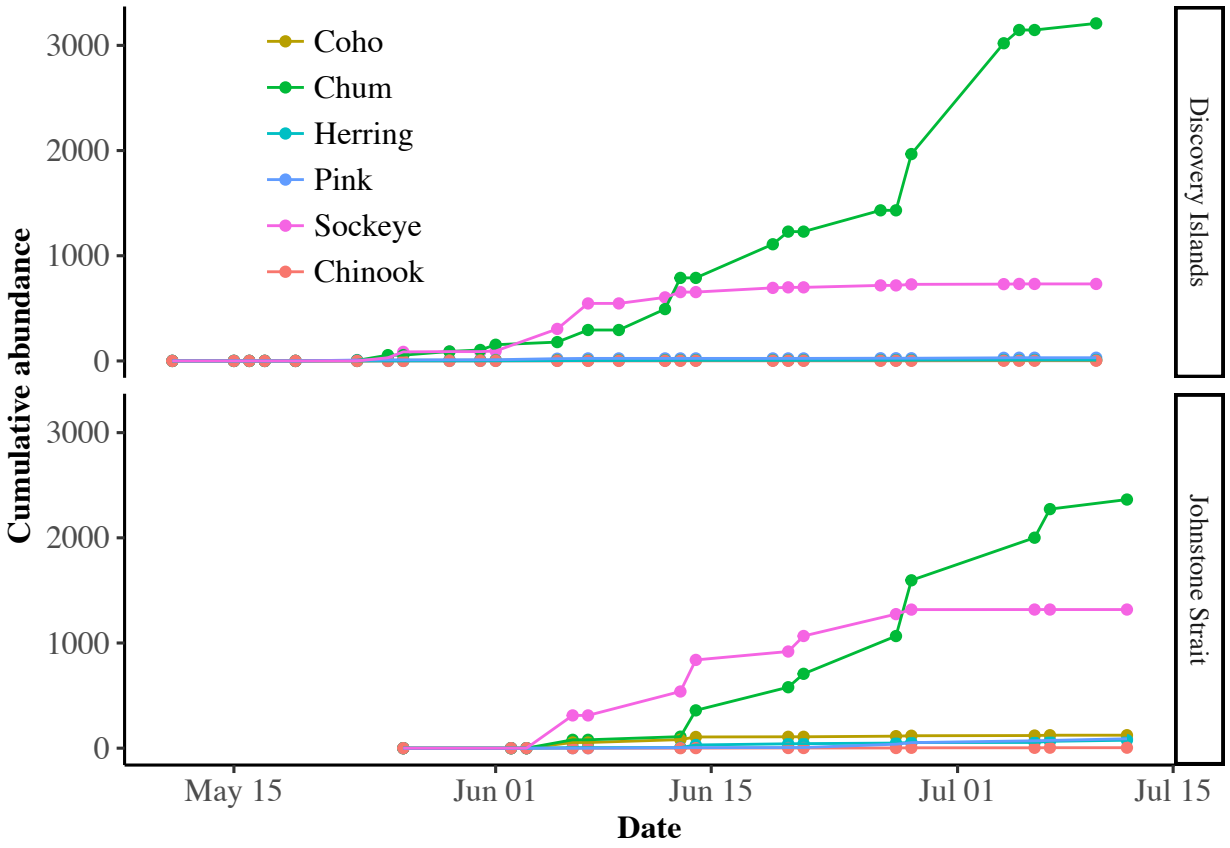

Figure 2: The cumulative abundance of fish captured in the Discovery Islands and Johnstone Strait in 2017.

Cumulative Abundance of Sockeye by Region

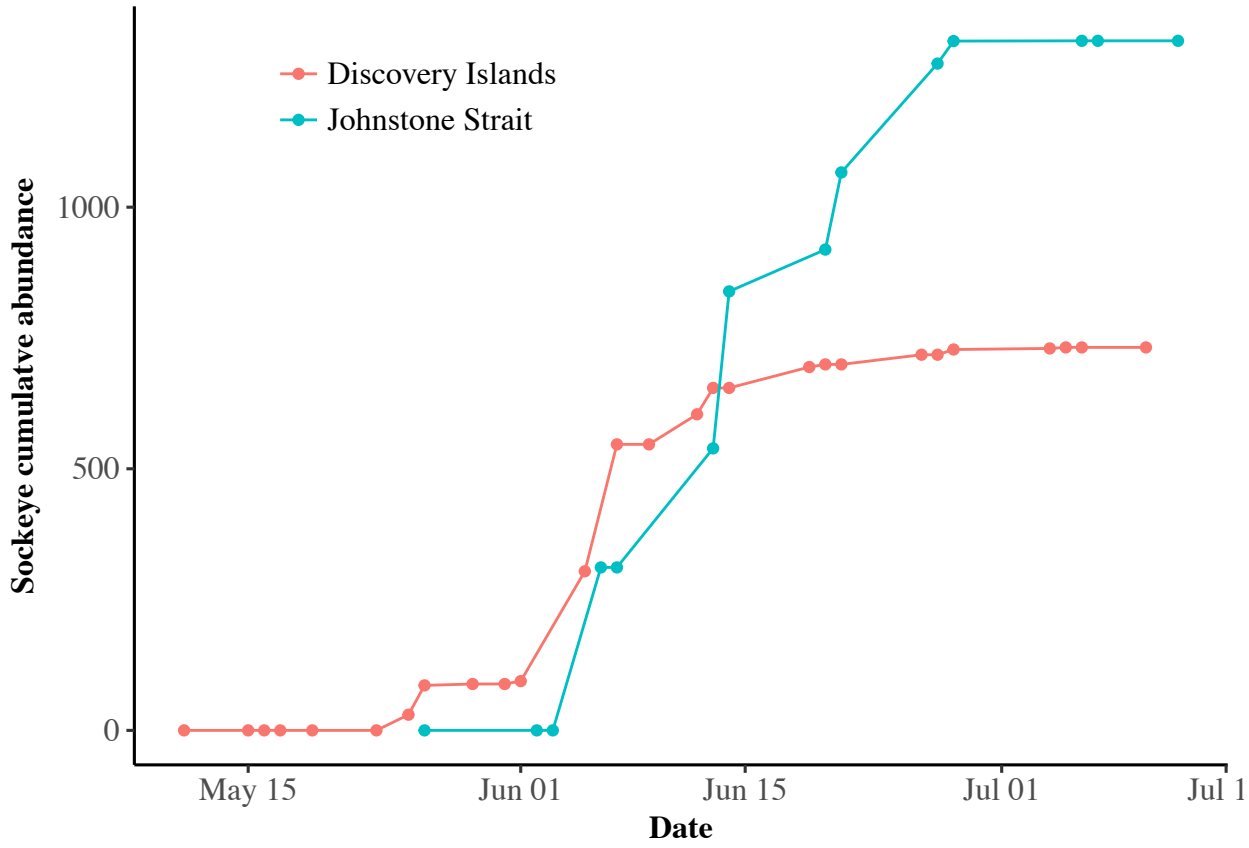

Figure 3: The cumulative abundance of sockeye captured in the Discovery Islands and Johnstone Strait in 2017.

Sockeye Catch Per Unit Effort

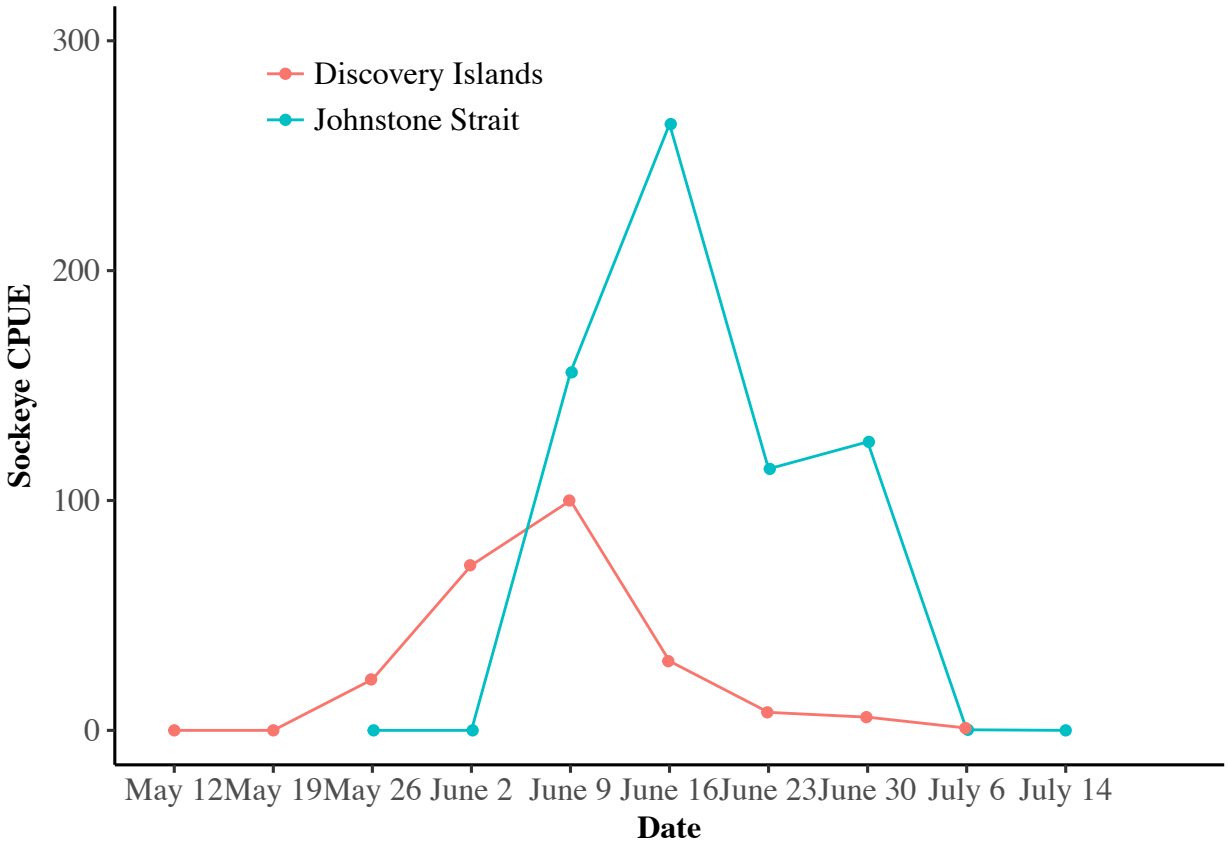

Figure 4: Catch per unit effort of juvenile sockeye salmon in 2017 averaged over one week periods for each region.

Parasite Loads

Definitions[1]

Prevalence: Number of individuals of a host species infected with a particular parasite species ÷ Number of hosts examined.

Mean Infection Intensity: Total number of individuals of a particular parasite species in a sample of a host species ÷ Number of infected individuals of the host species in the sample (= Mean number of individuals of a particular parasite species per infected host in a sample).

Abundance: The total number of individuals of a particular parasite species in a sample of hosts ÷ Total number of individuals of the host species in the sample.

Sea Lice Prevalence

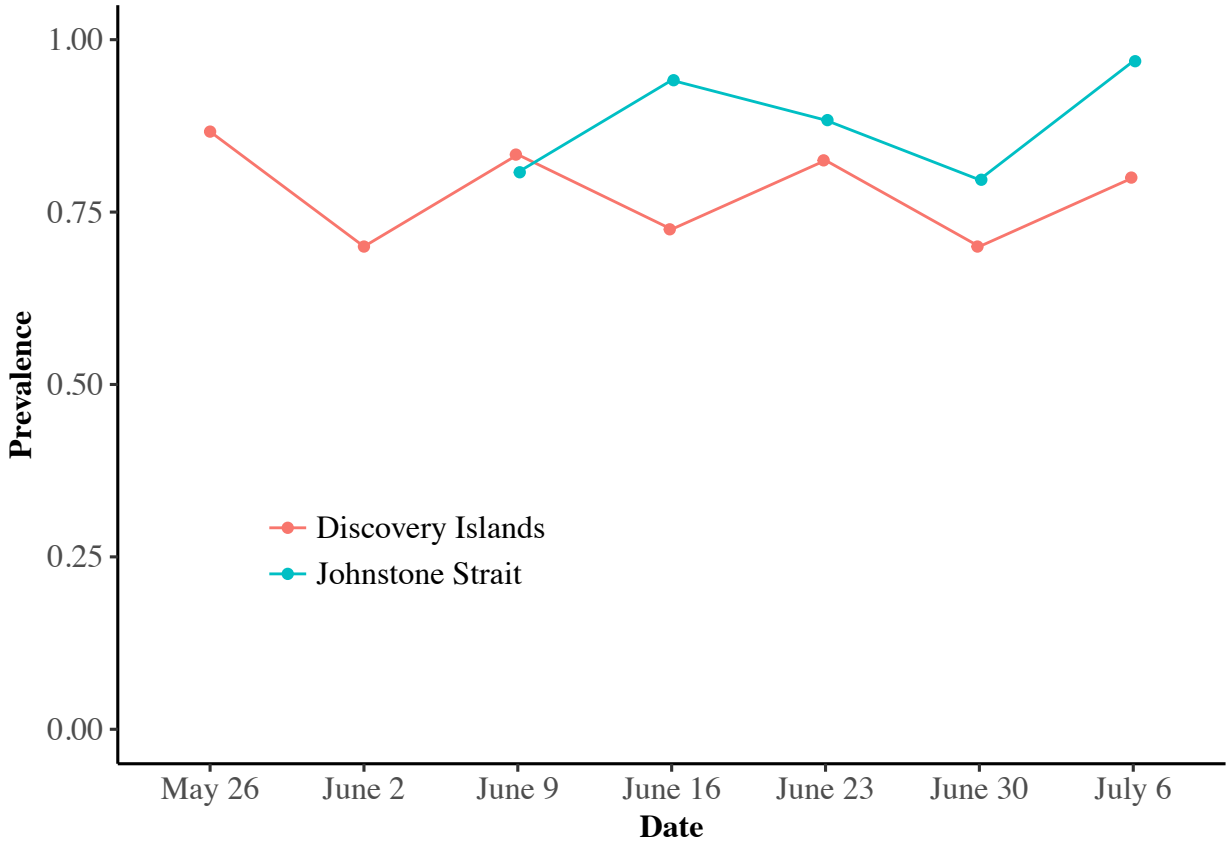

Figure 5: The proportion of juvenile sockeye that had at least one sea louse of any developmental stage of both *Lepeoptheirus salmonis* and *Caligus clemensi* in the Discovery Islands and Johnstone Strait in 2017.

[1]Margolis, L., Esch, G.W., Holmes, J.C., Kuris, A.M. and Schad, G.A. (1982). The use of ecological terms in parasitology: report of an ad hoc committee of the American Society of Parasitologists. J. Parasitol. 68:131–133.

Sea Lice Infection Abundance

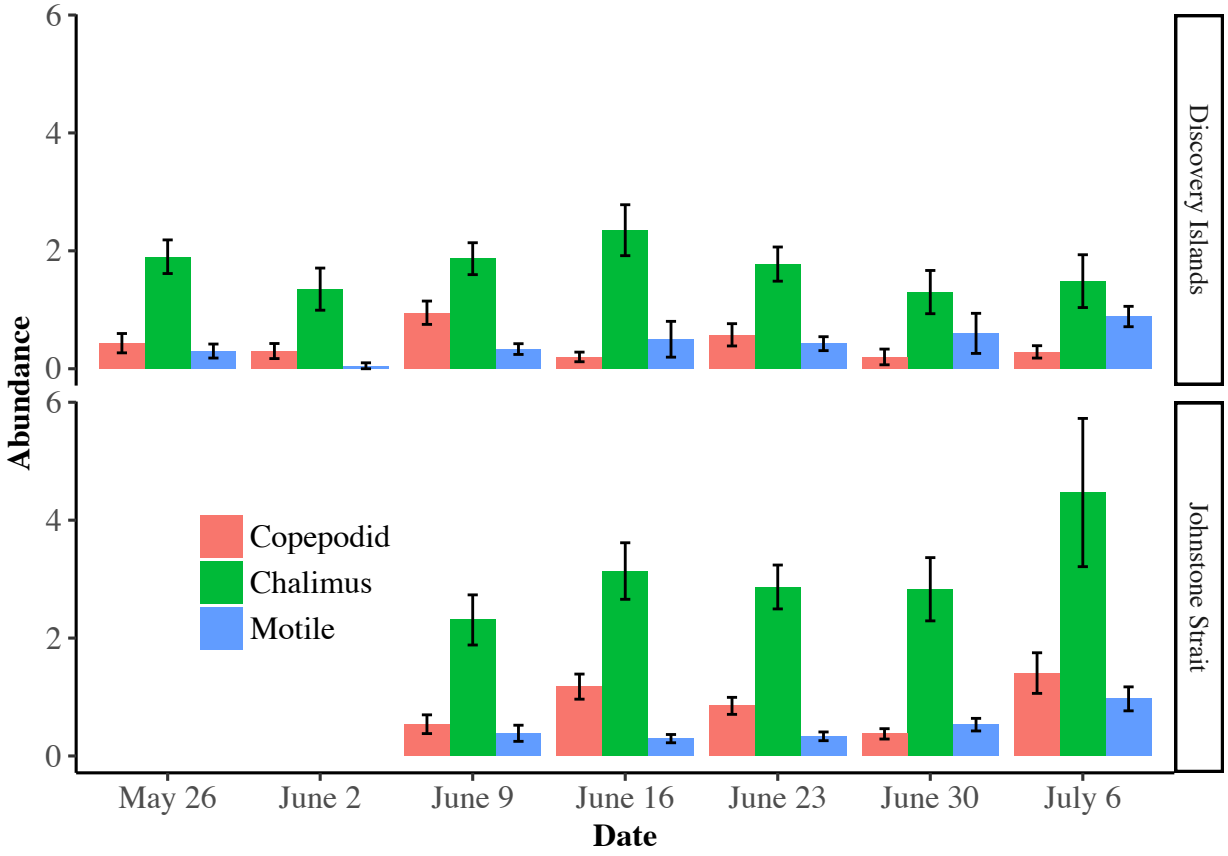

Figure 6: The abundance ± SE of three developmental stages of both *Lepeoptheirus salmonis* and *Caligus clemensi* sea lice per juvenile sockeye salmon.

Motile Infection Abundance by Species

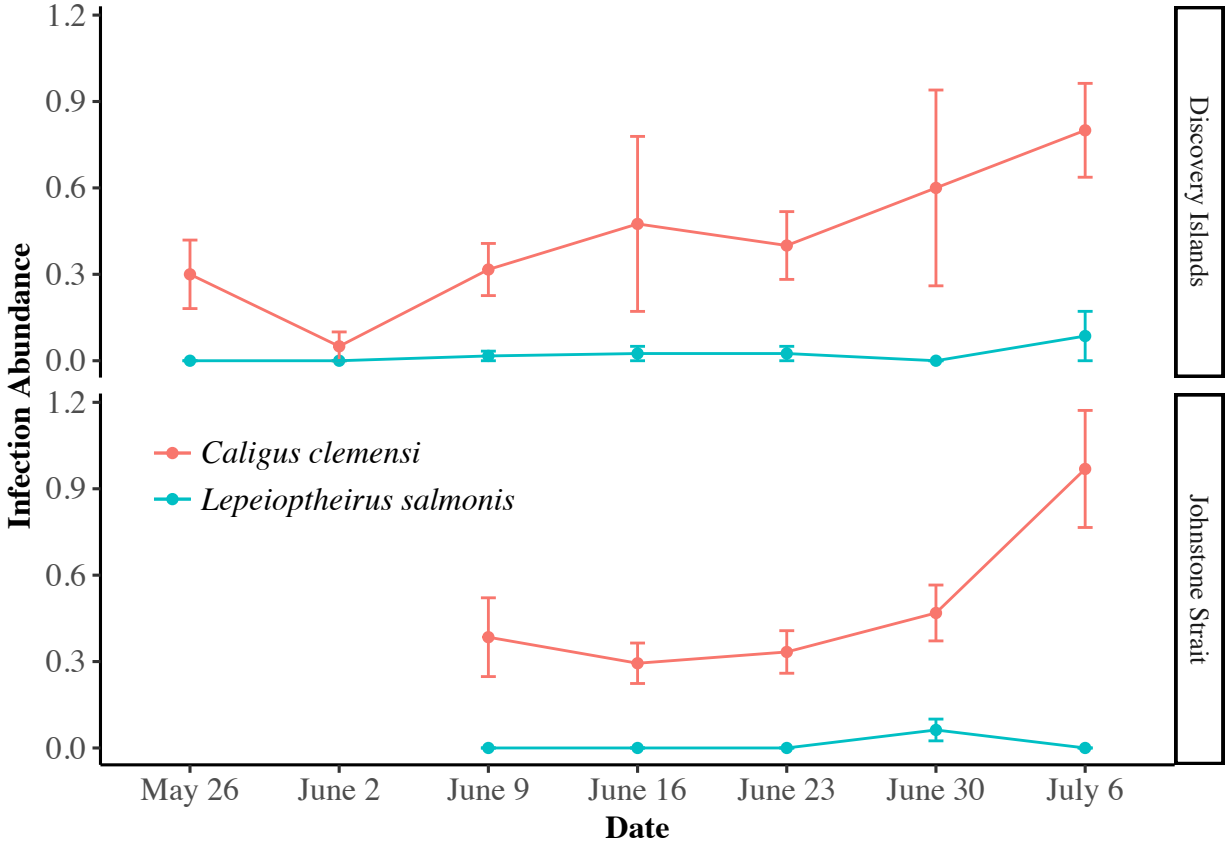

Figure 7: The abundance ± SE of **motile** *Lepeoptheirus salmonis* and *Caligus clemensi* sea lice combined infecting juvenile sockeye salmon in the Discovery Islands and Johnstone Strait in 2017.

Sea Lice Infection Intensity

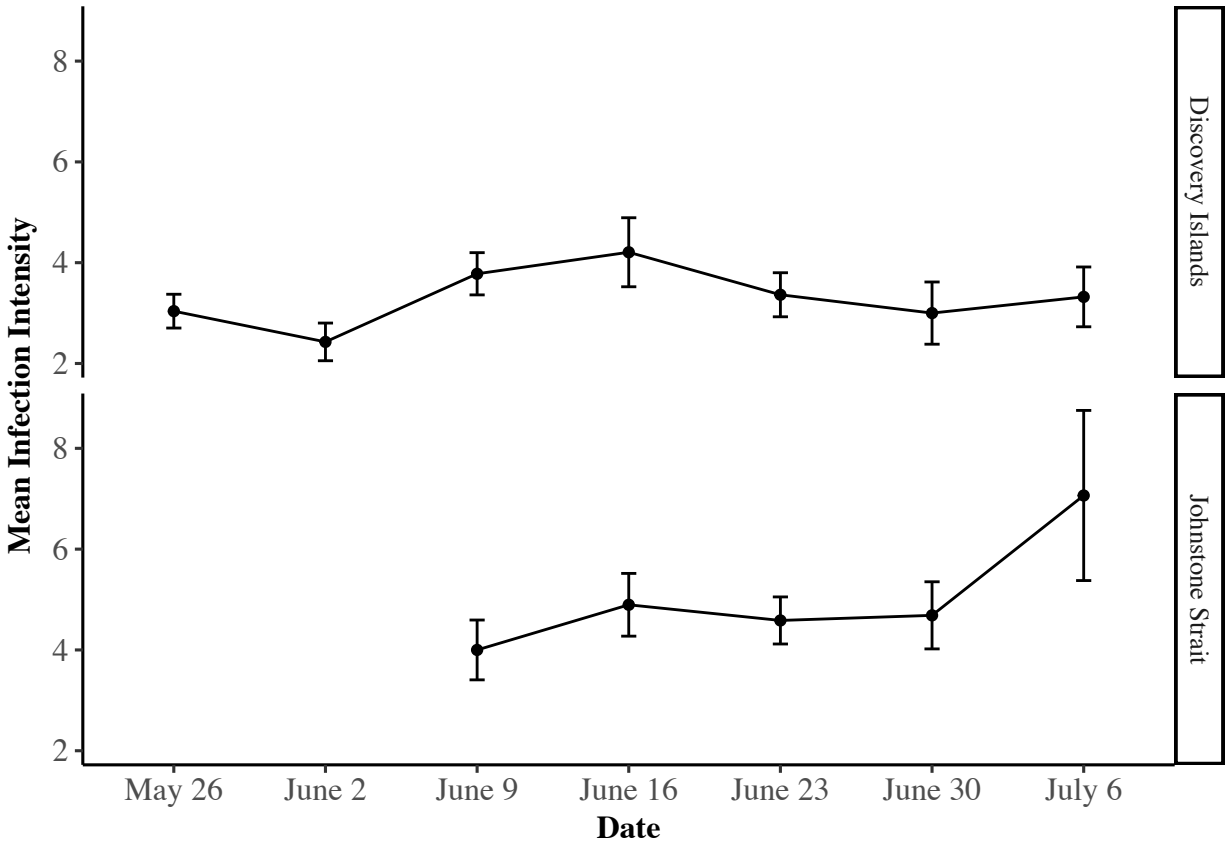

Figure 8: The mean infection intensity of all life stages of both *Lepeoptheirus salmonis* and *Caligus clemensi* sea lice on juvenile sockeye salmon in the Discovery Islands and Johnstone Strait in 2017.

Motile *Caligus clemensi* Infection Intensity

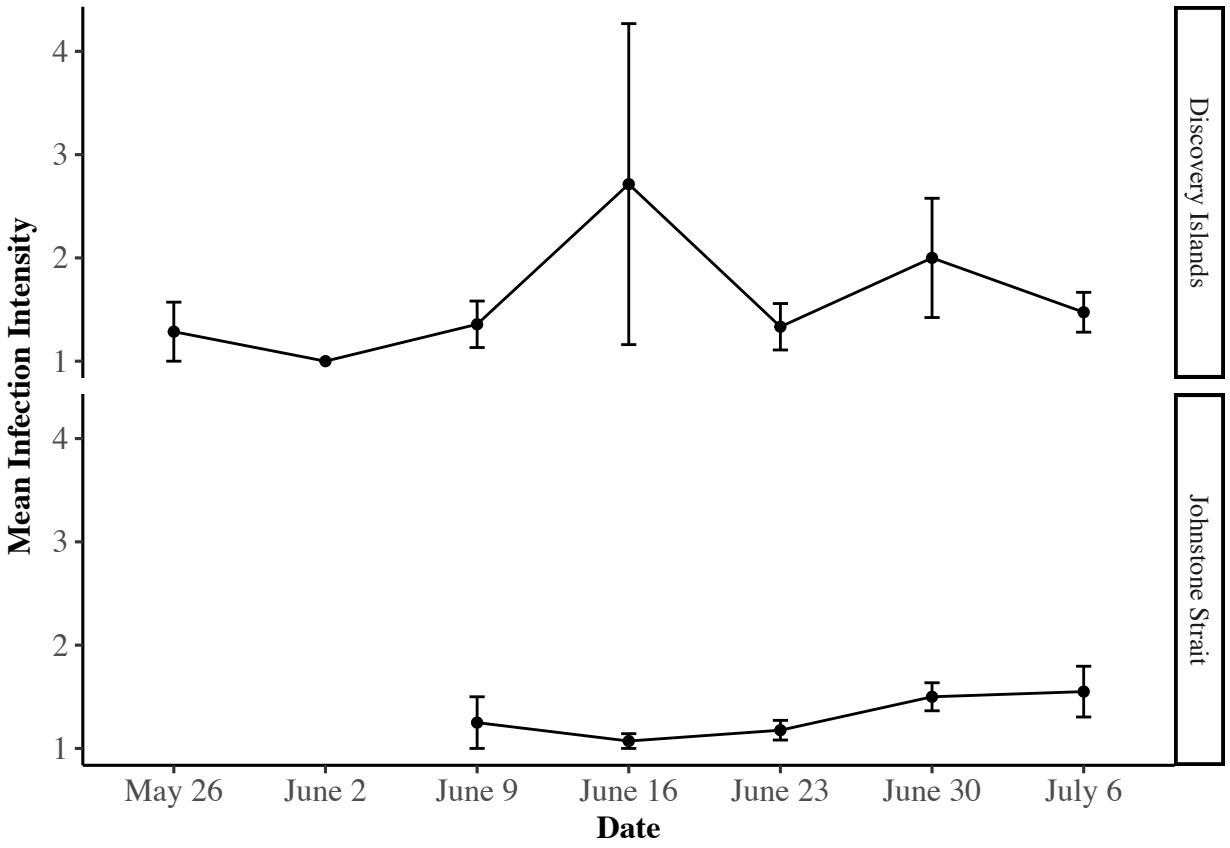

Figure 9: The mean infection intensity of **motile** *Caligus clemensi* sea lice per juvenile sockeye salmon infected with one or more motile *Caligus clemensi*.

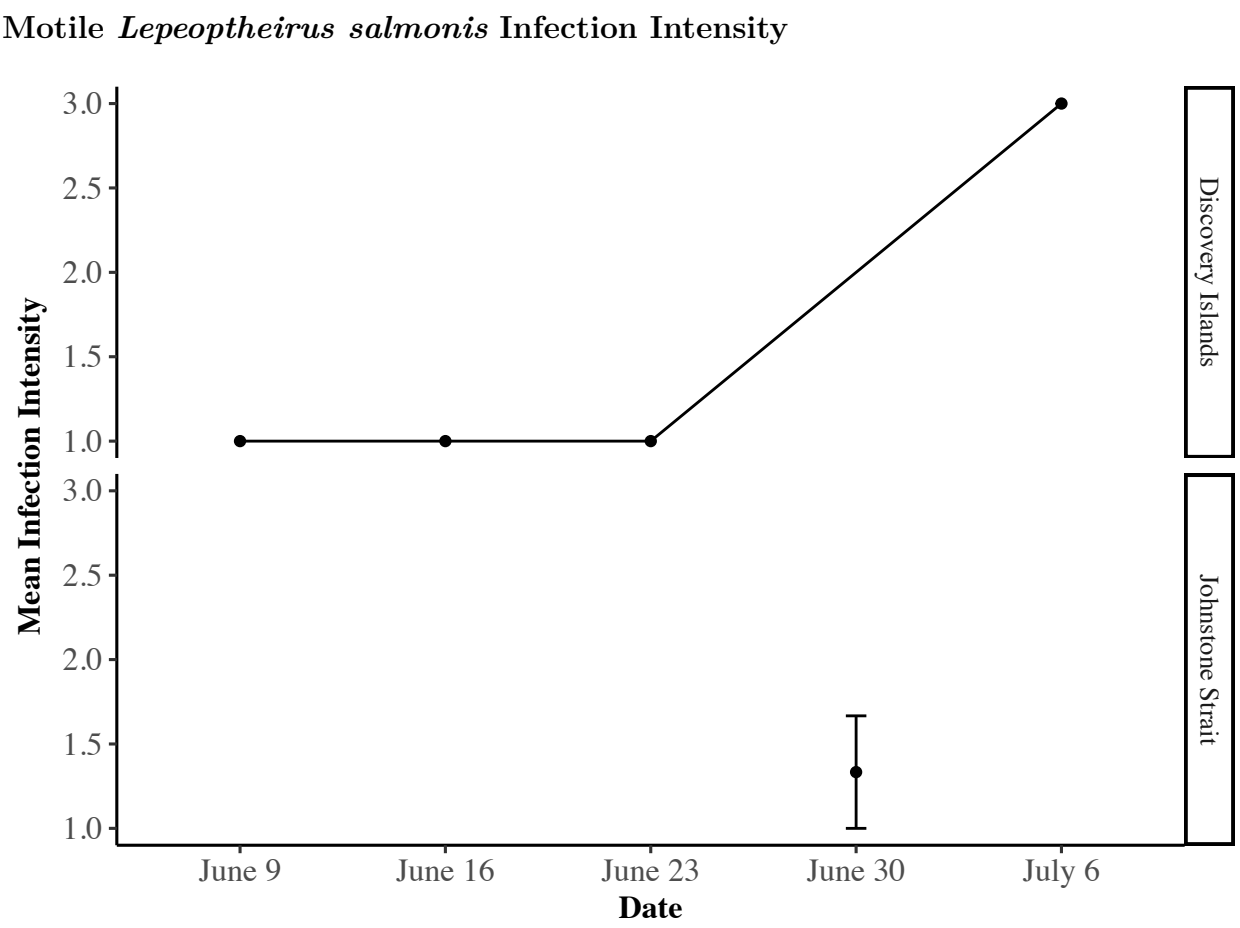

Figure 10: The mean intensity of **motile** *Lepeoptheirus salmonis* sea lice per juvenile sockeye salmon infected with one or more motile *Lepeoptheirus salmonis*.

Fish Length and Weight

Sockeye Length

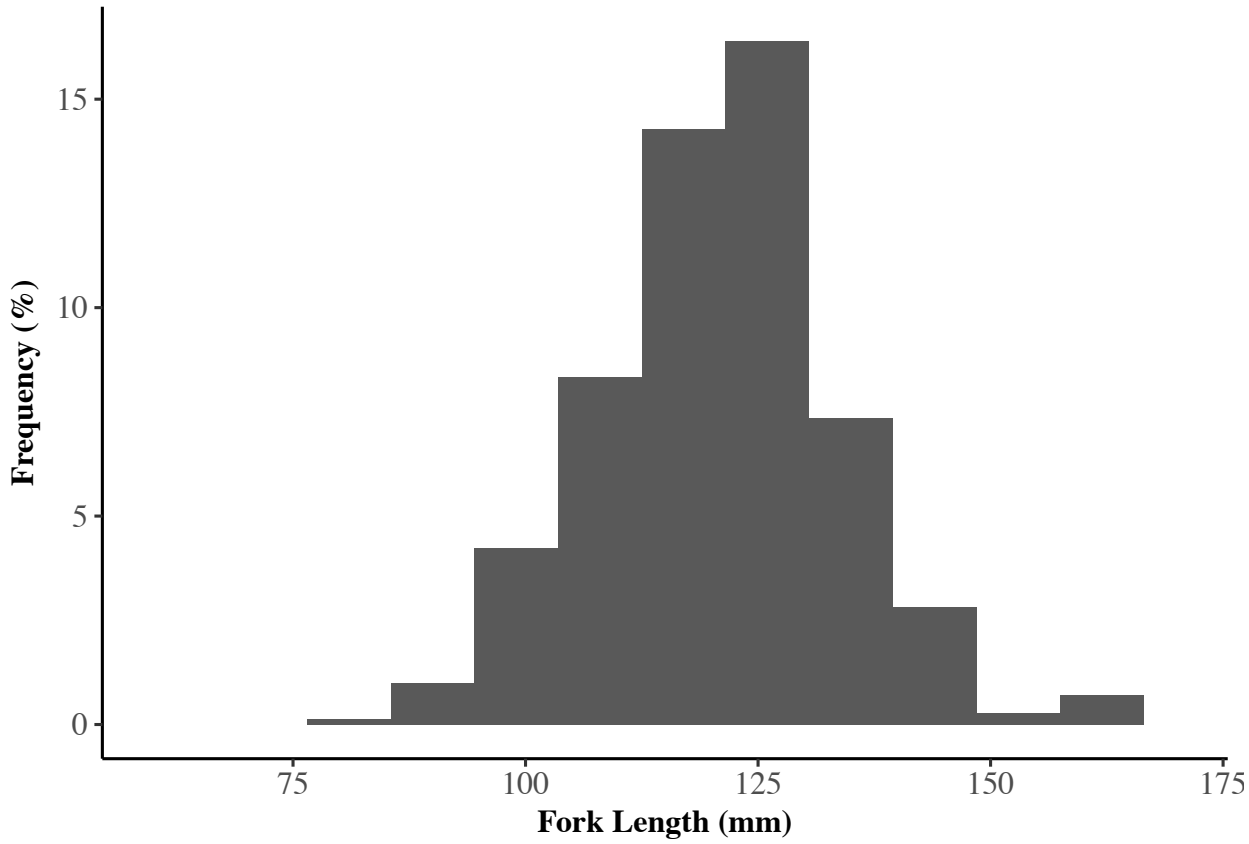

Figure 11: Length frequency histogram of juvenile sockeye in the Discovery Islands and Johnstone Strait in 2017.

Sockeye Weight

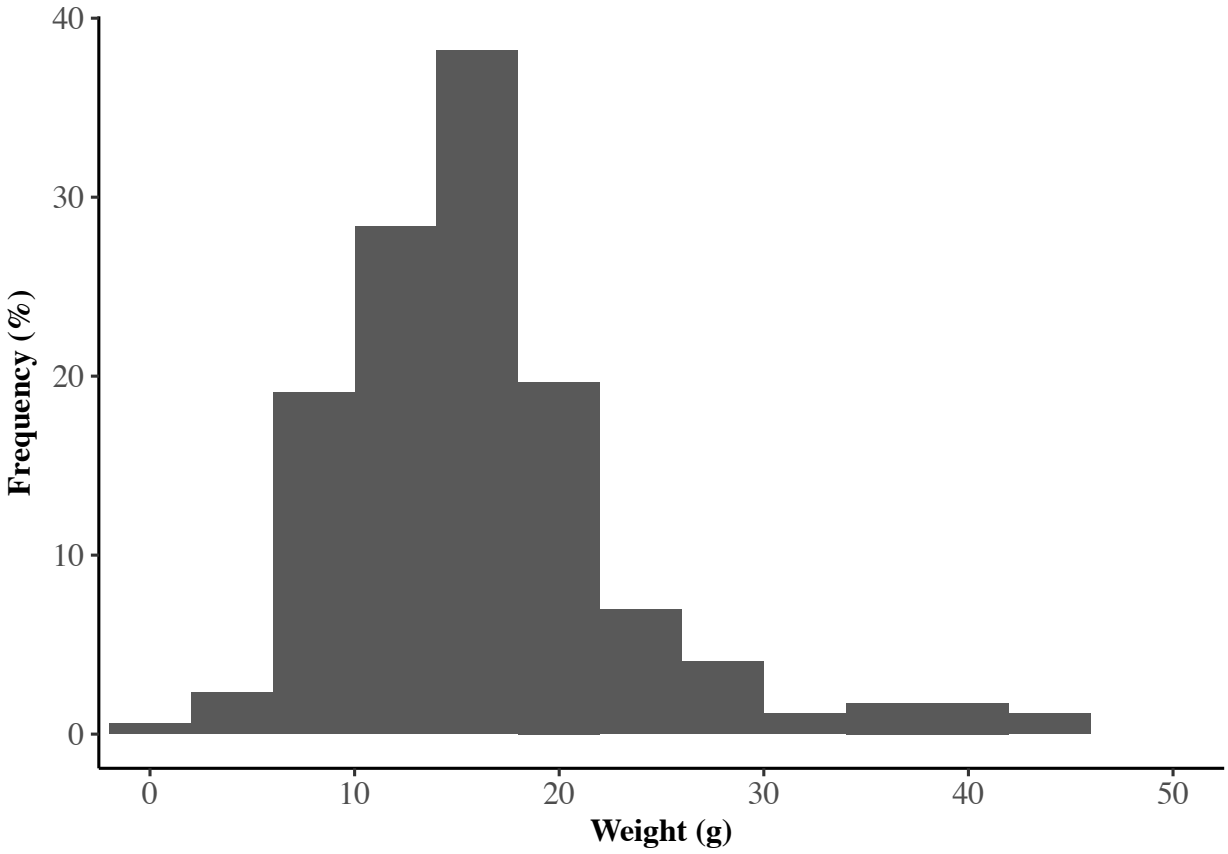

Figure 12: Weight frequency histogram of juvenile sockeye salmon in the Discovery Islands and Johnstone Strait in 2017.

Oceanographic Conditions

Chlorophyll a

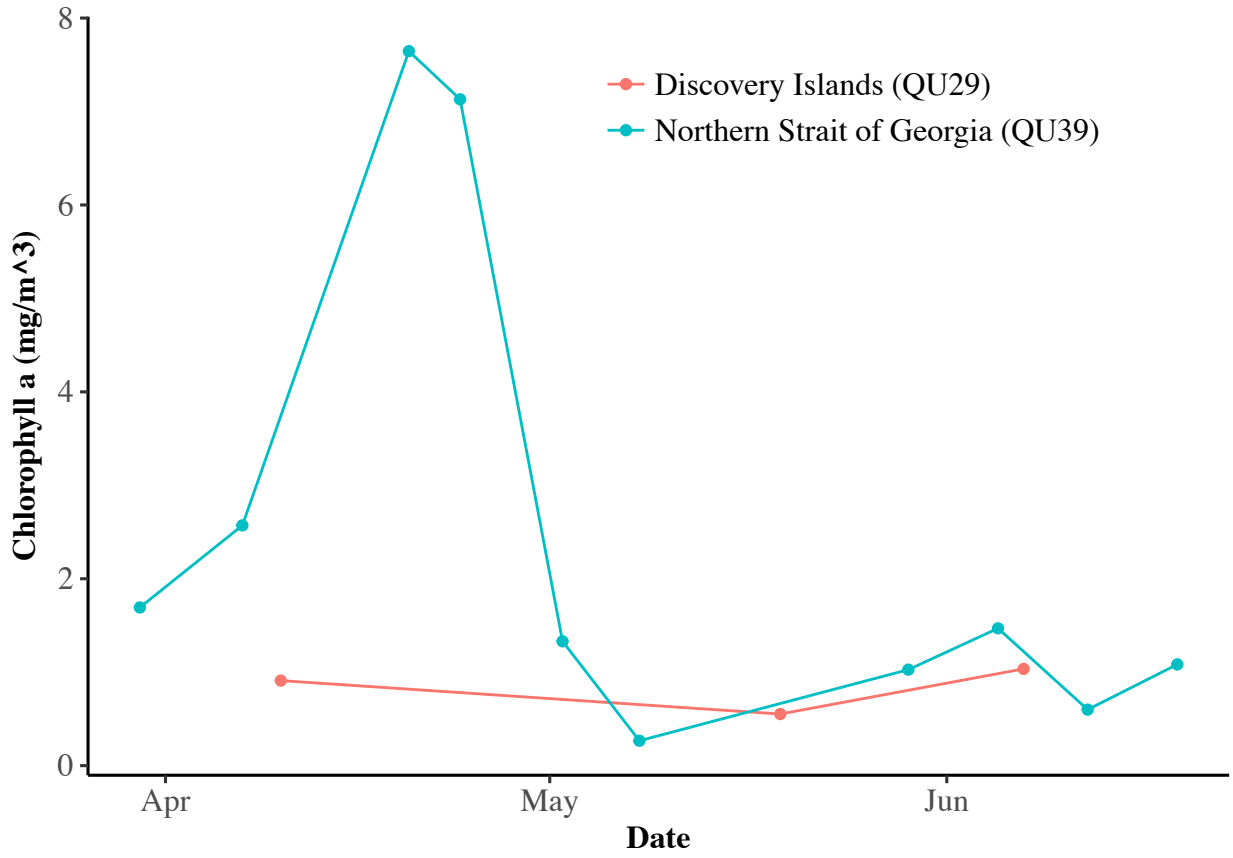

Figure 13: Surface chlorophyll a concentrations in the Disocovery Islands and the northern Strait of Georgia in 2017. See Figure 1 for station locations.

Temperature

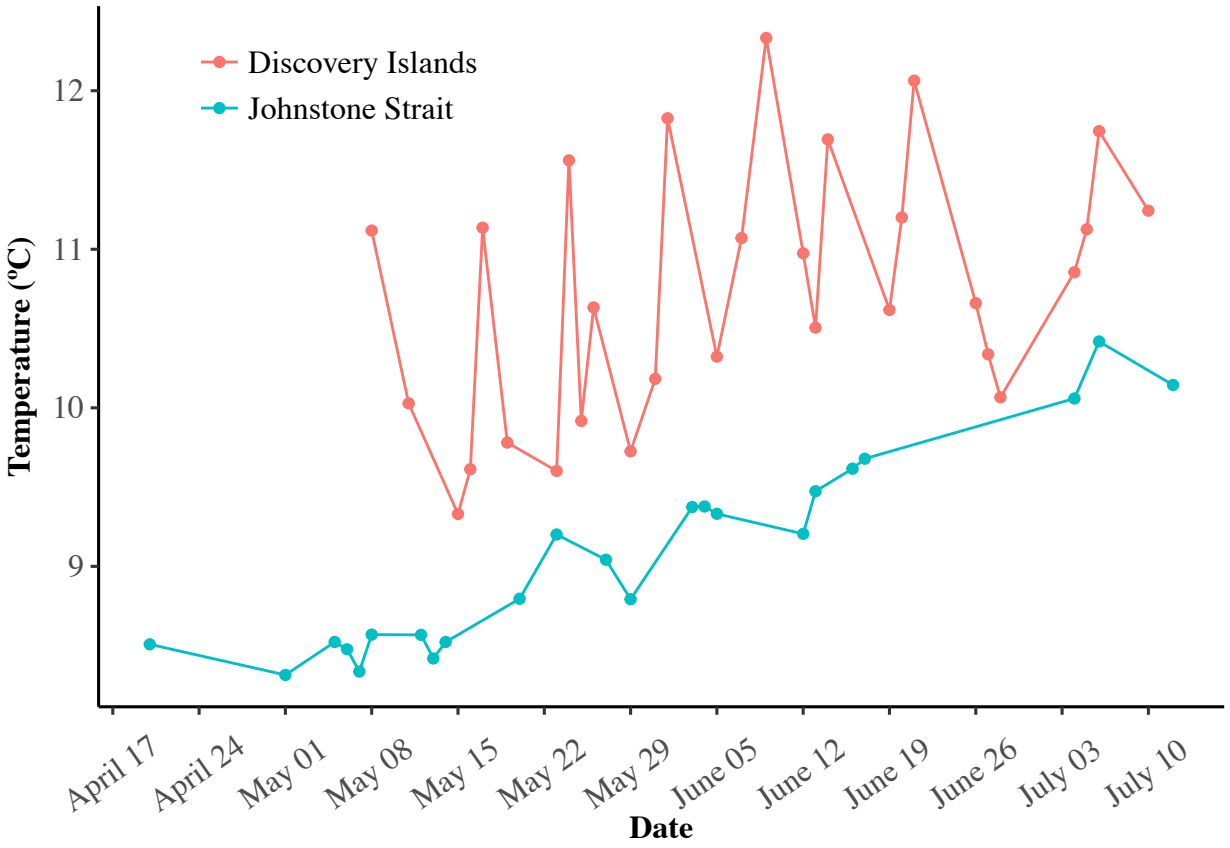

Figure 14: Average temperature of the top 30 m of the water column in the Disocvery Islands and Johnstone Strait in 2017.

Highlights

- Sampling has finished for the 2017 smolt migration
- Sockeye arrived later in 2017 than in 2015 and 2016
- Sockeye finished passing through the study region at a similar date as in 2015 and 2016
- Chum abundance is high in 2017
- Very few *Lep.* sea lice