

Wild Juvenile Salmonid Monitoring Program 2020 Quatsino Sound, BC

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Summary

Beach seine sampling was conducted on behalf of MOWI Canada West in Quatsino Sound, BC in 2020. Sampling was completed to monitor sea lice abundance, prevalence and intensity on juvenile wild salmon within Quatsino Sound in support of the Aquaculture Stewardship Certification process for MOWI Canada West finfish aquaculture sites in the area.

This data report represents the sixth year of wild juvenile salmonid monitoring within Quatsino Sound and Holberg Inlet.

Sampling was conducted during two separate sampling events in April and May 2020, selected to coincide with the peak outmigration period of juvenile salmonids. Sampling was completed at 10 sites within Quatsino Sound and Holberg Inlet, BC. The sites were selected based on their locations relative to existing aquaculture sites located in the area.

Thirty individuals from each target fish species (Pacific salmonids) or the total number of captured individuals from each target species (if less than 30 were captured) were collected from each of the 10 sites during the sampling events. Total catch numbers of each species were recorded. Water quality measurements including surface temperature and salinity were recorded at each site during each sampling event.

Collected sample fish were frozen and delivered to the Center for Aquatic Health Sciences (CAHS) for laboratory analysis. Sea lice infestation data was tabulated by CAHS and provided to Mainstream Biological Consulting for reporting. Sea lice observed on the individual fish specimens during laboratory analysis were identified as either *Lepeophtheirus spp.* or *Caligus sp.* These lice are assumed to be *Lepeophtheirus salmonis* and *Caligus clemensi* due to the lack of documented infestation of Pacific salmon by other species. The lice were recorded by life stage and the sex of pre-adult or adult motile lice was determined.

This data summary report documents the observed sea lice infestation rate on retained wild juvenile salmon collected in Quatsino Sound and Holberg Inlet in 2020. A total of 386 wild juvenile salmonids underwent lab analysis for sea lice infestation including 302 chum salmon, 79 coho salmon and five chinook salmon. No Atlantic salmon (*Salmo salar*) were captured during sampling completed in Quatsino Sound and Holberg Inlet in 2020. From the total sample population 156 samples were infested with 463 sea lice. The calculated prevalence for the total sample population was 40.4 % and the sea lice abundance was 1.2 for the sample population collected in Quatsino Sound and Holberg Inlet in 2020.

Chum salmon smolts were captured in significantly greater numbers than any other species. A total of 963 chum salmon were captured, representing 89.4 % of all captured salmonids. Of the 963 chum captured, 302 were kept for lab analysis for sea lice infestation. A total of 110 chum smolts were found to be infested with a total of 221 lice resulting in a calculated prevalence of 36.4 %, abundance of 0.73 and an average intensity of 2.0 for the chum salmon sample population.

A total of 109 coho salmon were captured, representing 10.1 % of all captured samples. Of the 109 coho captured, 79 were kept for lab analysis for sea lice infestation. A total of 44 coho smolts were found to be infested with a total of 240 lice resulting in a calculated

prevalence of 55.7 %, abundance of 3.0 and an average intensity of 5.5 for the coho salmon sample population.

A total of five chinook salmon were captured, representing 0.5 % of all captured samples. All of the chinook salmon captured were kept for lab analysis for sea lice infestation. Two chinook smolts were found to be infested with a total of two lice resulting in a calculated prevalence of 40.0 %, abundance of 0.40 and an average intensity of 1.0 for the chinook salmon sample population.

A total of 253 *L. salmonis* sea lice of various life stages were identified on 127 juvenile salmon of all species and 210 *C. clemensi* sea lice were found on 71 juvenile salmon of all species analyzed in the lab. There were 42 samples that were infested with at least one *L. salmonis* and *C. clemensi* sea louse.

For the chum salmon sample population, a total of 162 *L. salmonis* sea lice of various life stages were identified on 93 juvenile chum salmon and 59 *C. clemensi* sea lice were found on 37 of the juvenile chum salmon analyzed in the lab. There were 20 chum that were infested with at least one *L. salmonis* and *C. clemensi* sea louse.

For the coho salmon sample population, a total of 90 *L. salmonis* sea lice of various life stages were identified on 33 juvenile coho salmon and 150 *C. clemensi* sea lice were found on 33 juvenile coho salmon analyzed in the lab. There were 22 coho that were infested with at least one *L. salmonis* and *C. clemensi* sea louse.

A comparison of the prevalence, abundance and average intensity of sea lice species found on chum salmon was completed for sample data between 2015 and 2020 collected in Quatsino Sound and Holberg Inlet. This data is presented in the following summary table with additional yearly comparisons of juvenile wild salmon monitoring results presented in Appendix IV.

Year	<i>Caligus clemensi</i>			<i>Lepeophtheirus salmonis</i>		
	Prevalence	Abundance	Average Intensity	Prevalence	Abundance	Average Intensity
2015	13.6 %	0.24	1.75	12.4 %	0.21	1.72
2016	8.6 %	0.11	1.32	8.9 %	0.10	1.09
2017	1.7 %	0.02	1.00	1.7 %	0.02	1.00
2018	2.5 %	0.02	1.00	3.1 %	0.03	1.00
2019	7.9 %	0.10	1.31	1.8 %	0.02	1.13
2020	12.3 %	0.20	1.59	30.8 %	0.54	1.74

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1.0 Introduction

At the request of MOWI Canada West, beach seine sampling to capture wild juvenile salmon to be analyzed for sea lice infestation took place at 10 sites located in Quatsino Sound and Holberg Inlet, BC (Figure 1). The sample collection occurred during two sample events in 2020 on April 6 and May 5. These weeks were selected to coincide with the estimated peak outmigration dates of juvenile salmonids.

Parasitic copepods from the family Caligidae (sea lice) found in the coastal waters of British Columbia are divided into two genera: *Lepeophtheirus* and *Caligus*. Eleven species of *Lepeophtheirus* have been identified infesting fish in the Pacific Ocean, while only one species of *Caligus* (*Caligus clemensi*) have been identified (Margolis and Arthur 1979; McDonald and Margolis, 1995). *Caligus clemensi* infest a wide range of natural hosts in the marine environment including salmonids and non-salmonids; while *Lepeophtheirus salmonis* natural hosts on the Pacific coast have been found to include Pacific salmon, threespine stickleback and Pacific herring. *Lepeophtheirus spp.* sea lice found on salmonid specimens were assumed to be *L. salmonis* due to the lack of documented infestations of Pacific salmon by other *Lepeophtheirus* lice species (Jones and Nemec, 2004).

Both of these genera have similar life histories and developmental stages (Kabata, 1972; Johnson and Albright, 1991a). The sea lice hatch from eggs and develop through two free-swimming nauplii stages before developing into an infectious free-swimming copepodid. At this point, the sea lice attach to their host and develop through four chalimus stages. The chalimus are “non-motile” and are attached to their host by a frontal filament. The final chalimus stage terminates as the sea lice become “motile” and are no longer attached to their hosts by the frontal filament. The sea lice can now move freely on the fish as they develop through a pre-adult stage before becoming reproductively viable adults.

Water temperature and salinity are two environmental variables that influence sea lice development, growth, survival and reproductive rate. In British Columbia, surface seawater temperatures range from approximately 6 °C to 13 °C. Research on sea lice abundance conducted in the Broughton Archipelago and elsewhere on the coast of British Columbia indicates that surface water temperature during the winter months does not appear to hinder the seasonal abundance of *L. salmonis* (Saksida et al., 2007a, b). The rate of development and the generation times for *C. elongates* are strongly temperature dependent (Tully, 1992) and although this research has not been conducted, similar relationships with temperature are to be expected for *C. clemensi* (Jones and Johnson, 2015). Survival and development of *L. salmonis* is optimal in high salinity seawater. Under laboratory conditions copepodid survival was limited to conditions where salinity was greater than 10 ppt (Johnson and Albright, 1991b).

MOWI Canada West requested monitoring of sea lice abundance, prevalence and intensity on juvenile wild salmon within Quatsino Sound and Holberg Inlet in support of Aquaculture Stewardship Certification for their aquaculture sites within the area. This data summary report documents the observed sea lice infestation rates on retained juvenile salmonids collected in Quatsino Sound and Holberg Inlet in 2020. This represents the sixth year of wild juvenile salmonid monitoring in Quatsino Sound and Holberg Inlet conducted by MOWI Canada West, formerly Marine Harvest Canada. No Atlantic salmon have been captured or observed during sampling for juvenile salmonids at the 10 beach seine sites in Quatsino Sound completed in 2015 through to 2020.

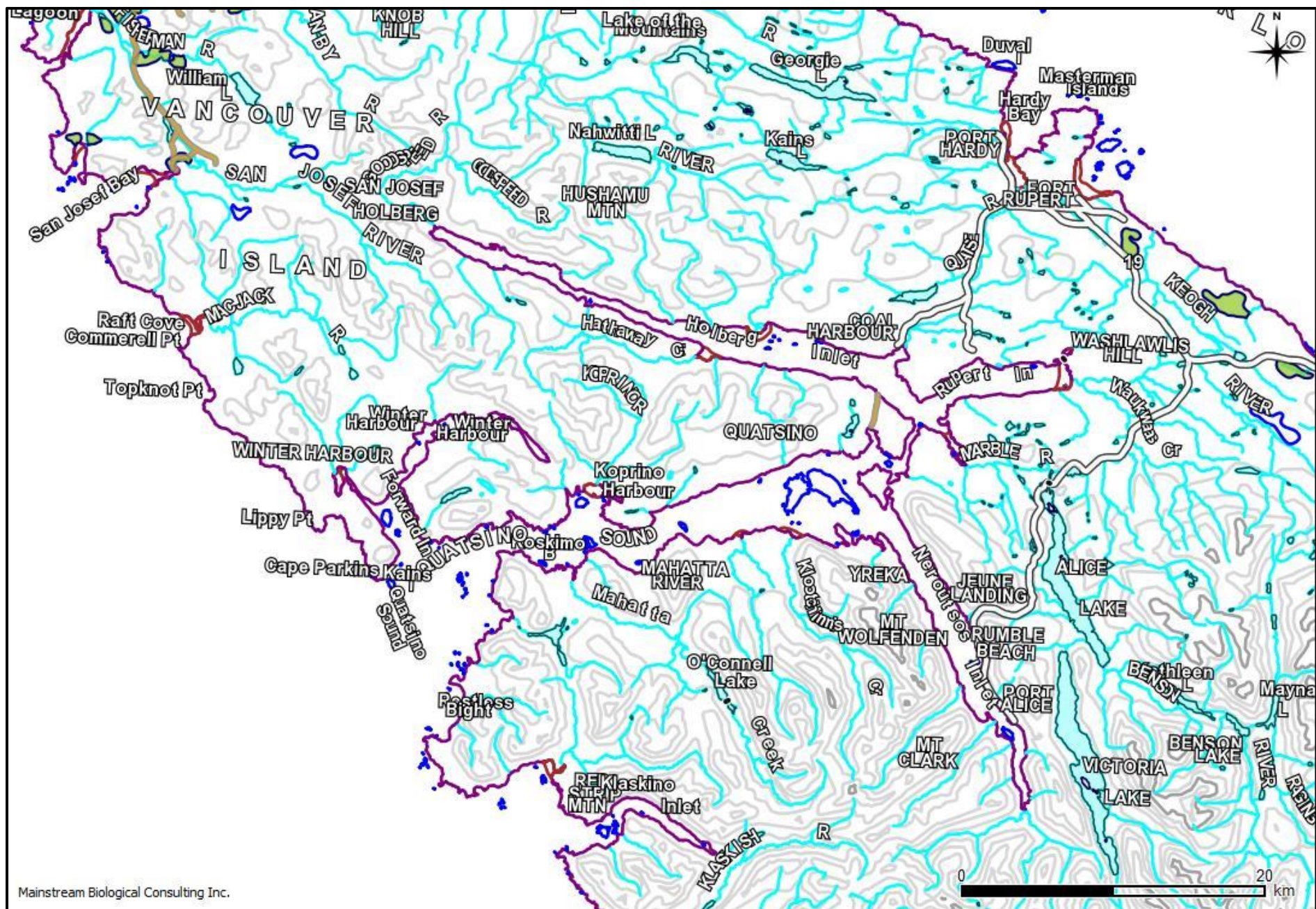


Figure 1: An overview map showing the location of Quatsino Sound and Holberg Inlet on the west coast of northern Vancouver Island, BC.

2.0 Methods

The fish inspected for sea lice infestation were collected from 10 sites in Quatsino Sound and Holberg Inlet, BC. These sites were chosen based on their locations relative to existing MOWI Canada West aquaculture sites in the area (Figure 2). The sites were sampled twice in 2020 on April 6 and May 5.

2.1 Site Locations

The 10 sites at which beach seining was conducted to collect specimens for sea lice analysis consisted of three sites in Holberg Inlet (Sites 1, 2 and 3) and seven sites in Quatsino Sound. The approximate locations of the 10 beach seine sites are shown in Figure 2. GPS coordinates collected in the field for the sites are presented in Table 1.

Table 1: The site number and location of the 10 beach seine sites where fish were collected for sea lice analysis in Quatsino Sound and Holberg Inlet in 2020.

Site #	Latitude	Longitude
1	50 35.042	127 40.212
2	50 34.530	127 36.323
3	50 34.406	127 35.813
4	50 28.842	127 46.410
5	50 28.097	127 47.407
6	50 28.289	127 51.111
7	50 27.526	127 52.180
8	50 27.464	127 53.740
9	50 28.917	127 53.430
10	50 29.954	127 52.581

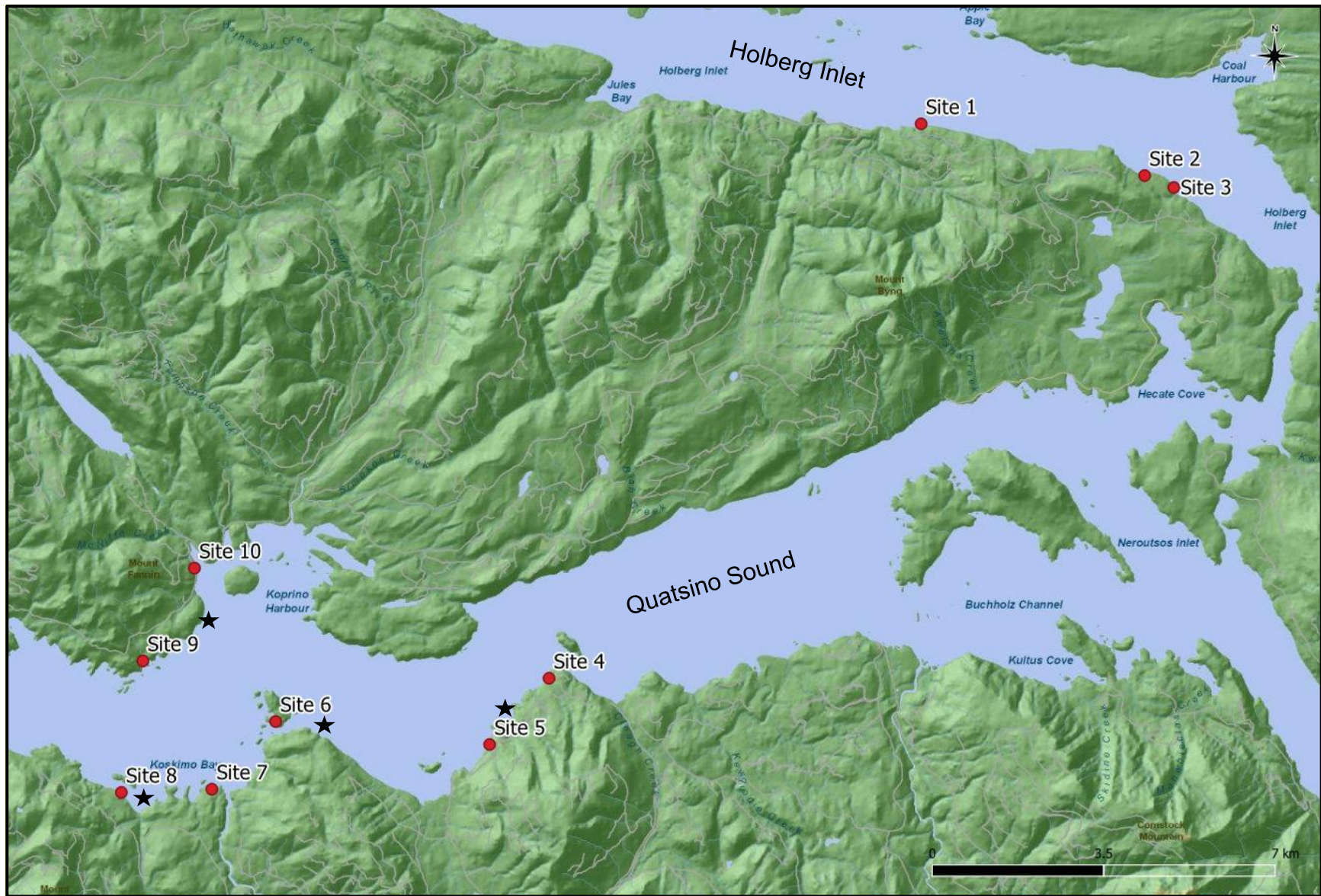


Figure 2: The locations of the 10 beach seine sites in Quatsino Sound and Holberg Inlet sampled in 2020. MOWI Canada West active aquaculture site locations are indicated with a black star.

2.2 Field Procedures

Procedures for beach seining, fish collection and field data recording adapted from procedures utilized by the Department of Fisheries and Oceans (DFO) were used for juvenile salmon sampling by Mainstream Biological Consulting staff during sampling in Quatsino Sound and Holberg Inlet in 2020.

An 18ft Boston Whaler, powered by a 70 horsepower outboard motor, was used to access the beach seine sites. A 150 ft (45.7 m) long by 12 ft (3.7 m) deep beach seine net was used to capture specimens. The net was constructed in three 50 ft (15.2 m) sections. The centre bunt section consists of one-quarter inch diameter diamond mesh, while the two side panels (wings) consist of half-inch diameter diamond mesh. Floats were located every 30 cm along the top-line and a lead line weighted the bottom of the net.

A three person crew was utilized to conduct the beach seine sets and retrieve samples in a consistent manner at each of the 10 selected sites. All beaches were approached slowly by boat and one crewmember was put ashore with the towline from one end of the beach seine net. The onshore crewmember held the towline at one side of the sample site, while the second crewmember ensured the net deployed smoothly off the bow or side of the boat. The third crewmember, the boat operator, backed the boat in a wide semicircle towards the opposite side of the sample site and remained on the boat to record field data. When the net was fully deployed, the second crewmember stepped into the shallow water with the towline or tossed it to the awaiting crewmember on shore. A slow retrieval of the net began immediately.

As the net was slowly retrieved, a sample of surface water was collected to measure salinity and water temperature data using an Oakton® SALT 6+ meter.

The crewmembers retrieved the net evenly from opposite ends ensuring that the lead line remained as close to the bottom as possible. All retrieved netting was piled on the beach above the water level. As the retrieval reached the net bunt, the lead line was retrieved at a faster rate than the floats to allow the netting of the bunt to form a bag under the captured fish. The lead line was then pulled up onto the beach above the water level. One crewmember worked their way around the outside of the net in the shallow water to ensure the floats stayed above the surface of the water. In this manner a small, shallow bag formed from the bunt of the net held the captured fish in the water.

The third crew member anchored the boat and the entire crew participated in the collection of individual fish to ensure that captured fish remained in the net for as short a period of time as possible. The net was manipulated, if necessary, in response to rising or falling tides in order to ensure the captured fish remained in the net and were held in sufficient water to minimize stress. The level of sufficient water was dependant on the size and numbers of captured fish but was generally thought of as enough water to minimize fish contact with the net or with other fish.

A total of 30 individuals from each target species captured or all of the individuals present (if less than 30) were collected as samples for sea lice infestation analysis. Individual fish were “swam” into an appropriately sized whirl-pak bag. All handling of fish was kept to a minimum.

When all the fish for retention were collected, a total catch number for each species was recorded. The fish remaining in the net were counted out of the seine net, or an estimate of the remaining fish was made (estimates were used when it appeared that

more than 500 individuals from any given species remained in the net). The total of fish remaining in the net was added to the number of retained individuals to calculate a total capture number for a given species.

A crewmember recorded all the information from each beach seine set in a standardized field form. The information recorded included the following:

- The site name (Site 1-10);
- The date;
- The time at the end of the individual fish collection;
- Comments on weather and oceanic conditions;
- Total capture and retained fish numbers for each specimen group;
- Water temperature (°C) and salinity (ppt) to one decimal place;
- Exact GPS coordinates; and
- The number of salmonid mortalities.

The retained fish from each site were packaged separately in re-sealable bags and labelled with the site name (Site 1-10), the date and sample numbers and species. Site sample bags were placed in a cooler with sufficient dry ice for storage. The specimens were transferred to a freezer immediately upon return from the field.

The beach seine net was reloaded onto the bow of the boat. Crewmembers scanned the net for obvious holes, which were repaired immediately if found. Remaining sample gear was stored for transit between sites.

The above procedures for beach seine net deployment and retrieval, as well as those described for fish collection, were repeated at all 10 sample sites.

2.3 Laboratory Procedures

Collected sample fish were frozen and delivered to the Center for Aquatic Health Sciences (CAHS) for laboratory analysis. Sea lice observed on the individual fish specimens during laboratory analysis were identified as either non-motile chalimus, or motile pre-adults and adults. Lice were identified as either of the two chalimus stages for *Lepeophtheirus salmonis* (Hamre et al., 2013) or four chalimus stages for *Caligus clemensi*. Motile lice, either pre-adults or adults, were identified as either *Lepeophtheirus salmonis* or *Caligus clemensi* and the sex of the louse was determined. Sea lice infestation data was tabulated by CAHS and provided to Mainstream Biological Consulting for reporting.

Data provided by CAHS also included measured fork length in millimetres and weight (recorded to the nearest tenth of a gram). Lengths and weights were recorded with the specimen's corresponding sea lice analysis results.

2.4 Data Analysis

Surface water quality data collected for temperature and salinity was summarized to report the minimum and maximum values as well as the calculated averages for each sample week.

Beach seine fish sample composition was summarized by species and site for each week. The recorded fork lengths and weights of the juvenile salmon sample population were summarized to present minimum and maximum values as well as calculated averages. Sea lice infestation rates, including the number of infested fish and the number of sea lice identified, were determined for the juvenile salmon sample population. Prevalence, as defined as the number of host fish found to have one or more sea lice compared to the total number of host fish examined, was determined for all salmon species captured. Abundance, as defined as the total number of sea lice observed compared to the total number of host fish examined, was also determined for all salmon species captured. The intensity of sea lice infestation, as described by the number of sea lice found on a single salmon was summarized. Average intensity was calculated by dividing the total number of sea lice identified by the number of infested fish.

Statistical analysis of the spatial and temporal distribution of sea lice was not conducted. Spatial and temporal analysis has been limited to the simple presentation and discussion of the number of sea lice found on fish specimens collected from each site during each of the sampling events.

3.0 Results

The following sections outline the results of beach seine collection and subsequent sea lice inspection of juvenile salmonids collected from Quatsino Sound and Holberg Inlet, BC, in 2020. Water quality field data is presented in Appendix I, beach seine fish capture data is included in Appendix II and data on the juvenile salmon sample population including sea lice lab analysis results provided by CAHS are located in Appendix III.

3.1 Water Quality Parameters

Surface measurements of water temperature and salinity, taken during beach seining at each of the 10 sites during the two sample periods, are presented in Table 2. The field data recorded at each site is included in Appendix I.

Recorded surface water temperatures ranged from a low of 6.3 °C recorded at Site 2 and Site 3 on April 6, 2020, to a high of 13.1 °C recorded at Site 10 on May 5, 2020 (Table 2; Appendix I). Calculated weekly average surface water temperatures increased from 8.1 °C for April 6, 2020, to 11.1 °C for May 5, 2020.

Recorded surface water salinity ranged from a low of 11.3 ppt recorded at Site 10 on May 5, 2020, to a high of 31.7 ppt recorded at Site 5 and Site 9 on April 6, 2020 (Table 2; Appendix I). The calculated weekly average surface water salinity decreased from 25.0 ppt for April 6, 2020, to 24.7 ppt for May 5, 2020.

Table 2: Water quality parameters collected at beach seine sites in Quatsino Sound and Holberg Inlet in 2020.

Site	April 6, 2020		May 5, 2020	
	Temp. (°C)	Salinity (ppt)	Temp. (°C)	Salinity (ppt)
1	7.9	14.1	10.2	24.9
2	6.3	11.4	9.9	13.5
3	6.3	20.2	11.4	25.5
4	7.7	29.2	10.2	30.2
5	8.1	31.7	10.5	31.0
6	7.7	30.3	11.2	31.4
7	8.3	31.0	11.3	28.5
8	8.4	26.0	11.2	26.6
9	8.9	31.7	11.6	24.5
10	9.2	24.5	13.1	11.3
Average	8.1	25.0	11.1	24.7

3.2 Fish Sample Composition

A total of 1077 fish were captured during beach seine sampling conducted in Quatsino Sound and Holberg Inlet, BC in 2020 with 386 retained for sea lice analysis (Table 3). A summary of the total number of fish captured and collected as specimens at each site over the collection period can be found in Table 4. Totals of fish captured and collected specimens at each site over the entire collection period can be found in Appendix II. Of the 963 chum salmon captured, 302 individual chum salmon (31.4 %) were retained and underwent lab analysis. Of the 109 coho salmon captured, 79 coho salmon (72.5 %) were retained and underwent lab analysis. All of the five chinook salmon captured underwent lab analysis (Table 3). No pink salmon, sockeye salmon or threespine stickleback and no Atlantic salmon were captured during the two sampling events in April and May 2020 (Table 3).

Chum salmon smolts were captured in significantly greater numbers than any other species. A total of 963 chum salmon were captured, representing 89.4 % of all captured salmonids (Table 3).

Table 3: The total of collected individuals of each fish species captured in Quatsino Sound and Holberg Inlet, BC in April and May 2020, and the percentage of the total capture population that they represent.

Common Name	Capture Totals (% of total capture population)	Collection Totals	Collection %
chum salmon	963 (89.4 %)	302	31.4
coho salmon	109 (10.1 %)	79	72.5
chinook salmon	5 (0.5 %)	5	100.0
pink salmon	0 (0.0 %)	0	-
sockeye salmon	0 (0.0 %)	0	-
threespine stickleback	0 (0.0 %)	0	-
All species	1077	386	35.8

Table 4: The number of captured fish (Capture Total) and the number of individual fish collected (Sample Total) from each of the 10 sample sites in Quatsino Sound and Holberg Inlet, BC in April and May 2020.

Site	Chum		Pink		Coho		Chinook		Sockeye		Capture Total	Sample Total
	Capture Total	Sample Total	Capture Total	Sample Total	Capture Total	Sample Total	Capture Total	Sample Total	Capture Total	Sample Total		
1	2	2	0	0	0	0	0	0	0	0	2	2
2	112	30	0	0	9	9	0	0	0	0	121	39
3	111	56	0	0	9	9	4	4	0	0	124	69
4	63	58	0	0	34	29	0	0	0	0	97	87
5	42	36	0	0	0	0	0	0	0	0	42	36
6	303	43	0	0	55	30	0	0	0	0	358	73
7	0	0	0	0	0	0	1	1	0	0	1	1
8	10	10	0	0	0	0	0	0	0	0	10	10
9	245	31	0	0	2	2	0	0	0	0	247	33
10	75	36	0	0	0	0	0	0	0	0	75	36
Total	963	302	0	0	109	79	5	5	0	0	1077	386

3.3 Fish Sample Size Statistics

Summary statistics for the sample population of juvenile salmonids were completed for weight and fork length. This analysis was completed for chum salmon and coho salmon only as the sample population of chinook salmon was not of sufficient size to warrant this analysis.

3.3.1 Chum Salmon

Analysis of weight and fork length data was completed for the chum salmon sample population collected in Quatsino Sound and Holberg Inlet in 2020. The weight and fork length of one chum salmon was not included in the lab data provided by CAHS and therefore this summary is for 301 chum salmon, rather than the sample total of 302. The weight of 301 chum smolts collected during the two sample events ranged from 0.26 g to 6.76 g and averaged 1.18 g (SD = 1.3). The fork length of the chum smolts ranged from 32 mm to 87 mm and averaged 45 mm (SD = 11.8). Chum salmon weight and length data was summarized by month which shows an increase in both parameters in the sample population from April to May (Table 5).

3.3.2 Coho Salmon

Analysis of weight and fork length data was completed for the coho salmon sample population collected in Quatsino Sound and Holberg Inlet in 2020. The weight of 79 coho smolts collected ranged from 3.13 g to 19.40 g and averaged 7.55 g (SD = 2.6). The fork length of the coho smolts ranged from 65 mm to 118 mm and averaged 83 mm (SD = 9.7). Coho salmon weight and length data was summarized by month which shows a slight decrease in weight in the sample population from April to May while the fork length remained consistent (Table 5).

Table 5: Average weights and lengths summarized by month of chum and coho salmon collected in Quatsino Sound and Holberg Inlet in 2020.

Species	Weight (g)		Length (mm)	
	April	May	April	May
Chum	0.58 (n=114)	1.55 (n=187)	38	49
Coho	8.41 (n=9)	7.43 (n=70)	83	83

3.4 Sea Lice Infestation Rates

The results of the laboratory analysis for the presence of sea lice on the sample population collected in Quatsino Sound and Holberg Inlet in 2020 are presented in Table 6. The data recorded for each fish in the sample population during lab analysis is included in Appendix III. A total of 386 samples were collected at 10 sites in Quatsino Sound and Holberg Inlet in 2020 and were inspected for sea lice infestation. A total of 156 individuals in the sample population were found to be infested with 463 sea lice (Table 6). A total of 110 chum smolts, 44 coho salmon and two chinook salmon were found to be infested with sea lice (Table 6). This data reflects the identification of sea lice of either species (*L. salmonis* and *C. clemensi*) on inspected juvenile salmon.

Prevalence was defined as the number of fish found to be infested with one or more sea louse compared to the total number of fish. Abundance was defined as the total number of sea lice observed compared to the total number of fish. The sea lice prevalence in the sample population collected in Quatsino Sound and Holberg Inlet in 2020 was 40.4 % and the abundance was 1.20 (Table 6). Sea lice counts of both species observed (*L. salmonis* and *C. clemensi*) were added together for the prevalence and abundance calculations for the entire sample population.

The intensity of sea lice infestation, as defined as the number of sea lice on a single sample, ranged from one louse found on 66 individuals to a maximum of 29 lice found on one individual. The average intensity was calculated by dividing the total number of sea lice by the number of infested fish, which was 2.0 for chum salmon, 5.5 for coho salmon and 1.0 for chinook salmon (Table 6).

Table 6: Results of analysis for sea lice infestation on the sample population collected by beach seine in Quatsino Sound and Holberg Inlet, BC in 2020.

Species	Sample size (n)	Total number of lice observed	Total number of fish infested	Prevalence (%)	Abundance	Average Intensity
chum	302	221	110	36.4	0.73	2.0
coho	79	240	44	55.7	3.04	5.5
chinook	5	2	2	40.0	0.40	1.0
Total	386	463	156	40.4	1.20	3.0

3.4.1 Infestation Rates on Chum Salmon

The results of the laboratory analysis for sea lice infestation for chum salmon are presented by site in Table 7. A total of 110 chum salmon were found to be infested with 221 sea lice. Sea lice counts of both sea lice species observed (*L. salmonis* and *C. clemensi*) were added together for the presentation of sea lice infestation, prevalence and abundance on the chum salmon sample population (Table 7). There were no chum salmon collected at Site 7 in 2020.

The chum salmon sample population sea lice infestation rates were summarized by site. A total of 110 chum salmon were found to be infested with at least one sea louse. The prevalence of sea lice on the chum salmon sample population (n=302) collected in Quatsino Sound and Holberg Inlet in 2020 was 36.4 %. Sea lice prevalence calculated by site and week for chum salmon is presented in Table 7. Sea lice prevalence was higher in chum salmon collected in May (48.4 %) than in April (16.7 %) 2020. The highest sea lice prevalence (100 %) was at Site 10 on May 5, 2020. Sea lice prevalence calculated by site for the total chum sample population was variable ranging from 0.0 % at Site 1 to a high of 63.9 % at Site 5.

A total of 221 sea lice were identified during laboratory analysis of retained chum salmon. The abundance of sea lice on the chum salmon sample population (n=302) collected in Quatsino Sound and Holberg Inlet in 2020 was 0.73. Sea lice abundance was calculated by week and by site and is presented in Table 7. Sea lice abundance was higher in chum salmon collected in May (1.04) than in April (0.22) 2020. The highest sea lice abundance (2.33) was at Site 10 on May 5, 2020. Sea lice abundance calculated by site for the total chum sample population was also variable ranging from 0.00 at Site 1 to a high of 1.28 at Site 5.

Table 7: The number of sea lice found on chum salmon collected in Quatsino Sound and Holberg Inlet in 2020 summarized by the 10 sites where beach seining was conducted. Calculated sea lice prevalence, abundance and average intensity is also included by site.

Site	Sample Week														Total Chum Sample Population		
	April 6, 2020							May 5, 2020							Prevalence (%)	Abundance	Average Intensity
	# of Chum Analyzed	# of Infested Chum	Average Weight of Infested Chum (g)	# of Lice	Prevalence (%)	Abundance	Average Intensity	# of Chum Analyzed	# of Infested Chum	Average Weight of Infested Chum (g)	# of Lice	Prevalence (%)	Abundance	Average Intensity			
1	2	0	-	0	0.0	0.00	0.0	0	-	-	-	-	-	-	0.0	0.00	0.0
2	0	-	-	-	-	-	-	30	8	1.14	14	26.7	0.47	1.8	26.7	0.47	1.8
3	29	3	0.96	5	10.3	0.17	1.7	27	16	1.06	34	59.3	1.26	2.1	33.9	0.70	2.1
4	30	7	0.57	11	23.3	0.37	1.6	28	2	1.67	5	7.1	0.18	2.5	15.5	0.28	1.8
5	6	1	0.39	1	16.7	0.17	1.0	30	22	0.77	45	73.3	1.50	2.0	63.9	1.28	2.0
6	13	2	0.55	2	15.4	0.15	1.0	30	16	4.42	46	53.3	1.53	2.9	41.9	1.12	2.7
7	0	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
8	4	2	0.53	2	50.0	0.50	1.0	6	3	0.62	8	50.0	1.33	2.7	50.0	1.00	2.0
9	0	-	-	-	-	-	-	31	18	1.02	30	58.1	0.97	1.7	58.1	0.97	1.7
10	30	4	0.67	4	13.3	0.13	1.0	6	6	0.73	14	100.0	2.33	2.3	27.8	0.50	1.8
Total	114	19	0.63	25	16.7	0.22	1.3	188	91	1.56	196	48.4	1.04	2.2	36.4	0.73	2.0

3.4.2 Infestation Rates on Coho Salmon

The results of the laboratory analysis for sea lice infestation for coho salmon are presented by site in Table 8. A total of 44 coho salmon were found to be infested with 240 sea lice in the coho salmon sample population (n=79). Sea lice counts of both sea lice species observed (*L. salmonis* and *C. clemensi*) were added together for the presentation of sea lice infestation, prevalence and abundance on the coho salmon sample population (Table 8). There were no coho salmon samples collected at Sites 1, 5, 7, 8 and 10.

A total of 44 coho salmon were found to be infested with at least one sea louse. The prevalence of sea lice on the coho salmon sample population (n=79) collected in Quatsino Sound and Holberg Inlet in 2020 was 55.7 %. Sea lice prevalence calculated by site and week for coho salmon is presented in Table 8. Sea lice prevalence calculated by site for the total coho sample population ranged from 36.7 % at Site 6 (n=30) to a high of 88.9 % at Site 3 (n=9).

A total of 240 sea lice were identified during laboratory analysis of retained coho salmon. The abundance of sea lice on the coho salmon sample population (n=79) collected in Quatsino Sound and Holberg Inlet in 2020 was 3.04. Sea lice abundance was calculated by week and by site and is presented in Table 8. Sea lice abundance calculated by site for the total coho sample population was variable ranging from 0.44 at Site 2 to a high of 12.11 at Site 3.

Table 8: The number of sea lice found on coho salmon collected in Quatsino Sound and Holberg Inlet in 2020 summarized by the 10 sites where beach seining was conducted. Calculated sea lice prevalence, abundance and average intensity is also included by site.

Site	Sample Week														Total Coho Sample Population		
	April 6, 2020							May 5, 2020									
	# of Coho Analyzed	# of Infested Coho	Average Weight of Infested Coho (g)	# of Lice	Prevalence (%)	Abundance	Average Intensity	# of Coho Analyzed	# of Infested Coho	Average Weight of Infested Coho (g)	# of Lice	Prevalence (%)	Abundance	Average Intensity	Prevalence (%)	Abundance	Average Intensity
1	0	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
2	9	4	8.42	4	44.4	0.44	1.0	0	-	-	-	-	-	-	44.4	0.44	1.0
3	0	-	-	-	-	-	-	9	8	11.31	109	88.9	12.11	13.6	88.9	12.11	13.6
4	0	-	-	-	-	-	-	29	20	6.16	104	69.0	3.59	5.2	69.0	3.59	5.2
5	0	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
6	0	-	-	-	-	-	-	30	11	7.65	20	36.7	0.67	1.8	36.7	0.67	1.8
7	0	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
8	0	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
9	0	-	-	-	-	-	-	2	1	6.01	3	50.0	1.50	3.0	50.0	1.50	3.0
10	0	-	-	-	-	-	-	0	-	-	-	-	-	-	-	-	-
Total	9	4	8.42	4	44.4	0.44	1.0	70	40	7.59	236	57.1	3.37	5.9	55.7	3.04	5.5

3.4.3 Infestation Rates on Chinook Salmon

A total of five chinook salmon were collected in Quatsino Sound and Holberg Inlet in 2020. Two chinook salmon were found to be infested with one sea louse each resulting in a species prevalence of 40.0 % and an abundance of 0.40 (Table 6). The infested chinook salmon were both collected at Site 3 on May 5, 2020.

3.5 Infestation Rates by Sea Lice Species

A total of 253 *Lepeophtheirus salmonis* sea lice of various life stages were identified on 127 juvenile salmon of all species and 210 *Caligus clemensi* sea lice were found on 71 juvenile salmon of all species analyzed in the lab (Appendix III). There were 42 samples that were infested with at least one *L. salmonis* and *C. clemensi* sea louse.

3.5.1 Infestation Rates by Sea Lice Species on Chum Salmon

An analysis of the species of sea lice identified on the 110 infested chum salmon collected in Quatsino Sound and Holberg Inlet was completed and is presented in Table 9. A total of 162 *Lepeophtheirus salmonis* sea lice of various life stages were identified on 93 juvenile chum salmon and 59 *Caligus clemensi* sea lice were found on 37 of the juvenile chum salmon analyzed in the lab (Appendix III). Of the infested chum salmon, 20 were found to have at least one *L. salmonis* and *C. clemensi* sea louse. The sea lice species identified on chum salmon are also presented by site in Table 10.

Table 9: The number of sea lice in each life stage by species identified on the chum salmon sample population from Quatsino Sound and Holberg Inlet in 2020.
LEP = *Lepeophtheirus salmonis* CAL = *Caligus clemensi*

Life Stage ¹	April 6, 2020	May 5, 2020
LEP Co	10	72
LEP C1	11	48
LEP C2	1	17
LEP PAM	0	3
LEP PAF	0	0
LEP AM	0	0
LEP AF	0	0
Total LEP	22	140
CAL Co	2	13
CAL C1	1	32
CAL C2	0	7
CAL C3	0	1
CAL C4	0	1
CAL PAM	0	1
CAL PAF	0	0
CAL AM	0	0
CAL AF	0	1
Total CAL	3	56

¹ Lice life stage codes: Co = copepodid, C1-4 = chalimus 1-4, PAM = pre-adult male, PAF = pre-adult female, AM = adult male, AF = adult female.

Table 10: The species of sea lice found on chum salmon collected in Quatsino Sound and Holberg Inlet in 2020 summarized by the 10 sites where beach seining was conducted. LEP = *Lepeophtheirus salmonis* CAL = *Caligus clemensi*

Site	Sample Week								Total		
	April 6, 2020				May 5, 2020						
	# of Chum Analyzed	# of Infested Chum	# of LEP	# of CAL	# of Chum Analyzed	# of Infested Chum	# of LEP	# of CAL	# of Chum Analyzed	# of Infested Chum	# of Lice
1	2	0	0	0	0	-	-	-	2	0	0
2	0	-	-	-	30	8	1	13	30	8	14
3	29	3	3	2	27	16	17	17	56	19	39
4	30	7	11	0	28	2	2	3	58	9	16
5	6	1	1	0	30	22	36	9	36	23	46
6	13	2	2	0	30	16	35	11	43	18	48
7	0	-	-	-	0	-	-	-	0	-	-
8	4	2	2	0	6	3	8	0	10	5	10
9	0	-	-	-	31	18	29	1	31	18	30
10	30	4	3	1	6	6	12	2	36	10	18
Total	114	19	22	3	188	91	140	56	302	110	221

3.5.2 Infestation Rates by Sea Lice Species on Coho Salmon

The sea lice species found on the 44 infested coho salmon are presented in Table 11. A total of 90 *Lepeophtheirus salmonis* sea lice were identified on 33 juvenile coho salmon analyzed in the lab (Appendix III). A total of 150 *Caligus clemensi* sea lice were found on 33 juvenile coho salmon analyzed in the lab (Appendix III). Of the infested coho salmon, 22 were found to have at least one *L. salmonis* and *C. clemensi* sea louse. The sea lice species identified on coho salmon are also presented by site in Table 12.

Table 11: The number of sea lice in each life stage by species identified on coho salmon from Quatsino Sound and Holberg Inlet in 2020. LEP = *Lepeophtheirus salmonis* CAL = *Caligus clemensi*

Life Stage ¹	April 6, 2020	May 5, 2020
LEP Co	0	43
LEP C1	1	25
LEP C2	0	18
LEP PAM	0	1
LEP PAF	0	2
LEP AM	0	0
LEP AF	0	0
Total LEP	1	89
CAL Co	0	32
CAL C1	0	75
CAL C2	2	28
CAL C3	0	8
CAL C4	0	2
CAL PAM	0	0
CAL PAF	0	0
CAL AM	0	0
CAL AF	1	2
Total CAL	3	147

¹ Lice life stage codes: Co = copepodid, C1-4 = chalimus 1-4, PAM = pre-adult male, PAF = pre-adult female, AM = adult male, AF = adult female.

Table 12: The species of sea lice found on coho salmon collected in Quatsino Sound and Holberg Inlet in 2020 summarized by the 10 sites where beach seining was conducted. LEP = *Lepeophtheirus salmonis* CAL = *Caligus clemensi*

Site	Sample Week								Total		
	April 6, 2020				May 5, 2020						
	# of Coho Analyzed	# of Infested Coho	# of LEP	# of CAL	# of Coho Analyzed	# of Infested Coho	# of LEP	# of CAL	# of Coho Analyzed	# of Infested Coho	# of Lice
1	0	-	-	-	0	-	-	-	0	-	-
2	9	4	1	3	0	-	-	-	9	4	4
3	0	-	-	-	9	8	20	89	9	8	109
4	0	-	-	-	29	20	52	52	29	20	104
5	0	-	-	-	0	-	-	-	0	-	-
6	0	-	-	-	30	11	16	4	30	11	20
7	0	-	-	-	0	-	-	-	0	-	-
8	0	-	-	-	0	-	-	-	0	-	-
9	0	-	-	-	2	1	1	2	2	1	3
10	0	-	-	-	0	-	-	-	0	-	-
Total	9	4	1	3	70	40	89	147	79	44	240

3.5.3 Infestation Rates by Sea Lice Species on Chinook Salmon

There were two infested chinook salmon out of the five samples collected. One chinook salmon was infested with one LEP Co and one was infested with one CAL C1. Both infested fish were collected at Site 3 on May 5, 2020 in Holberg Inlet.

4.0 Conclusions

This report presents the data from the sixth year of beach seining and sea lice analysis conducted for wild juvenile salmonid monitoring in Quatsino Sound and Holberg Inlet, BC by MOWI Canada West. This report is limited to the summary and presentation of the data collected in 2020. A tabular comparison of water quality data and chum sea lice infestation data from 2015 to 2020 is presented in Appendix IV.

A total of 386 samples underwent lab analysis for sea lice infestation in 2020 including 302 chum, 79 coho and five chinook salmon. Sea lice were found on each of the species analyzed in the lab. A total of 156 juvenile salmonids were found to be infested with sea lice in the total sample population, resulting in a calculated sea lice prevalence of 40.4 % in 2020. A total of 463 sea lice were found during laboratory analysis resulting in an abundance of 1.20 for the sample population.

Chum salmon smolts were captured in significantly greater numbers than any other species. A total of 963 chum salmon were captured, representing 89.4 % of all captured samples. Of the 963 chum captured, 302 were kept for lab analysis for sea lice infestation. A total of 110 chum smolts were found to be infested with a total of 221 lice resulting in a calculated prevalence of 36.4 %, abundance of 0.73 and an average intensity of 2.0 for the chum salmon sample population.

A total of 109 coho salmon were captured, representing 10.1 % of all captured samples. Of the 109 coho captured, 79 were kept for lab analysis for sea lice infestation. A total of 44 coho smolts were found to be infested with a total of 240 lice resulting in a calculated prevalence of 55.7 %, abundance of 3.04 and an average intensity of 5.5 for the coho salmon sample population.

A total of five chinook salmon were captured, representing 0.5 % of all captured samples. All of the chinook salmon captured were kept for lab analysis for sea lice infestation. Two chinook smolts were found to be infested with a total of two lice resulting in a calculated prevalence of 40.0 %, abundance of 0.40 and an average intensity of 1.0 for the chinook salmon sample population.

A total of 253 *Lepeophtheirus salmonis* sea lice of various life stages were identified on 127 juvenile salmon of all species and 210 *Caligus clemensi* sea lice were found on 71 juvenile salmon of all species analyzed in the lab. There were 42 samples that were infested with at least one *L. salmonis* and *C. clemensi* sea louse.

For the chum salmon sample population, a total of 162 *Lepeophtheirus salmonis* sea lice of various life stages were identified on 93 juvenile chum salmon and 59 *Caligus clemensi* sea lice were found on 37 of the juvenile chum salmon analyzed in the lab. There were 20 chum that were infested with at least one *L. salmonis* and *C. clemensi* sea louse.

For the coho salmon sample population, a total of 90 *Lepeophtheirus salmonis* sea lice of various life stages were identified on 33 juvenile coho salmon and 150 *Caligus clemensi* sea lice were found on 33 juvenile coho salmon analyzed in the lab. There were 22 coho that were infested with at least one *L. salmonis* and *C. clemensi* sea louse.

A comparison of the prevalence, abundance and average intensity of sea lice species found on chum salmon was completed for sample data from 2015 to 2020 collected in Quatsino Sound and Holberg Inlet. This data is presented in the following summary table with additional yearly comparisons of juvenile wild salmon monitoring results presented in Appendix IV.

Year	<i>Caligus clemensi</i>			<i>Lepeophtheirus salmonis</i>		
	Prevalence	Abundance	Average Intensity	Prevalence	Abundance	Average Intensity
2015	13.6 %	0.24	1.75	12.4 %	0.21	1.72
2016	8.6 %	0.11	1.32	8.9 %	0.10	1.09
2017	1.7 %	0.02	1.00	1.7 %	0.02	1.00
2018	2.5 %	0.02	1.00	3.1 %	0.03	1.00
2019	7.9 %	0.10	1.31	1.8 %	0.02	1.13
2020	12.3 %	0.20	1.59	30.8 %	0.54	1.74

5.0 References

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Appendix I – Field Data

Date	Time	Site	Salinity (ppt) 0.2m	Temperature (° C) 0.2m
04-06-20	9:30	Site 1	14.1	7.9
04-06-20	9:50	Site 2	11.4	6.3
04-06-20	10:03	Site 3	20.2	6.3
04-06-20	10:44	Site 4	29.2	7.7
04-06-20	11:04	Site 5	31.7	8.1
04-06-20	11:22	Site 6	30.3	7.7
04-06-20	11:35	Site 7	31.0	8.3
04-06-20	11:58	Site 8	26.0	8.4
04-06-20	12:24	Site 9	31.7	8.9
04-06-20	12:39	Site 10	24.5	9.2
05-05-20	9:19	Site 1	24.9	10.2
05-05-20	9:37	Site 2	13.5	9.9
05-05-20	9:55	Site 3	25.5	11.4
05-05-20	10:50	Site 4	30.2	10.2
05-05-20	11:10	Site 5	31.0	10.5
05-05-20	11:30	Site 6	31.4	11.2
05-05-20	11:57	Site 7	28.5	11.3
05-05-20	12:11	Site 8	26.6	11.2
05-05-20	12:31	Site 9	24.5	11.6
05-05-20	12:51	Site 10	11.3	13.1

Appendix II – Capture and Collection Sample Totals

Date	Time	Site Name	Weather Comments	Tide Stage	Pink Captured	Pink Retained	Chum Captured	Chum Retained	Coho Captured	Coho Retained	Chinook Captured	Chinook Retained	Sockeye Captured	Sockeye Retained	Salmonid Mortalities	Comments
04-06-20	9:30	Site 1	Calm	Low	0	0	2	2	0	0	0	0	0	0	0	
04-06-20	9:50	Site 2	Calm	Low	0	0	0	0	9	9	0	0	0	0	0	
04-06-20	10:03	Site 3	Calm	Low	0	0	37	29	0	0	1	1	0	0	0	6 sculpin, 8 tubesnouts
04-06-20	10:44	Site 4	Calm	High	0	0	35	30	0	0	0	0	0	0	0	
04-06-20	11:04	Site 5	Calm	High	0	0	6	6	0	0	0	0	0	0	0	1 sculpin
04-06-20	11:22	Site 6	Calm	High	0	0	13	13	0	0	0	0	0	0	0	Very high tide
04-06-20	11:35	Site 7	Calm	High	0	0	0	0	0	0	1	1	0	0	0	Very high tide, 3 sand dabs, 1 sculpin
04-06-20	11:58	Site 8	Calm	High	0	0	4	4	0	0	0	0	0	0	0	Very high tide
04-06-20	12:24	Site 9	Calm	High	0	0	0	0	0	0	0	0	0	0	0	1 sculpin
04-06-20	12:39	Site 10	Calm	High	0	0	69	30	0	0	0	0	0	0	0	Very high tide
05-05-20	9:19	Site 1	Sunny, calm	Mid	0	0	0	0	0	0	0	0	0	0	0	2 sculpin, 1 pipefish
05-05-20	9:37	Site 2	Sunny, calm	Mid	0	0	112	30	0	0	0	0	0	0	0	24 pipefish, 3 sculpin
05-05-20	9:55	Site 3	Sunny, calm	Mid	0	0	74	27	9	9	3	3	0	0	0	1 shiner perch
05-05-20	10:50	Site 4	Sunny, calm	High	0	0	28	28	34	29	0	0	0	0	0	
05-05-20	11:10	Site 5	Ground swell	High	0	0	36	30	0	0	0	0	0	0	0	
05-05-20	11:30	Site 6	Calm, high overcast	High	0	0	290	30	55	30	0	0	0	0	5	
05-05-20	11:57	Site 7	Ground swell	High	0	0	0	0	0	0	0	0	0	0	0	1 sculpin
05-05-20	12:11	Site 8	Calm, high overcast	High	0	0	6	6	0	0	0	0	0	0	0	3 gunnels, 4 sculpin
05-05-20	12:31	Site 9	Overcast, calm	High	0	0	245	31	2	2	0	0	0	0	0	
05-05-20	12:51	Site 10	Overcast, calm	High	0	0	6	6	0	0	0	0	0	0	0	2 green crab

Appendix III – Sea Lice Analysis Data

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
6-Apr-20	Site 1	Chum	46	0.73								0										0
6-Apr-20	Site 1	Chum	37	0.46								0										0
6-Apr-20	Site 2	Coho	87	9.50								0			1							1
6-Apr-20	Site 2	Coho	85	8.60								0										0
6-Apr-20	Site 2	Coho	85	9.82								0										0
6-Apr-20	Site 2	Coho	93	11.20		1						1										0
6-Apr-20	Site 2	Coho	75	6.54								0										0
6-Apr-20	Site 2	Coho	75	6.48								0			1							1
6-Apr-20	Site 2	Coho	85	9.55								0										0
6-Apr-20	Site 2	Coho	78	6.49								0								1		1
6-Apr-20	Site 2	Coho	80	7.49								0										0
6-Apr-20	Site 3	Chum	38	0.57								0										0
6-Apr-20	Site 3	Chum	43	0.75								0										0
6-Apr-20	Site 3	Chum	39	0.56								0										0
6-Apr-20	Site 3	Chum	48	0.57								0										0
6-Apr-20	Site 3	Chum	34	0.48	1							1										0
6-Apr-20	Site 3	Chum	38	0.58								0										0
6-Apr-20	Site 3	Chum	40	0.57								0										0
6-Apr-20	Site 3	Chum	37	0.52								0										0
6-Apr-20	Site 3	Chum	40	0.73								0										0
6-Apr-20	Site 3	Chum	38	0.57								0										0
6-Apr-20	Site 3	Chum	40	0.66								0										0
6-Apr-20	Site 3	Chum	40	0.55								0										0
6-Apr-20	Site 3	Chum	39	0.58								0										0
6-Apr-20	Site 3	Chum	38	0.58								0										0
6-Apr-20	Site 3	Chum	38	0.62								0										0
6-Apr-20	Site 3	Chum	39	0.69								0										0
6-Apr-20	Site 3	Chum	42	0.62								0										0
6-Apr-20	Site 3	Chum	42	0.62								0										0
6-Apr-20	Site 3	Chinook	38	0.62								0										0
6-Apr-20	Site 3	Chum	40	0.68								0	1									1
6-Apr-20	Site 3	Chum	54	1.73		1	1					2		1								1
6-Apr-20	Site 3	Chum	33	0.55								0										0
6-Apr-20	Site 3	Chum	36	0.66								0										0
6-Apr-20	Site 3	Chum	38	0.60								0										0
6-Apr-20	Site 3	Chum	36	0.64								0										0
6-Apr-20	Site 3	Chum	39	0.60								0										0
6-Apr-20	Site 3	Chum	38	0.44								0										0
6-Apr-20	Site 3	Chum	39	0.57								0										0
6-Apr-20	Site 3	Chum	39	0.51								0										0

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
6-Apr-20	Site 3	Chum	36	0.46								0										0
6-Apr-20	Site 4	Chum	45	0.92								0										0
6-Apr-20	Site 4	Chum	33	0.41								0										0
6-Apr-20	Site 4	Chum	34	0.51		2						2										0
6-Apr-20	Site 4	Chum	34	0.45								0										0
6-Apr-20	Site 4	Chum	38	0.62								0										0
6-Apr-20	Site 4	Chum	32	0.38								0										0
6-Apr-20	Site 4	Chum	37	0.65								0										0
6-Apr-20	Site 4	Chum	39	0.59								0										0
6-Apr-20	Site 4	Chum	37	0.63								0										0
6-Apr-20	Site 4	Chum	38	0.49								0										0
6-Apr-20	Site 4	Chum	35	0.60								0										0
6-Apr-20	Site 4	Chum	40	0.79								0										0
6-Apr-20	Site 4	Chum	37	0.68	1							1										0
6-Apr-20	Site 4	Chum	40	0.73								0										0
6-Apr-20	Site 4	Chum	35	0.44								0										0
6-Apr-20	Site 4	Chum	39	0.62								0										0
6-Apr-20	Site 4	Chum	36	0.58		1						1										0
6-Apr-20	Site 4	Chum	38	0.64		3						3										0
6-Apr-20	Site 4	Chum	42	0.67								0										0
6-Apr-20	Site 4	Chum	36	0.62								0										0
6-Apr-20	Site 4	Chum	34	0.43		1						1										0
6-Apr-20	Site 4	Chum	40	0.60								0										0
6-Apr-20	Site 4	Chum	37	0.51								0										0
6-Apr-20	Site 4	Chum	38	0.52								0										0
6-Apr-20	Site 4	Chum	39	0.66								0										0
6-Apr-20	Site 4	Chum	37	0.57		1						1										0
6-Apr-20	Site 4	Chum	38	0.62								0										0
6-Apr-20	Site 4	Chum	40	0.72								0										0
6-Apr-20	Site 4	Chum	39	0.57		2						2										0
6-Apr-20	Site 4	Chum	35	0.42								0										0
6-Apr-20	Site 5	Chum	38	0.51								0										0
6-Apr-20	Site 5	Chum	37	0.39	1							1										0
6-Apr-20	Site 5	Chum	34	0.50								0										0
6-Apr-20	Site 5	Chum	38	0.49								0										0
6-Apr-20	Site 5	Chum	34	0.45								0										0
6-Apr-20	Site 5	Chum	39	0.68								0										0
6-Apr-20	Site 6	Chum	37	0.63								0										0
6-Apr-20	Site 6	Chum	32	0.36								0										0
6-Apr-20	Site 6	Chum	35	0.45								0										0
6-Apr-20	Site 6	Chum	40	0.58								0										0
6-Apr-20	Site 6	Chum	37	0.45								0										0
6-Apr-20	Site 6	Chum	38	0.57								0										0

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
6-Apr-20	Site 6	Chum	37	0.58								0										0
6-Apr-20	Site 6	Chum	40	0.55	1							1										0
6-Apr-20	Site 6	Chum	38	0.45								0										0
6-Apr-20	Site 6	Chum	34	0.44								0										0
6-Apr-20	Site 6	Chum	35	0.51								0										0
6-Apr-20	Site 6	Chum	37	0.54	1							1										0
6-Apr-20	Site 6	Chum	39	0.58								0										0
6-Apr-20	Site 7	Chinook	39	0.72								0										0
6-Apr-20	Site 8	Chum	39	0.53	1							1										0
6-Apr-20	Site 8	Chum	39	0.52	1							1										0
6-Apr-20	Site 8	Chum	34	0.41								0										0
6-Apr-20	Site 8	Chum	38	0.58								0										0
6-Apr-20	Site 10	Chum	38	0.56								0										0
6-Apr-20	Site 10	Chum	37	0.45								0										0
6-Apr-20	Site 10	Chum	39	0.54								0										0
6-Apr-20	Site 10	Chum	37	0.48								0										0
6-Apr-20	Site 10	Chum	37	0.50								0										0
6-Apr-20	Site 10	Chum	34	0.45								0										0
6-Apr-20	Site 10	Chum	42	0.77								0										0
6-Apr-20	Site 10	Chum	35	0.42								0										0
6-Apr-20	Site 10	Chum	37	0.50	1							1										0
6-Apr-20	Site 10	Chum	38	0.60								0										0
6-Apr-20	Site 10	Chum	39	0.58								0										0
6-Apr-20	Site 10	Chum	39	0.60	1							1										0
6-Apr-20	Site 10	Chum	38	0.58								0										0
6-Apr-20	Site 10	Chum	35	0.46								0										0
6-Apr-20	Site 10	Chum	38	0.57								0										0
6-Apr-20	Site 10	Chum	44	0.95	1							1										0
6-Apr-20	Site 10	Chum	36	0.54								0										0
6-Apr-20	Site 10	Chum	40	0.63								0										0
6-Apr-20	Site 10	Chum	38	0.54								0										0
6-Apr-20	Site 10	Chum	40	0.57								0										0
6-Apr-20	Site 10	Chum	37	0.51								0										0
6-Apr-20	Site 10	Chum	35	0.48								0										0
6-Apr-20	Site 10	Chum	38	0.54								0										0
6-Apr-20	Site 10	Chum	41	0.78								0										0
6-Apr-20	Site 10	Chum	39	0.61								0	1									1
6-Apr-20	Site 10	Chum	38	0.65								0										0
6-Apr-20	Site 10	Chum	38	0.50								0										0
6-Apr-20	Site 10	Chum	36	0.40								0										0
6-Apr-20	Site 10	Chum	38	0.55								0										0
6-Apr-20	Site 10	Chum	37	0.57								0										0
5-May-20	Site 2	Chum	42	0.88								0		1								1

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
5-May-20	Site 2	Chum	49	1.34								0										0
5-May-20	Site 2	Chum	44	0.91								0										0
5-May-20	Site 2	Chum	52	1.54								0										0
5-May-20	Site 2	Chum	44	0.80		1						1		1								1
5-May-20	Site 2	Chum	52	1.46								0										0
5-May-20	Site 2	Chum	43	1.90								0		1								1
5-May-20	Site 2	Chum	47	1.26								0										0
5-May-20	Site 2	Chum	43	0.81								0										0
5-May-20	Site 2	Chum	40	0.94								0				1						1
5-May-20	Site 2	Chum	44	1.20								0										0
5-May-20	Site 2	Chum	46	1.10								0										0
5-May-20	Site 2	Chum	45	1.16								0		3								3
5-May-20	Site 2	Chum	44	0.90								0										0
5-May-20	Site 2	Chum	44	0.80								0										0
5-May-20	Site 2	Chum	39	0.66								0										0
5-May-20	Site 2	Chum	53	1.80								0										0
5-May-20	Site 2	Chum	37	0.47								0										0
5-May-20	Site 2	Chum	45	0.93								0										0
5-May-20	Site 2	Chum	32	0.38								0										0
5-May-20	Site 2	Chum	41	0.78								0	1	1								2
5-May-20	Site 2	Chum	44	0.80								0										0
5-May-20	Site 2	Chum	38	0.60								0										0
5-May-20	Site 2	Chum	47	1.25								0	1	1								2
5-May-20	Site 2	Chum	40	0.87								0										0
5-May-20	Site 2	Chum	38	0.55								0										0
5-May-20	Site 2	Chum	38	0.60								0										0
5-May-20	Site 2	Chum	48	0.89								0										0
5-May-20	Site 2	Chum	40	0.81								0										0
5-May-20	Site 2	Chum	50	1.43								0	1	1								2
5-May-20	Site 3	Chum	49	1.25			1					1										0
5-May-20	Site 3	Chum	50	1.40								0										0
5-May-20	Site 3	Chum	38	0.53								0										0
5-May-20	Site 3	Chum	43	0.94								0										0
5-May-20	Site 3	Chum	40	0.67								0		1								1
5-May-20	Site 3	Chum	59	2.20		1		1				2										0
5-May-20	Site 3	Chum	40	0.65								0		1								1
5-May-20	Site 3	Chum	38	0.47								0										0
5-May-20	Site 3	Chum	52	1.53								0										0
5-May-20	Site 3	Chum	52	1.37				1				1	1	2								3
5-May-20	Site 3	Chum	38	0.59								0	3	3								6
5-May-20	Site 3	Chum	42	0.86		1						1		1								1
5-May-20	Site 3	Chum	42	0.75		1						1										0
5-May-20	Site 3	Chum	36	0.55	1							1	1									1

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
5-May-20	Site 3	Chum	40	0.63								0										0
5-May-20	Site 3	Chum	45	0.95	1	1						2										0
5-May-20	Site 3	Chinook	39	0.66	1							1										0
5-May-20	Site 3	Chum	38	0.54								0										0
5-May-20	Site 3	Chum	39	0.60	1							1										0
5-May-20	Site 3	Chum	41	0.75			1					1		1								1
5-May-20	Site 3	Chum	44	0.85	1	1	1					3		2								2
5-May-20	Site 3	Chum	39	0.50								0										0
5-May-20	Site 3	Chinook	36	0.59								0		1								1
5-May-20	Site 3	Chum	35	0.46								0										0
5-May-20	Site 3	Chum	50	1.41				1				1										0
5-May-20	Site 3	Chum	37	0.44								0										0
5-May-20	Site 3	Chum	60	2.63								0		1								1
5-May-20	Site 3	Chum	41	0.82								0										0
5-May-20	Site 3	Chum	43	0.81	2							2										0
5-May-20	Site 3	Chinook	37	0.65								0										0
5-May-20	Site 3	Coho	100	11.46								0		13	4							17
5-May-20	Site 3	Coho	98	10.80								0										0
5-May-20	Site 3	Coho	101	11.23	5							5	9	13	2							24
5-May-20	Site 3	Coho	97	10.55	5				1			6	7	1								8
5-May-20	Site 3	Coho	118	19.40		1						1	2	15								17
5-May-20	Site 3	Coho	95	9.49	2							2	3	4							1	8
5-May-20	Site 3	Coho	90	8.48	6							6	2	1	1							4
5-May-20	Site 3	Coho	92	9.23								0	1									1
5-May-20	Site 3	Coho	95	10.62								0	1	6	3							10
5-May-20	Site 4	Coho	77	5.77								0										0
5-May-20	Site 4	Coho	74	5.08								0	1	1	2							4
5-May-20	Site 4	Coho	68	4.44								0		1								1
5-May-20	Site 4	Coho	85	7.35		2						2										0
5-May-20	Site 4	Coho	79	6.14	3				1			4	2	1								3
5-May-20	Site 4	Coho	82	6.73								0										0
5-May-20	Site 4	Coho	85	7.35								0										0
5-May-20	Site 4	Coho	73	5.63	1	1						2				1						1
5-May-20	Site 4	Coho	83	7.27		1	5					6	1	1	2	2	1					7
5-May-20	Site 4	Coho	92	9.72								0										0
5-May-20	Site 4	Coho	88	5.95								0										0
5-May-20	Site 4	Coho	73	4.70	1	1						2		1								1
5-May-20	Site 4	Coho	76	5.60		1						1			2							2
5-May-20	Site 4	Coho	82	6.53	1	1						2		1								1
5-May-20	Site 4	Coho	80	6.56	2		2					4	1	1	1							3
5-May-20	Site 4	Coho	82	7.90								0										0
5-May-20	Site 4	Coho	85	7.04								0										0
5-May-20	Site 4	Coho	87	7.66		2						2	1		4	2						7

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
5-May-20	Site 4	Coho	82	8.31								0										0
5-May-20	Site 4	Coho	68	3.92		2	3					5		2								2
5-May-20	Site 4	Coho	78	6.10	3							3		1	2							3
5-May-20	Site 4	Chum	60	2.61								0	1									1
5-May-20	Site 4	Coho	75	5.51	6	3						9										0
5-May-20	Site 4	Coho	80	7.93			1					1	1	1	1						1	4
5-May-20	Site 4	Coho	81	7.59								0										0
5-May-20	Site 4	Coho	80	6.38								0		2	1	1						4
5-May-20	Site 4	Coho	84	8.20		2	1					3		2	1	1						4
5-May-20	Site 4	Coho	79	6.48	3		1					4		1	1							2
5-May-20	Site 4	Coho	70	4.67		1						1		1								1
5-May-20	Site 4	Coho	79	7.00	1							1		1	1							2
5-May-20	Site 4	Chum	42	0.81								0										0
5-May-20	Site 4	Chum	45	1.01								0										0
5-May-20	Site 4	Chum	45	1.02								0										0
5-May-20	Site 4	Chum	43	1.08								0										0
5-May-20	Site 4	Chum	40	0.73	1	1						2	1	1								2
5-May-20	Site 4	Chum	44	1.05								0										0
5-May-20	Site 4	Chum	39	0.60								0										0
5-May-20	Site 4	Chum	42	0.83								0										0
5-May-20	Site 4	Chum	80	2.30								0										0
5-May-20	Site 4	Chum	45	0.99								0										0
5-May-20	Site 4	Chum	43	1.13								0										0
5-May-20	Site 4	Chum	44	1.08								0										0
5-May-20	Site 4	Chum	44	0.87								0										0
5-May-20	Site 4	Chum	36	0.43								0										0
5-May-20	Site 4	Chum	45	1.12								0										0
5-May-20	Site 4	Chum	40	0.67								0										0
5-May-20	Site 4	Chum	40	0.86								0										0
5-May-20	Site 4	Chum	40	0.79								0										0
5-May-20	Site 4	Chum	51	1.67								0										0
5-May-20	Site 4	Chum	39	0.85								0										0
5-May-20	Site 4	Chum	35	0.52								0										0
5-May-20	Site 4	Chum	60	2.57								0										0
5-May-20	Site 4	Chum	73	3.80								0										0
5-May-20	Site 4	Chum	50	1.43								0										0
5-May-20	Site 4	Chum	56	2.07								0										0
5-May-20	Site 4	Chum	51	1.45								0										0
5-May-20	Site 4	Chum	46	1.01								0										0
5-May-20	Site 5	Chum	40	0.69			2					2										0
5-May-20	Site 5	Chum	38	0.61		1						1										0
5-May-20	Site 5	Chum	39	0.72								0										0
5-May-20	Site 5	Chum	39	0.54								0										0

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
5-May-20	Site 5	Chum	42	0.74		1						1										0
5-May-20	Site 5	Chum	45	0.96	3							3										0
5-May-20	Site 5	Chum	44	0.90								0										0
5-May-20	Site 5	Chum	52	1.63								0			1							1
5-May-20	Site 5	Chum	40	0.80	1							1										0
5-May-20	Site 5	Chum	46	0.26	1	1						2										0
5-May-20	Site 5	Chum	44	0.99	1	1						2					1					1
5-May-20	Site 5	Chum	50	1.36		2						2										0
5-May-20	Site 5	Chum	58	1.46								0										0
5-May-20	Site 5	Chum	35	0.29								0										0
5-May-20	Site 5	Chum	39	0.60	1							1										0
5-May-20	Site 5	Chum	40	0.68	4	1						5		1								1
5-May-20	Site 5	Chum	48	1.26	1	1						2										0
5-May-20	Site 5	Chum	39	0.52	1							1										0
5-May-20	Site 5	Chum	45	1.07	2	1						3										0
5-May-20	Site 5	Chum	37	0.58								0										0
5-May-20	Site 5	Chum	47	1.38								0										0
5-May-20	Site 5	Chum	38	0.50		1						1										0
5-May-20	Site 5	Chum	45	1.10	2							2										0
5-May-20	Site 5	Chum	38	0.57	1							1			1							1
5-May-20	Site 5	Chum	36	0.46	1							1		1								1
5-May-20	Site 5	Chum	39	0.56								0										0
5-May-20	Site 5	Chum	38	0.49	1							1										0
5-May-20	Site 5	Chum	37	0.53	2							2		1	1							2
5-May-20	Site 5	Chum	38	0.55	1							1		2								2
5-May-20	Site 5	Chum	37	0.53	1							1										0
5-May-20	Site 6	Chum	70	3.66								0		2								2
5-May-20	Site 6	Chum	83	5.82								0										0
5-May-20	Site 6	Chum	76	4.28	2							2										0
5-May-20	Site 6	Chum	87	6.30								0										0
5-May-20	Site 6	Chum	68	3.31	2							2										0
5-May-20	Site 6	Chum	59	1.21	1	1						2										0
5-May-20	Site 6	Chum	76	4.66	2	2						4	1									1
5-May-20	Site 6	Chum	81	4.96								0										0
5-May-20	Site 6	Chum	80	5.84	1							1										0
5-May-20	Site 6	Chum	79	6.70	5	2						7										0
5-May-20	Site 6	Chum	73	3.76	2							2	1									1
5-May-20	Site 6	Chum	83	6.76		1						1		2	3			1				6
5-May-20	Site 6	Chum	75	4.79			1					1									1	1
5-May-20	Site 6	Chum	73	3.93								0										0
5-May-20	Site 6	Chum	82	5.62	2							2										0
5-May-20	Site 6	Chum	71	3.67								0										0
5-May-20	Site 6	Chum	66	3.15	1							1										0

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
5-May-20	Site 6	Chum	75	4.60								0										0
5-May-20	Site 6	Chum	75	4.16								0										0
5-May-20	Site 6	Chum	73	3.98								0										0
5-May-20	Site 6	Chum	76	4.75								0										0
5-May-20	Site 6	Chum	82	5.58								0										0
5-May-20	Site 6	Chum	83	6.03								0										0
5-May-20	Site 6	Chum	72	3.99								0										0
5-May-20	Site 6	Chum	58	2.34	1		1					2										0
5-May-20	Site 6	Chum	72	4.31								0										0
5-May-20	Site 6	Chum	66	2.90								0										0
5-May-20	Site 6	Chum	75	5.25			1					1										0
5-May-20	Site 6	Chum	77	4.28	1							1										0
5-May-20	Site 6	Chum	80	5.13	1	1	4					6										0
5-May-20	Site 6	Coho	95	10.16								0										0
5-May-20	Site 6	Coho	76	5.34								0										0
5-May-20	Site 6	Coho	78	6.30								0										0
5-May-20	Site 6	Coho	86	7.43								0		1								1
5-May-20	Site 6	Coho	80	5.64								0										0
5-May-20	Site 6	Coho	104	12.50				1				1										0
5-May-20	Site 6	Coho	83	6.88								0										0
5-May-20	Site 6	Coho	76	5.38								0										0
5-May-20	Site 6	Coho	79	6.34								0										0
5-May-20	Site 6	Coho	65	3.13								0		2								2
5-May-20	Site 6	Coho	88	8.78								0										0
5-May-20	Site 6	Coho	73	4.91		4	3					7										0
5-May-20	Site 6	Coho	92	10.45								0										0
5-May-20	Site 6	Coho	111	15.12		1						1										0
5-May-20	Site 6	Coho	71	4.44								0										0
5-May-20	Site 6	Coho	75	5.72								0										0
5-May-20	Site 6	Coho	87	7.85								0										0
5-May-20	Site 6	Coho	80	6.66								0										0
5-May-20	Site 6	Coho	81	6.77	1							1										0
5-May-20	Site 6	Coho	85	7.18								0										0
5-May-20	Site 6	Coho	75	8.18		1						1										0
5-May-20	Site 6	Coho	89	8.05								0										0
5-May-20	Site 6	Coho	85	7.36								0										0
5-May-20	Site 6	Coho	80	5.79		1						1										0
5-May-20	Site 6	Coho	80	5.77								0										0
5-May-20	Site 6	Coho	75	4.74								0										0
5-May-20	Site 6	Coho	85	8.26	1		1					2										0
5-May-20	Site 6	Coho	71	4.43								0										0
5-May-20	Site 6	Coho	70	4.01	1							1										0
5-May-20	Site 6	Coho	85	8.05	1							1		1								1

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
5-May-20	Site 8	Chum	40	0.59								0										0
5-May-20	Site 8	Chum	36	0.53	1	5						6										0
5-May-20	Site 8	Chum	40	0.65	1							1										0
5-May-20	Site 8	Chum	41	0.69	1							1										0
5-May-20	Site 8	Chum	40	0.60								0										0
5-May-20	Site 8	Chum	35	0.45								0										0
5-May-20	Site 9	Coho	80	6.01			1					1				1	1					2
5-May-20	Site 9	Coho	100	12.03								0										0
5-May-20	Site 9	Chum	45	1.17								0										0
5-May-20	Site 9	Chum	40	0.93								0										0
5-May-20	Site 9	Chum	42	0.93	1							1										0
5-May-20	Site 9	Chum	43	1.10								0										0
5-May-20	Site 9	Chum	44	0.90		2						2										0
5-May-20	Site 9	Chum	N/A	N/A								0										0
5-May-20	Site 9	Chum	35	1.12								0										0
5-May-20	Site 9	Chum	54	1.73		1	1					2										0
5-May-20	Site 9	Chum	45	1.10								0										0
5-May-20	Site 9	Chum	43	0.90	1		1					2										0
5-May-20	Site 9	Chum	45	1.01								0										0
5-May-20	Site 9	Chum	45	1.05								0	1									1
5-May-20	Site 9	Chum	43	0.86	1	2						3										0
5-May-20	Site 9	Chum	42	0.86	1	1						2										0
5-May-20	Site 9	Chum	48	1.10	1							1										0
5-May-20	Site 9	Chum	48	1.25	2							2										0
5-May-20	Site 9	Chum	52	1.43		1	1					2										0
5-May-20	Site 9	Chum	48	1.12								0										0
5-May-20	Site 9	Chum	47	1.08								0										0
5-May-20	Site 9	Chum	43	0.78	1							1										0
5-May-20	Site 9	Chum	45	0.91			1					1										0
5-May-20	Site 9	Chum	42	0.89		1						1										0
5-May-20	Site 9	Chum	44	0.86			1					1										0
5-May-20	Site 9	Chum	46	1.03		2						2										0
5-May-20	Site 9	Chum	44	0.89	1	2						3										0
5-May-20	Site 9	Chum	45	1.20								0										0
5-May-20	Site 9	Chum	44	1.04		2						2										0
5-May-20	Site 9	Chum	45	1.01		1						1										0
5-May-20	Site 9	Chum	54	1.53								0										0
5-May-20	Site 9	Chum	54	1.83								0										0
5-May-20	Site 9	Chum	50	1.59								0										0
5-May-20	Site 10	Chum	42	0.79	2	2						4			1							1
5-May-20	Site 10	Chum	44	0.91	1	1						2										0
5-May-20	Site 10	Chum	42	0.78	1	1						2		1								1
5-May-20	Site 10	Chum	38	0.59	2							2										0

Sample Date	Site	Fish Species	Length (mm)	Weight (g)	LEP Co	LEP C1	LEP C2	LEP PAM	LEP PAF	LEP AM	LEP AF	LEP Total	CAL Co	CAL C1	CAL C2	CAL C3	CAL C4	CAL PAM	CAL PAF	CAL AM	CAL AF	CAL Total
5-May-20	Site 10	Chum	34	0.33	1							1										0
5-May-20	Site 10	Chum	44	0.96	1							1										0

Appendix IV – 2015-2020 Comparisons

Surface water temperature comparison between data collected in Quatsino Sound and Holberg Inlet between 2015 and 2020.

Site	April Temp. (°C)						May Temp. (°C)					
	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020
1	8.7	11.1	9.2	11.8	9.3	7.9	11.6	10.8	12.3	10.0	14.4	10.2
2	8.0	11.2	8.5	11.8	8.7	6.3	11.9	11.1	12.5	10.0	11.5	9.9
3	8.4	11.0	8.5	10.0	8.5	6.3	12.5	11.2	12.4	11.8	13.4	11.4
4	9.7	9.8	8.9	11.6	9.2	7.7	11.6	11.0	12.5	10.4	11.3	10.2
5	9.6	10.0	9.1	9.8	9.4	8.1	11.2	11.2	13.1	9.9	13.1	10.5
6	10.5	9.9	9.1	11.3	9.8	7.7	12.1	11.6	12.8	11.3	17.4	11.2
7	10.1	9.9	9.0	10.1	11.1	8.3	12.3	11.0	12.9	12.6	14.6	11.3
8	10.0	9.6	9.0	9.5	10.6	8.4	12.7	11.1	12.5	11.7	16.2	11.2
9	10.0	9.3	9.0	9.3	11.2	8.9	11.9	11.2	12.9	12.1	11.8	11.6
10	10.4	8.1	8.5	9.6	13.7	9.2	13.5	11.1	12.7	14.2	16.2	13.1
Average	9.5	10.0	8.8	10.5	10.3	8.1	12.1	11.1	12.7	11.4	14.0	11.1

Surface water salinity comparison between data collected in Quatsino Sound and Holberg Inlet between 2015 and 2020.

Site	April Salinity (ppt)						May Salinity (ppt)					
	2015	2016	2017	2018	2019	2020	2015	2016	2017	2018	2019	2020
1	14.0	22.3	21.9	23.0	27.3	14.1	27.5	27.9	22.1	30.4	28.3	24.9
2	13.8	21.0	23.7	23.1	26.2	11.4	28.4	27.8	21.7	30.1	28.2	13.5
3	18.1	21.0	22.3	21.0	23.5	20.2	28.0	27.7	21.1	27.9	23.3	25.5
4	26.2	26.6	28.8	25.7	18.1	29.2	30.2	29.5	25.5	32.0	31.0	30.2
5	26.5	27.7	29.0	28.5	30.5	31.7	29.8	29.3	24.5	30.4	23.1	31.0
6	27.2	27.8	28.6	25.9	25.2	30.3	30.3	29.6	25.2	32.4	26.1	31.4
7	24.3	27.5	28.4	27.5	32.6	31.0	29.9	29.0	24.9	17.0	24.5	28.5
8	20.2	24.2	28.3	28.4	26.3	26.0	30.4	29.4	23.8	32.4	28.6	26.6
9	26.5	13.8	28.1	26.4	24.3	31.7	30.4	29.5	24.4	32.3	16.6	24.5
10	26.3	9.2	21.0	27.1	13.4	24.5	29.8	25.5	20.1	29.7	17.2	11.3
Average	22.3	22.1	26.0	25.7	24.7	25.0	29.5	28.5	23.3	29.5	24.7	24.7

A comparison of the results of analysis for sea lice infestation on samples collected by beach seine in Quatsino Sound and Holberg Inlet, BC between 2015 and 2020.

Species	Sample size (n) 2015	Sample size (n) 2016	Sample size (n) 2017	Sample size (n) 2018	Sample size (n) 2019	Sample size (n) 2020	Total # of fish infested 2015	Total # of fish infested 2016	Total # of fish infested 2017	Total # of fish infested 2018	Total # of fish infested 2019	Total # of fish infested 2020	Prevalence (%) 2015	Prevalence (%) 2016	Prevalence (%) 2017	Prevalence (%) 2018	Prevalence (%) 2019	Prevalence (%) 2020
chum	177	235	479	325	441	302	37	36	16	18	43	110	20.9	15.3	3.3	5.5	9.8	36.4
coho	21	1	58	37	35	79	7	0	6	13	5	44	33.3	0.0	10.3	35.1	14.3	55.7
pink	1	2	0	0	7	0	0	1	0	0	1	-	0.0	50.0	-	-	14.3	-
chinook	12	19	0	6	6	5	2	9	0	0	1	2	16.7	47.4	-	0.0	16.7	40.0
sockeye	0	0	0	31	2	0	0	0	0	2	2	-	-	-	-	6.5	100.0	-
TSB	7	0	1	0	0	0	4	0	1	0	0	-	57.1	-	100.0	-	-	-
Total	218	257	538	399	491	386	50	46	23	33	52	156	22.9	17.9	4.3	8.3	10.6	40.4

Species	Sample size (n) 2015	Sample size (n) 2016	Sample size (n) 2017	Sample size (n) 2018	Sample size (n) 2019	Sample size (n) 2020	Total # of lice observed 2015	Total # of lice observed 2016	Total # of lice observed 2017	Total # of lice observed 2018	Total # of lice observed 2019	Total # of lice observed 2020	Abundance 2015	Abundance 2016	Abundance 2017	Abundance 2018	Abundance 2019	Abundance 2020
chum	177	235	479	325	441	302	80	54	16	18	55	221	0.45	0.23	0.03	0.06	0.12	0.73
coho	21	1	58	37	35	79	12	0	11	54	33	240	0.57	0.00	0.19	1.46	0.94	3.04
pink	1	2	0	0	7	0	0	1	0	-	1	-	0.00	0.50	-	-	0.14	-
chinook	12	19	0	6	6	5	2	14	0	0	1	2	0.17	0.74	-	0.00	0.17	0.4
sockeye	0	0	0	31	2	0	0	0	0	2	5	-	-	-	-	0.06	2.50	-
TSB	7	0	1	0	0	0	5	0	2	-	-	-	0.71	-	2.0	-	-	-
Total	218	257	538	399	491	386	99	69	29	74	95	463	0.45	0.27	0.05	0.19	0.19	1.20

A comparison of the calculated sea lice prevalence and abundance by site and by week as determined for chum salmon collected in Quatsino Sound and Holberg Inlet, BC between 2015 and 2020.

Site	Sample Month											
	April											
	Prevalence (%) 2015	Prevalence (%) 2016	Prevalence (%) 2017	Prevalence (%) 2018	Prevalence (%) 2019	Prevalence (%) 2020	Abundance 2015	Abundance 2016	Abundance 2017	Abundance 2018	Abundance 2019	Abundance 2020
1	6.6	0	0	0	0	0.0	0.07	0	0	0	0	0.00
2	0	3.3	3.3	0	0	-	0	0.03	0.3	0	0	-
3	3.3	0	0	0	10.0	10.3	0.03	0	0	0	0.10	0.17
4	40.0	-	3.3	0	0	23.3	0.80	-	0.03	0	0	0.37
5	-	0	0	10.0	10.0	16.7	-	0	0	0.1	0.10	0.17
6	-	-	0	0	9.1	15.4	-	-	0	0	0.09	0.15
7	0	26.7	0	-	4.8	-	0	0.40	0	-	0.05	-
8	41.9	-	0	-	-	50.0	1.10	-	0	-	-	0.50
9	-	10.0	3.3	0	-	-	-	0.17	0.03	0	-	-
10	-	3.3	0	0	3.2	13.3	-	0.03	0	0	0.03	0.13
TOTAL	17.1	6.9	1.5	2.8	4.3	16.7	0.39	0.10	0.01	0.3	0.04	0.22

Site	Sample Month											
	May											
	Prevalence (%) 2015	Prevalence (%) 2016	Prevalence (%) 2017	Prevalence (%) 2018	Prevalence (%) 2019	Prevalence (%) 2020	Abundance 2015	Abundance 2016	Abundance 2017	Abundance 2018	Abundance 2019	Abundance 2020
1	31.3	20.0	0	0	3.3	-	0.50	0.33	0	0	0.03	-
2	0	33.3	3.3	0	9.7	26.7	0	0.03	0.03	0	0.10	0.47
3	17.2	-	0	12.9	30.0	59.3	0.17	-	0	0.13	0.50	1.26
4	-	-	3.3	-	-	7.1	-	-	0.03	-	-	0.18
5	-	-	3.3	0	33.3	73.3	-	-	0.03	0	0.43	1.50
6	-	-	0	9.4	23.3	53.3	-	-	0	0.09	0.33	1.53
7	-	-	3.2	-	0.0	-	-	-	0.03	-	0.00	-
8	50.0	-	23.3	9.7	6.3	50.0	2.50	-	0.23	0.10	0.06	1.33
9	60.0	65.5	0	10.0	3.4	58.1	2.60	1.00	0	0.10	0.03	0.97
10	-	-	6.7	6.7	6.9	100.0	-	-	0.07	0.07	0.07	2.33
TOTAL	26.4	48.9	4.7	6.9	14.7	48.4	0.54	0.74	0.05	0.07	0.20	1.04

The number of sea lice in each life stage by species identified on the chum salmon sample population from Quatsino Sound and Holberg Inlet in 2015, 2016, 2017, 2018, 2019 and 2020.

LEP = *Lepeophtheirus salmonis* CAL = *Caligus clemensi*

Life Stage ¹	Number of Lice 2015	Number of Lice 2016	Number of Lice 2017	Number of Lice 2018	Number of Lice 2019	Number of Lice 2020
LEP Co	2	3	6	3	4	82
LEP C1	12	6	2	2	2	59
LEP C2	21	9	0	5	3	18
LEP PAM	0	6	0	0	0	3
LEP PAF	2	0	0	0	0	0
LEP AM	1	1	0	0	0	0
LEP AF	0	0	0	0	0	0
TOTAL LEP	38	25	8	10	9	162
CAL Co	2	3	1	0	6	15
CAL C1	24	18	6	6	25	33
CAL C2	7	4	1	1	4	7
CAL C3	4	2	0	0	5	1
CAL C4	5	2	0	0	2	1
CAL PAM	0	0	0	1	1	1
CAL PAF	0	0	0	0	1	0
CAL AM	0	0	0	0	2	0
CAL AF	0	0	0	0	0	1
TOTAL CAL	42	29	8	8	46	59

¹ Lice life stage codes: Co = copepodid, C1-4 = chalimus 1-4, PAM = pre-adult male, PAF = pre-adult female, AM = adult male, AF = adult female.

The species of sea lice found on chum salmon collected in Quatsino Sound and Holberg Inlet between 2015 and 2020 summarized by the 10 sites where beach seining was conducted. LEP = *Lepeophtheirus salmonis* CAL = *Caligus clemensi*

Site	April											
	# of LEP 2015	# of LEP 2016	# of LEP 2017	# of LEP 2018	# of LEP 2019	# of LEP 2020	# of CAL 2015	# of CAL 2016	# of CAL 2017	# of CAL 2018	# of CAL 2019	# of CAL 2020
1	0	0	0	0	0	0	2	0	0	0	0	0
2	0	1	1	0	0	-	0	0	0	0	0	-
3	1	0	0	0	3	3	0	0	0	0	0	2
4	2	-	1	0	2	11	2	-	0	0	0	0
5	-	0	0	2	1	1	-	0	0	1	1	0
6	-	-	0	0	0	2	-	-	0	0	0	0
7	0	2	0	-	0	-	0	10	0	-	1	-
8	23	-	0	-	-	2	11	-	0	-	-	0
9	-	2	0	0	-	-	-	3	1	0	-	-
10	-	1	0	0	0	3	-	0	0	0	1	1
TOTAL	26	6	2	2	6	22	15	13	1	1	3	3

Site	May											
	# of LEP 2015	# of LEP 2016	# of LEP 2017	# of LEP 2018	# of LEP 2019	# of LEP 2020	# of CAL 2015	# of CAL 2016	# of CAL 2017	# of CAL 2018	# of CAL 2019	# of CAL 2020
1	1	3	0	0	0	-	15	2	0	0	1	-
2	0	0	1	0	1	1	0	1	0	0	2	13
3	3	-	0	0	0	17	2	-	0	4	15	17
4	-	-	1	-	-	2	-	-	0	-	-	3
5	-	-	1	0	2	36	-	-	0	0	11	9
6	-	-	0	3	0	35	-	-	0	0	10	11
7	-	-	1	-	0	-	-	-	0	-	0	-
8	2	-	1	1	0	8	3	-	6	2	1	0
9	6	16	0	3	0	29	7	13	0	0	1	1
10	-	-	1	1	0	12	-	-	1	1	2	2
TOTAL	12	19	6	8	3	140	27	16	7	7	43	56

A comparison of sea lice infestation rates on chum salmon collected in Quatsino Sound and Holberg Inlet between 2015 and 2020.

Year	<i>Caligus clemensi</i>			<i>Lepeophtheirus salmonis</i>		
	Prevalence	Abundance	Average Intensity	Prevalence	Abundance	Average Intensity
2015	13.6 %	0.24	1.75	12.4 %	0.21	1.72
2016	8.6 %	0.11	1.32	8.9 %	0.10	1.09
2017	1.7 %	0.02	1.00	1.7 %	0.02	1.00
2018	2.5 %	0.02	1.00	3.1 %	0.03	1.00
2019	7.9 %	0.10	1.31	1.8 %	0.02	1.13
2020	12.3 %	0.20	1.59	30.8 %	0.54	1.74