

**SEA LICE MONITORING STUDY IN GOLETAS
CHANNEL AND QUEEN CHARLOTTE STRAIT,
BC
YEAR 7**

Tlatlasikwala First Nation
Marine Harvest Canada Inc
2018



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July 2018



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Executive Summary

This year marked the seventh year of the sea lice study conducted by Pacificus Biological Services (Pacificus) with the assistance of members of the Tlatlasikwala First Nation within Goletas Channel for Marine Harvest Canada Inc. (Marine Harvest). Meeting the Aquaculture Stewardship Council (ASC) requirements for Marine Harvest finfish aquaculture sites is in part supported by the ongoing monitoring of sea lice abundance, prevalence and intensity on juvenile wild salmon in Goletas Channel and the Shelter Bay area. Similar to previous years, beach seining for juvenile salmon was conducted in April and May, at 20 sites per sampling round. Scientific collection permits were obtained to collect up to 30 specimens each of the target species at each of the sampling sites in order to obtain a representative sample size. The target species for this study were juvenile pink salmon (*Oncorhynchus gorbuscha*) although juvenile chum (*O. keta*), coho (*O. kisutch*), Chinook (*O. tshawytscha*), and sockeye (*O. nerka*) salmon and three-spined stickleback (*Gasterosteus aculeatus*) were also sampled where possible. Throughout the sampling period water temperature, salinity and dissolved oxygen levels were also recorded at each location. Over the course of the two sampling events, a total of 260 fish were retained for lab analysis for sea lice. Of the 260 fish retained, 201 were pink salmon, 39 were chum, 10 were coho, 9 were sockeye, as well as one three-spined stickleback. Of these samples, a total of 25 *Lepeophtheirus salmonis* lice, and 148 *Caligus clemensi* lice were identified. Table 1 provides a summary of the prevalence, abundance and average intensity for both lice species found on pink salmon juveniles (target species) for all study years.

Table 1. Prevalence, abundance and average intensity of *C. clemensi* and *L. salmonis* lice on pink salmon from 2011 to 2018.

Year	<i>Lepeophtheirus salmonis</i>			<i>Caligus clemensi</i>		
	Prevalence	Abundance	Average Intensity	Prevalence	Abundance	Average Intensity
2011 (n = 611)	4%	0.04	1.09	13%	0.15	1.24
2013 (n = 612)	1%	0.01	1.00	4%	0.04	1.00
2014 (n = 500)	2%	0.02	1.00	5%	0.06	1.03
2015 (n = 460)	19%	0.13	1.17	21%	0.21	1.50
2016 (n = 336)	7%	0.07	1.14	16%	0.24	1.55
2017 (n = 189)	5%	0.07	1.30	10%	0.11	1.11
2018 (n = 201)	6%	0.07	1.17	11%	0.24	2.23

Introduction

The study aim for 2018 was to add to the existing baseline studies (Pacificus 2011, 2013a and 2013b, 2014, 2015, 2016, 2017) of ambient sea lice levels present in Goletas Channel and Queen Charlotte Strait, British Columbia (Figure 1) by continuing the study during this years' salmonid outmigration period (April and May 2018). The study was conducted on behalf of Marine Harvest Canada and the Tlatlasikwala First Nation. As no historical data existed for Goletas Channel and Queen Charlotte Strait prior to 2011, the primary objective of this project is to add to the data that has been collected since 2011. This study now also falls under the requirement to monitor wild salmonids by the Aquaculture Stewardship Council (ASC). This is the seventh study year in Goletas Channel (Pacificus 2011, 2013a, 2014, 2015, 2016, 2017) and the sixth study year in the Shelter Bay area (Pacificus 2013b, 2014, 2015, 2016, 2017). Secondary objectives included determining life history characteristics of sea lice in this area as well as of abundance, life stage, and distribution of the two species targeted. Additionally, observations regarding smolt outmigration timing, abundance and distribution patterns were to be gathered.

A total of 20 beach seine sites were sampled during the 2018 sample year. All 20 sites were the same sites sampled during the sample years from 2015-2017; study years prior had additional sites that are no longer sampled. Six sites were located within the Shelter Bay Area, Queen Charlotte Strait in DFO's Management Areas 11-2¹ and 12-13². The remaining 14 sites were located in Goletas Channel in DFO's Management Areas 12-11, 12-12, 12-15, 12-16.

The sample totals for pink salmon captured during the 2018 study year follow the trend observed during 2016 and 2017 but not the other study years. Prior to 2016, the highest proportion of pink salmon captured occurred in May. This trend suggested that in previous years the peak of the pink salmon smolt migration was being intercepted during beach seines conducted in May. However this year, as in 2016 and 2017, the results suggest the peak of the pink salmon migration was slightly earlier than previous years of the study and was intercepted during the April sampling.

Two species of sea louse commonly found on salmonids in BC waters, *Lepeophtheirus salmonis* and *Caligus clemensi*, were the focus of this study. The most common species of sea lice in the marine environment are of the family Caligidae (Boxaspen, 2006). Two genera *Lepeophtheirus*

¹ <http://www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/areas-secteurs/12-eng.html> (Accessed June 16, 2014)

² <http://www.pac.dfo-mpo.gc.ca/fm-gp/maps-cartes/areas-secteurs/11-eng.html> (Accessed June 16, 2014)

and *Caligus* have been identified as infesting fish within the Pacific Ocean (Butterworth et al. 2008). These parasitic copepods have been found on all juvenile Pacific salmon species as well as juvenile herring within the coast waters of British Columbia (Beamish et al. 2009). The two species that were the focus of the study have similar developmental cycles. The timelines of each stage differs for each species and is also highly variably dependent on water temperature. The lice start out as eggs then hatch into two motile nauplius stages. From there they progress into a motile, parasitic copepodid (Co). Once they have attached to a host, the lice progress through four sessile, chalimus stages (C1, C2, C3 and C4). While in the chalimus stage, the lice are attached to the host by a frontal filament. During the C4 stage, this is no longer the case and the lice become motile once more on the host. The lice then progress into pre adult males (PAM) and pre adult females (PAF) then into reproductively viable adult males (AM) and adult females (AF).

Environmental conditions that affect sea lice survival, growth and reproduction include water temperature and salinity. Reproduction and development rates were observed to increase with temperature rise for *Caligus curtus*, *Caligus elongates* and *L. salmonis* in Atlantic studies (Saksida et al 2015). In terms of salinity, the rate of incubation in salinity less than 15 parts per thousand (ppt) showed failure to produce viable nauplii (Jones and Johnson, 2015). There was a certain tolerance for freshwater influence found, however rising salinity and warmer temperatures was found to be beneficial to sea lice development and survival.

The target species for this study were pink salmon smolts (*Oncorhynchus gorbuscha*) although samples of chum (*O. keta*), coho (*O. kisutch*), Chinook (*O. tshawytscha*), and sockeye (*O. nerka*) salmon juveniles as well as cutthroat trout (*O. clarki*), Dolly Varden (*Salvelinas malma*) and three-spined stickleback (*Gasterosteus aculeatus*) juveniles were also retained for analysis if encountered. No Atlantic salmon (*Salmo salar*) were observed during the 2018 sampling activities. All fry and smolt samples were caught with a beach seine and processed for lab analysis at the BC Center for Aquatic Health Sciences in Campbell River, BC. Samples were analysed for sea lice prevalence (percentage of fish that are infested), intensity (average number of sea lice on infested fish) and abundance (average number of sea lice on all fish sampled).

A total of ten fish farms tenures were located within the study area (Figure 2). Currently seven of the locations are operational; Bell Island, Bull Harbour, Marsh Bay, Heath Bay, Shelter Bay, Shelter Pass and Doyle Island. The non-operational sites included Duncan Island, Raynor Island and Robertson Island.

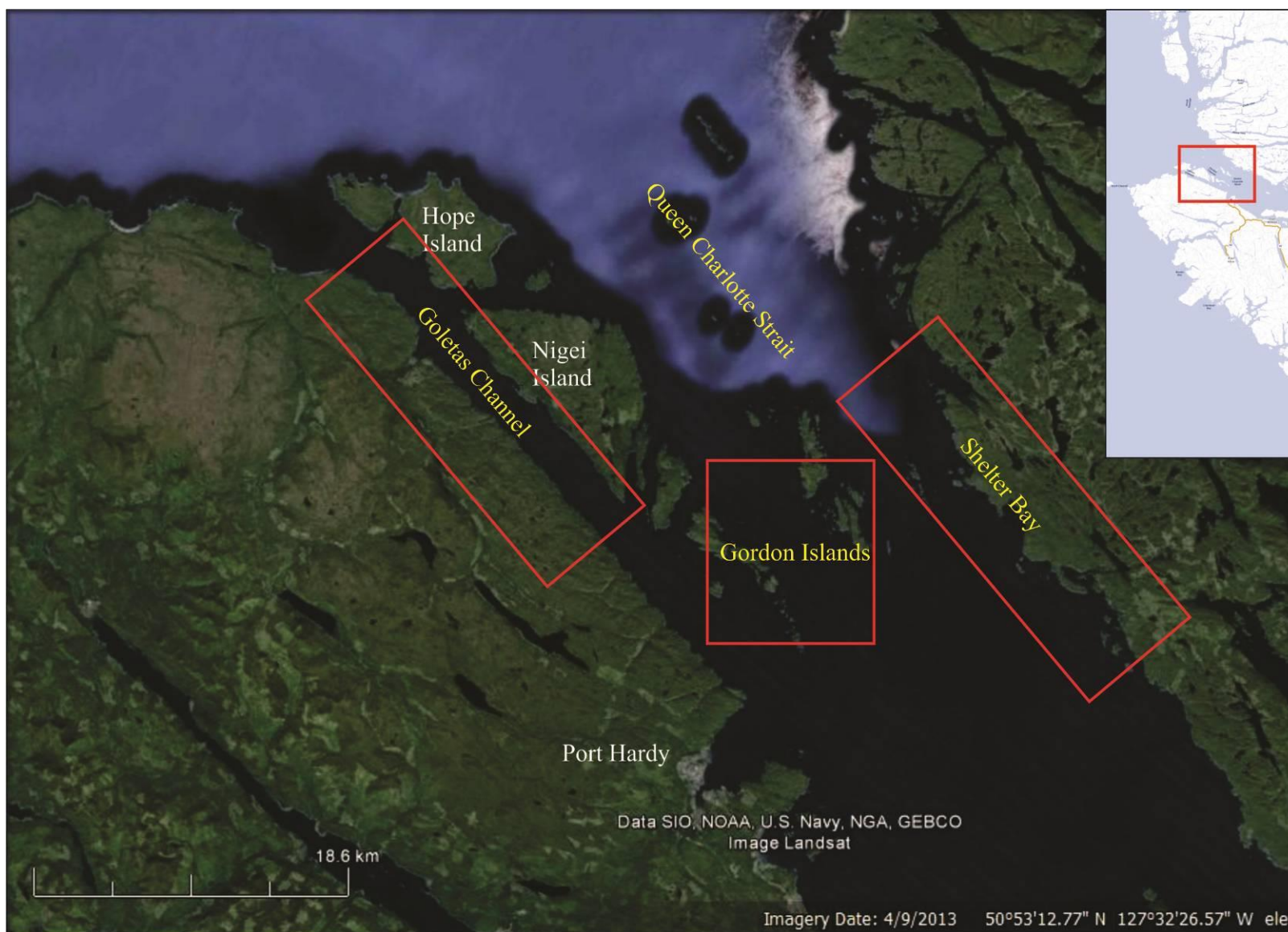


Figure 1: Overview map showing study locations (red boxes) for the 2018 sample year in relation to Port Hardy, Vancouver Island, BC.

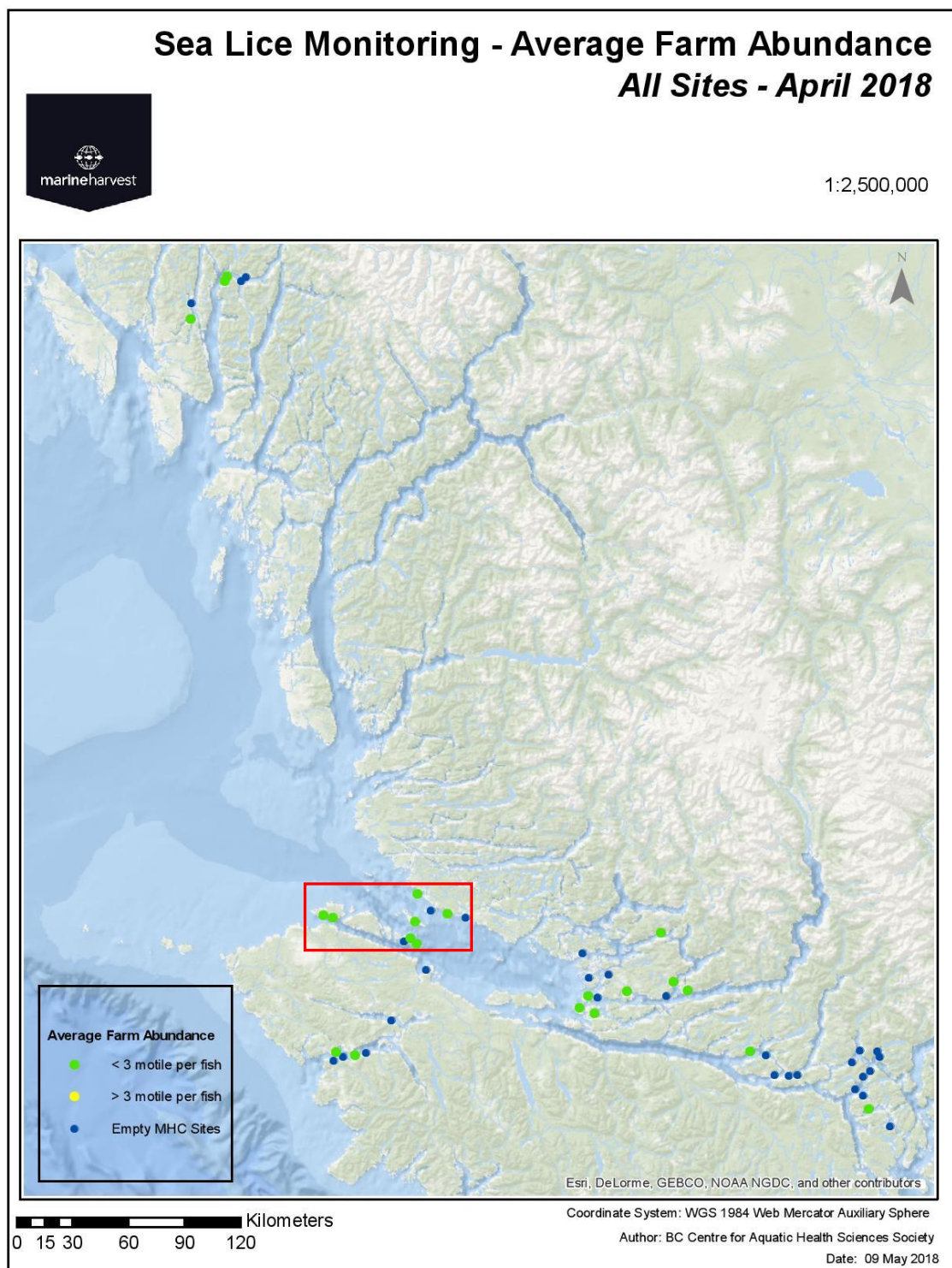


Figure 2: Location map of the MHC fish farms located on the BC coast in April, 2018³ with area of study location outlined in red.

³ http://marineharvest.ca/planet/environmental_commitment/additional-data-reporting/

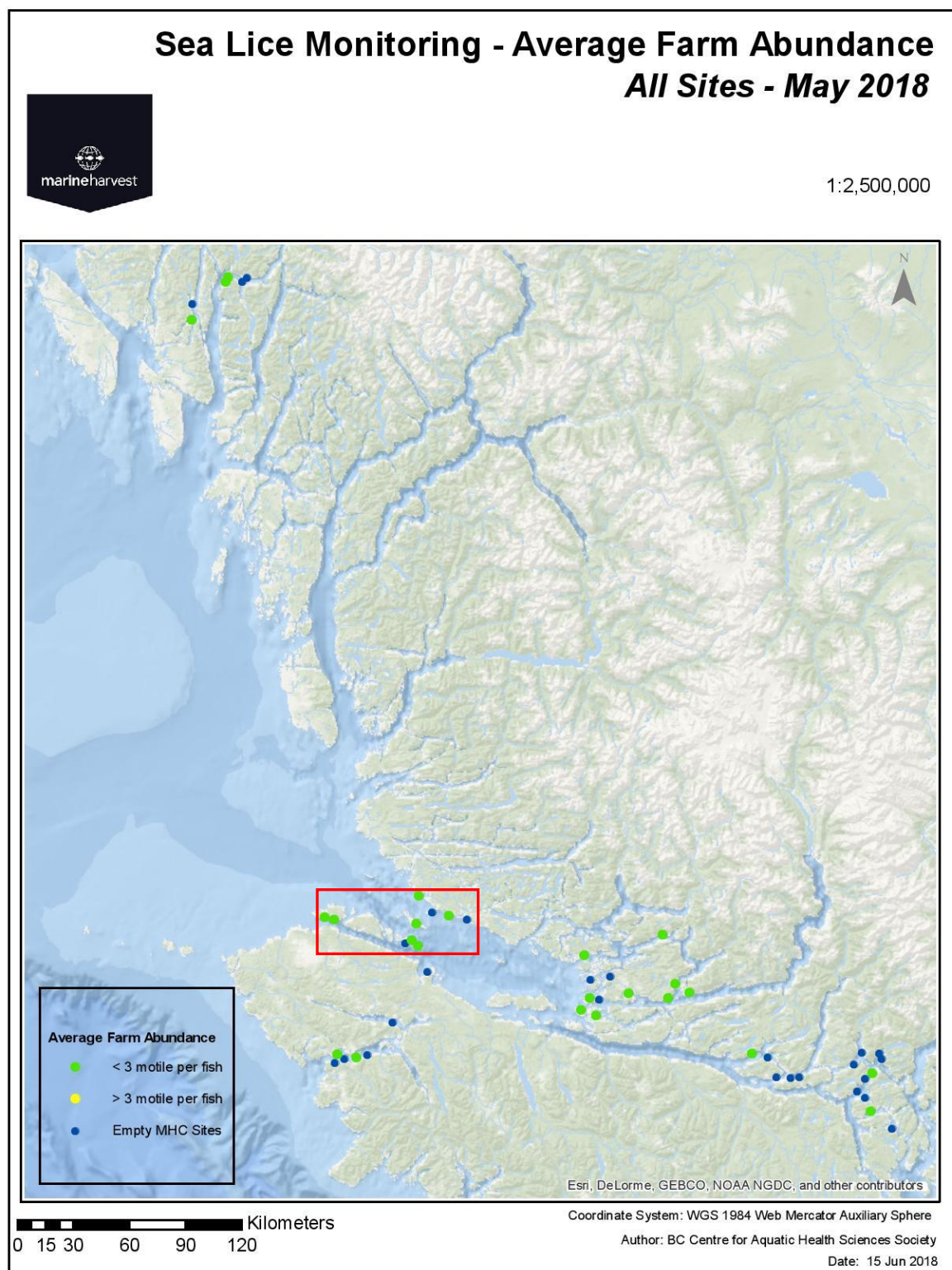


Figure 3: Location map of the MHC fish farms located on the BC coast in May, 2018⁴ with area of study location outlined in red.

⁴ http://marineharvest.ca/planet/environmental_commitment/additional-data-reporting/

Methodology

The survey area consisted of 20 beach seine sampling locations within Queen Charlotte Strait. The 20 sites were named from Site 1 through Site 20 based on relative geographic locations. This is a change from previous years of sampling, where sample locations within Goletas Channel (Zones 1-5) were determined in the first year of the study (2011), and identified during the pre-sampling field reconnaissance (Pacificus 2011). Shelter Bay (Zone 6, Queen Charlotte Strait) sampling sites were determined in 2013 (Pacificus 2013b) and altered slightly in 2014 (Pacificus 2014). The change in naming convention was implemented for the 2017 sampling period (Appendix 1). Sample locations were chosen based on targeting areas with appropriate habitat characteristics and likelihood of juvenile salmonids holding in these locations during the project time frame. Efforts were made to evenly distribute sites throughout the survey area.

Sites 1-14

This is the seventh year of sea lice monitoring in Sites 1-14 (Zones 1-5), all located within Goletas Channel. Originally defined in six zones and designated with site numbers from 1-20 in 2017, all zones contained 3 to 4 sample sites, however in 2014, three sites were eliminated due to a combination of lack of fish being captured, redistributing effort, and allowing new sites to be added. In addition, Site 14 was added in 2014 and located within the Deserters Group of islands. Sample sites selected for the 2016 sample year were the same as those selected in 2014 and 2015. Sites 4, 5, 8 and 10 were located on the west side of Goletas channel, on Vancouver Island (Figure 3 and 4). Sites 1-3 were located on Hope Island (Figure 4), Sites 6, 7 and 9 on Nigei Island (Figure 3) and Sites 11-14 around the Gordon and Deserter Group (Figure 5).

Sites 15-20

This is the sixth year of sea lice monitoring in Sites 15-20 (Zone 6), located northeast of Port Hardy, in the Shelter Bay area of Queen Charlotte Strait (Figure 6). Five sampling locations were originally established (Pacificus 2013b). In 2014, one site was eliminated and two were merged into one site in a new location (now known as Site 15) due to lack of suitable areas for beach seining. Two new sites were added in April of 2014. Site 18 was located near Marsh Bay, and Site 20 was located by Robinson Island. In May of 2014, an additional sampling location (Site 19) was added and located near Browning Island, in between Site 18 and 20. Sites 15-20 were sampled in 2014, 2015, 2016, and 2017, and were repeated for the 2018 sample year.

The study followed the sampling regime of 2014, 2015, and 2017, where monthly sampling occurred in April and May.

Crew size was four to five people with one person operating the boat and collecting environmental data and three people hauling the net and processing fish samples. The sampling crew was composed of personnel from Pacificus. Three members from the Tlaltlasikwala First Nation joined the crew on a portion of the sampling dates.

Fish were sampled using a beach seine net deployed in a simple arc set pattern by boat and pulled into the beach area by the crew as outlined in the beach seining section of *The Salmonid Field Protocols Handbook* (2008). The seine net was built by Redden Nets in Campbell River with dimensions as follows: 150 ft length with ½” wings and ¼” bunt mesh, 2 fathom depth and #2 lead line.

Prior to setting the net a preliminary search of the shoreline at each location was performed for five minutes from the boat at a distance of 10-20m from the shore in order to assess the presence of salmonids. If fish were observed then a set encompassed this area, if no fish were observed during this search then the set was performed at the most likely area for fish presence as determined by the crew during the search.

If no salmonids were caught on the first set in a sample site, a subsequent set was made within the defined sample area to a maximum of two sets per sampling location (Pacificus 2013a). During the 2011 study, subsequent sets were made to a maximum of three sets per sampling location, however the results indicated that only on one occasion did a third set within a sampling location result in a captured salmonid (Pacificus 2011). Therefore, the maximum number of sets per sampling location was modified to two for the 2013 study year and has remained this way for each sample year since.

If salmonids were caught, specimens were randomly selected for lab analysis and a count of the remaining numbers of fish to be released in the set was made based on field identification to the species level. A maximum of 30 fish/species for each target species were targeted to be retained from each site for the lice analysis in each monthly sample. Target species for the survey were pink, chum, sockeye, coho, Chinook, Dolly Varden, cutthroat, stickleback and herring.

Retained sample specimens were placed in sample bags and euthanized with a Tricaine methanesulfonate (TMS) overdose immediately. Samples in 2 ounce bags were given 1.0 ml of a 240 mg/L TMS solution while samples in 4 ounce bags were given 5 ml of the TMS solution. Each sample bag, having been pricked with a tack prior to usage, was then placed in a bucket where the solution was allowed to drain out and then poured to ground in the upland area. Sample bags for each site were placed in a larger bag together with relevant data for the set included on waterproof paper. Once samples were processed they were placed on ice in a cooler while in the field and frozen once they were transported back to Port Hardy. When the monthly sampling was complete the samples were transported in a frozen state to the BC Centre for Aquatic Health Sciences (CAHS) for laboratory analysis which included species identification and microscopic lice counts. Specimens were classified and analyzed for wet weight and fork length; sea lice were enumerated, identified to species, sexed, and life stage was determined for each sample. For the purpose of analysis, louse prevalence was defined as the number of fish infested out of the total number sampled, abundance as the total average number of lice per fish and intensity as the total number of lice per infested fish.

In cases where less than 10 individuals per species per month were collected, prevalence, abundance and intensity of louse infestations was calculated but will not be discussed further within this report due to the increased potential for errors arising in conclusions based from very small sample sizes. Values are still represented within the following tables however, any utilization of these data arising from very small sample sizes should only be utilized with the appropriate context given to the sample size for which determined the values.

In sets where large numbers of fish (over 100) were encountered in a single set or where sea conditions did not permit identification and/or processing of fish in the bunt of the net, caught fish were placed in a sea-water filled tote with airstones to maintain dissolved oxygen levels before being processed. Those fish that were not retained were released in a timely manner when identification and quantification had been completed.

Environmental data was collected at every seine location and consisted of temperature ($^{\circ}\text{C}$), dissolved oxygen (D_0) in milligrams per liter (mg/l) and salinity in parts per thousand (ppt) at the surface (0m), 1m depth and 4m depth. These measurements were taken using a 556 YSI meter at the same time and location as the set proximal to the mid-point of the net. Weather conditions at

the time of each set were noted as well as any additional comments pertaining to the set. Locational data was collected from the sampling vessel's navigation system, a Ray-Marine multi-function GPS unit.

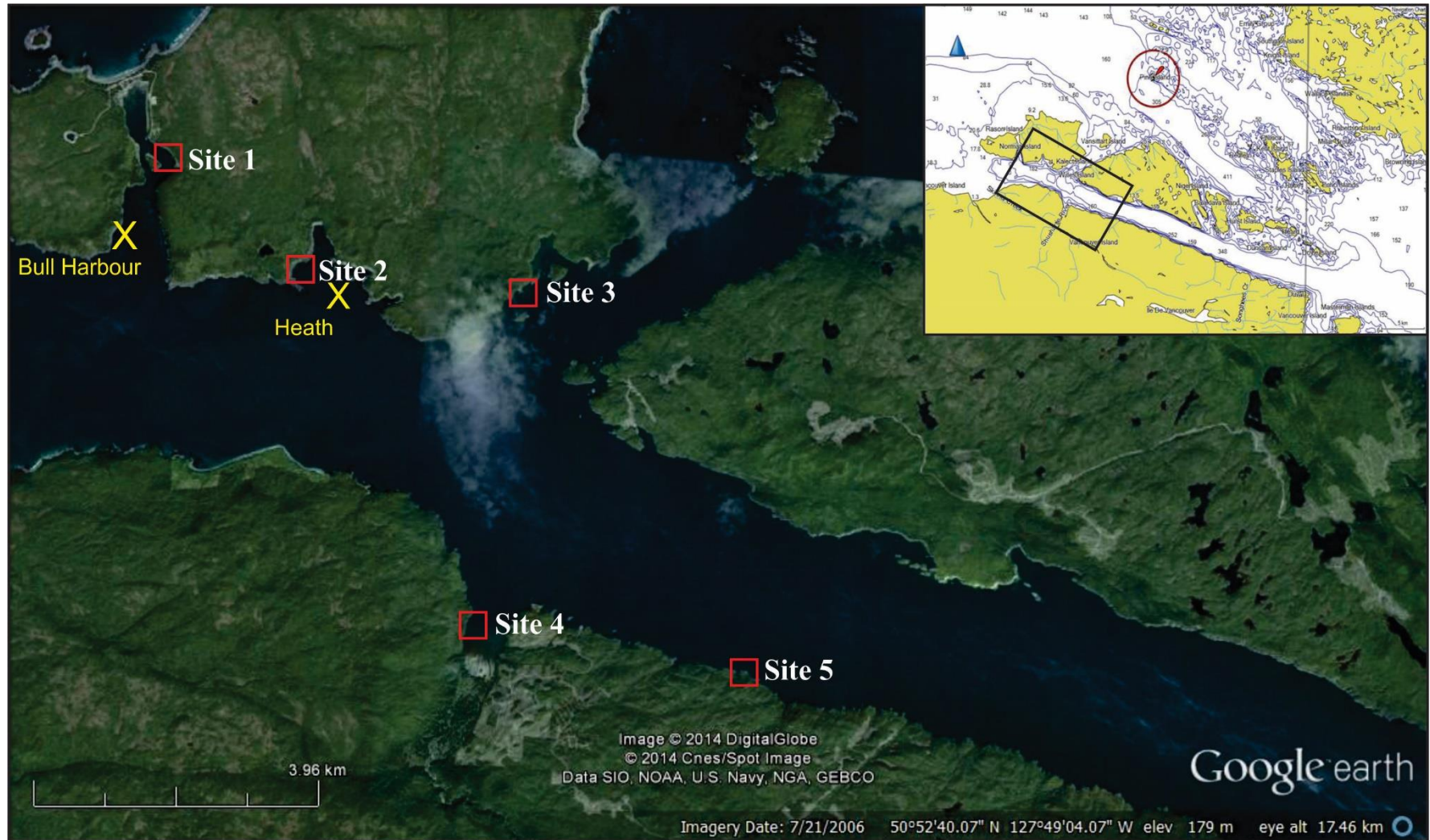


Figure 3: Location map of the sampling sites from 1 to 5 located on Vancouver Island and Hope Island examined during the 2018 sample year in Goletas Channel, British Columbia. The yellow “X” indicates active and inactive fish farm locations.

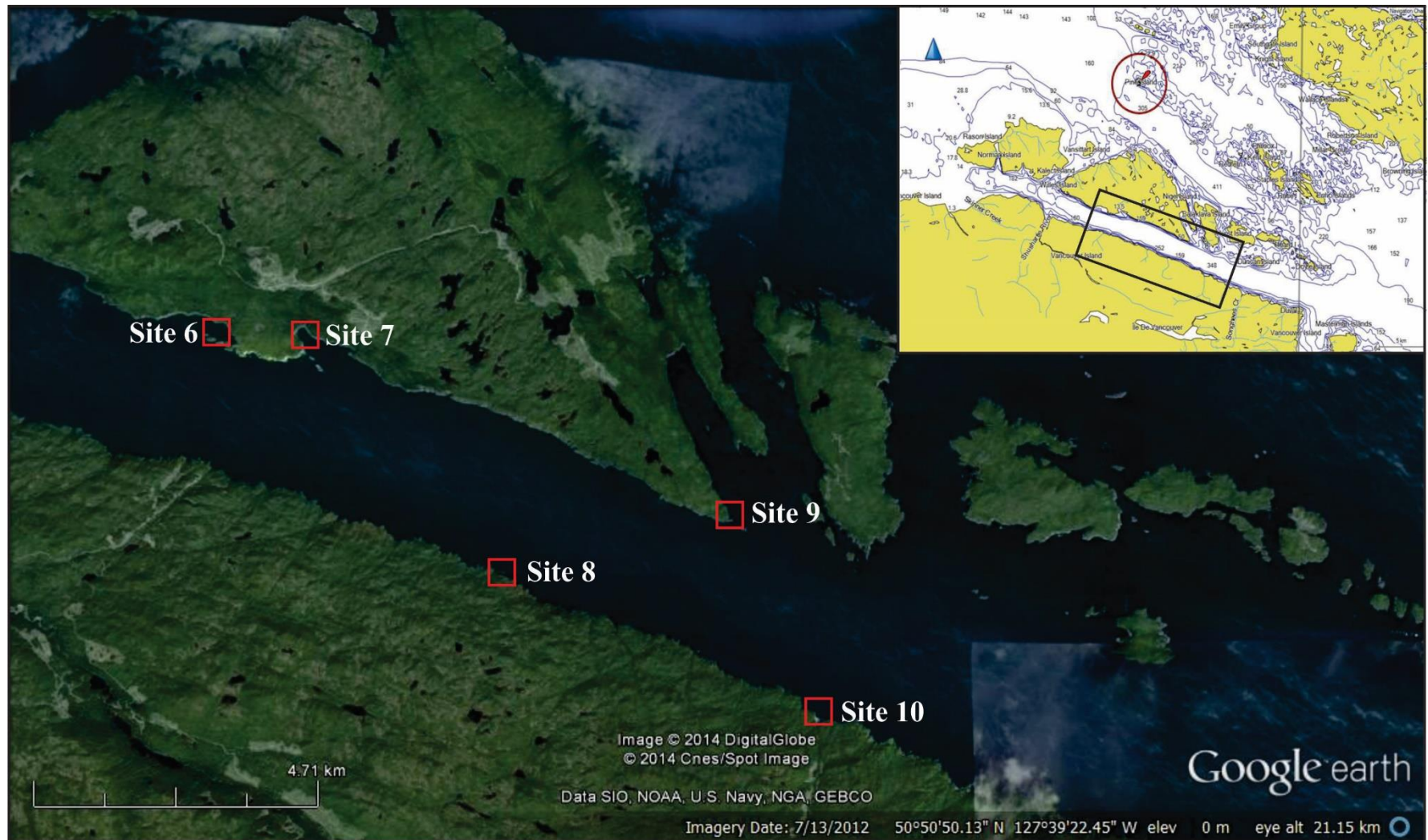


Figure 4: Location map of the sampling sites 6 to 10 located on Vancouver Island and Nigei Island examined during the 2018 sample year in Goletas Channel, British Columbia.

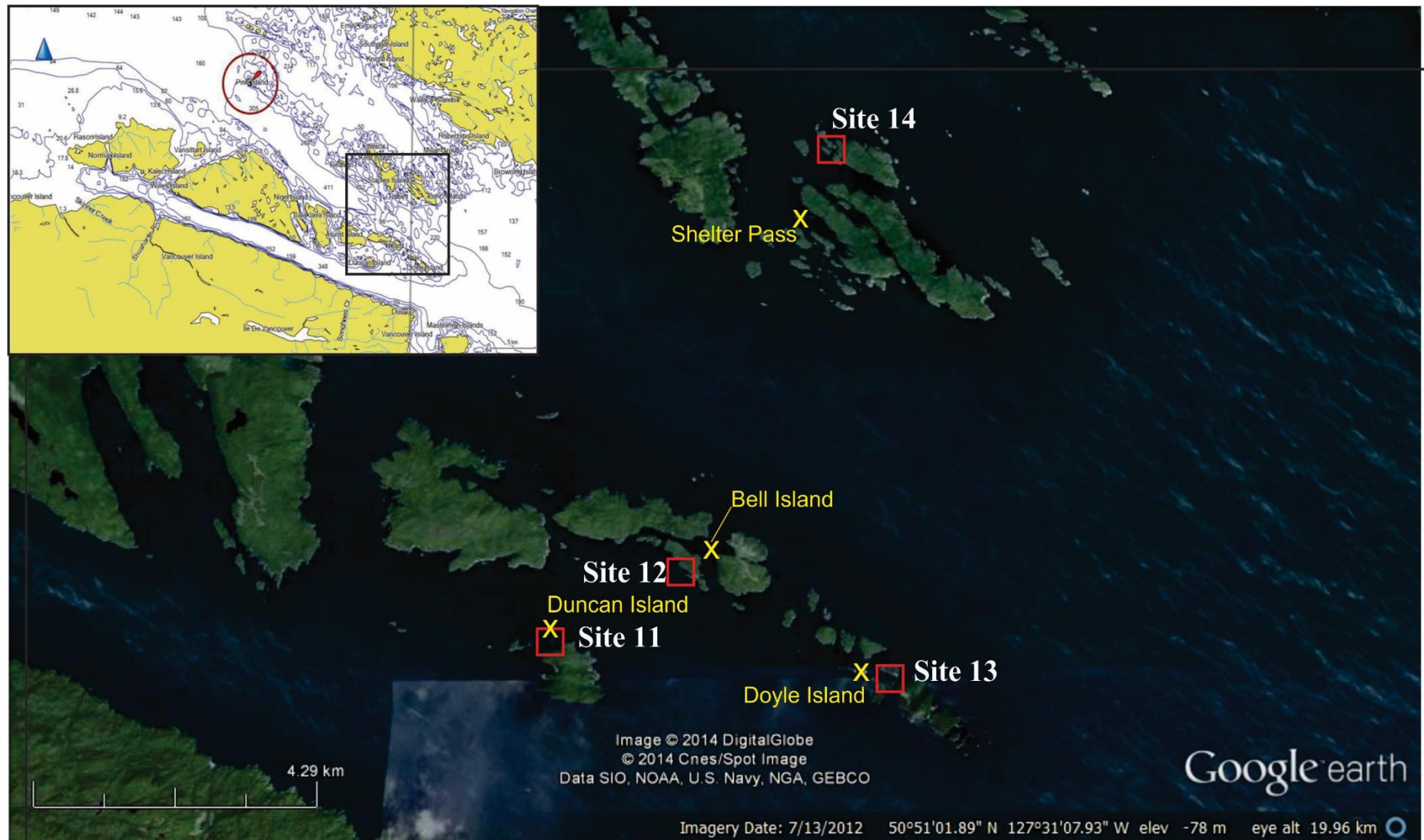


Figure 5: Location map of the sampling sites 11 to 14 located in the Gordon Group examined during the 2018 sample year in Goletas Channel, British Columbia. The yellow “X” indicates active and inactive fish farm locations.

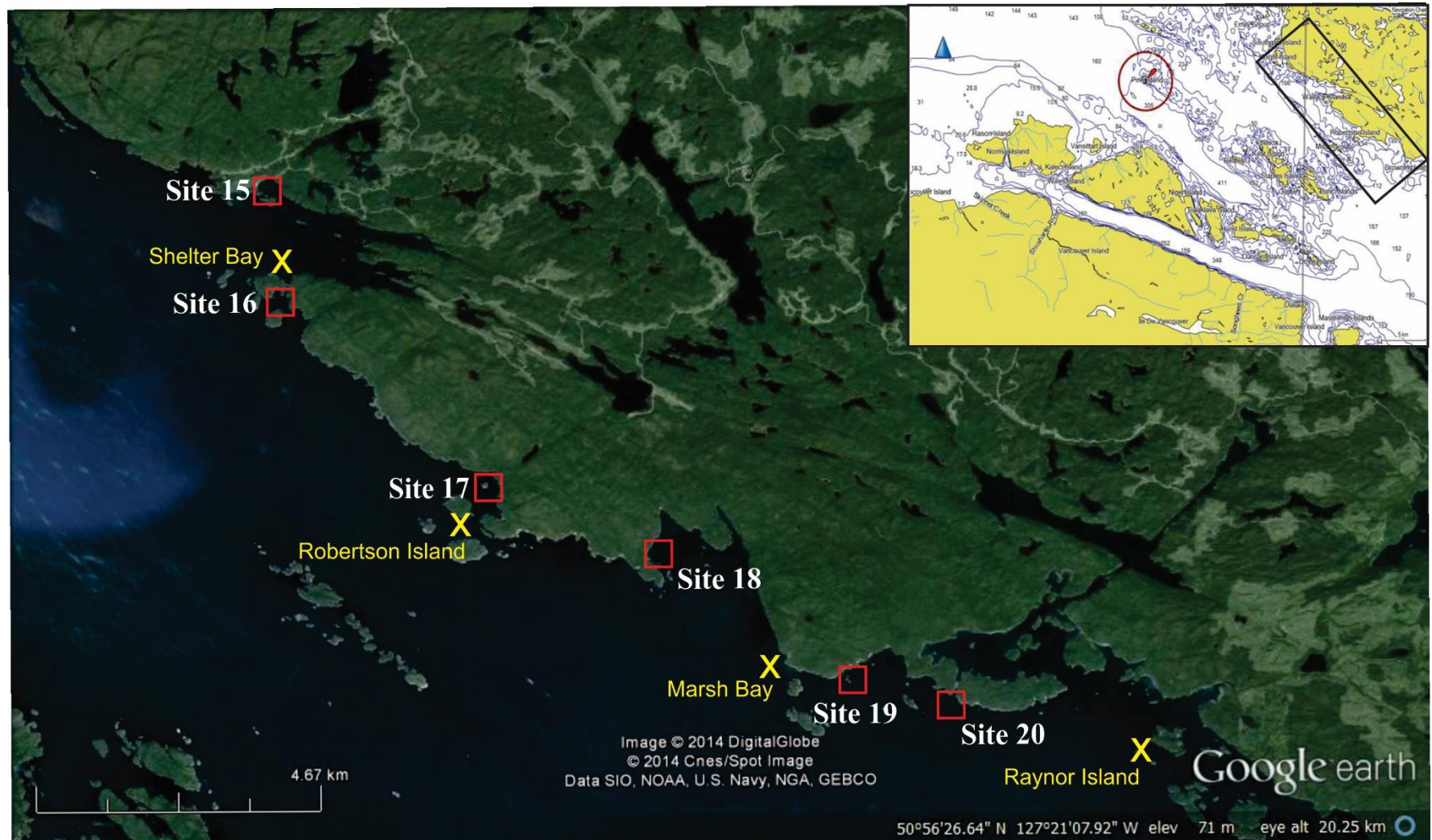


Figure 6: Location map of sampling sites 15 to 20 located in the Shelter Bay area examined during the 2018 sample year in Queen Charlotte Strait, British Columbia. The yellow “X” indicates active and inactive fish farm locations.

Results

Two rounds of beach seining were completed during the 2018 sample season. The first round occurred on April 17th, 18th, 19th and 20th. The second round occurred on May 22nd, 23rd, 24th, and 25th. All 20 sites were sampled during the first and second rounds within the 2018 sample year.

A project total of 68 sets were completed during the 2018 season, 20 of which were successful at capturing target species. A total of 31 sets were completed during the April sampling, 14 of which were successful at capturing target species. A total of 37 sets were completed during the May sampling, 6 of which were successful at capturing target species.

During the April sampling the crew was unable to capture fish within the first seine attempt at twelve sites; six of the subsequent sets resulted in the capture of target species. During the May sampling, the crew was unable to capture fish within the first seine attempt at seventeen sites; three of the subsequent sets resulted in the capture of target species.

It should be noted that the sample numbers detailed within this report have been adjusted to reflect the identification completed during the lab analysis. Due to the higher accuracy of identification in a lab setting versus the difficulty of field identification of juvenile salmonids, captured and retained data presented within this report has been adjusted to represent the lab analysis identification. As a result of more accurate lab identification, the maximum retention number per species, per site (30 samples retained per species, per site) was exceeded in one case.

The number of samples obtained in each of the 20 successful sets ranged from 1 to 49 of the target species and averaged 13 samples per successful set. A total of 260 samples were retained for laboratory analysis: 201 pink salmon, 39 chum, 10 coho, 9 sockeye, and one three-spined stickleback. The resulting retention for sampling included pink salmon at the highest (77.31%), followed by chum (15.00%), coho (3.85%), sockeye (3.46%) and three-spined stickleback (0.38%). A summary of capture and collection totals is provided in Table 2 and 3.

Table 2: Species sampled in study year 2018, examined by percent of total capture, the collection (retained for sampling) total, and corresponding collection percentage (retained for sampling).

Species	Capture total (% of total)	Collection total	Collection %
Pink salmon	89.83	201	77.31
Chum salmon	6.72	39	15.00
Coho salmon	1.72	10	3.85
Sockeye salmon	1.55	9	3.46
Three-spined stickleback	0.17	1	0.38
All species	100	260	100

Table 3: Distribution of fish species capture and sample retention by sampling site in the 2018 study year.

Site	Pink		Chum		Coho		Sockeye		Three-spined Stickleback		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	0	0	2	2	0	0	0	0	0	0	2	2
2	108	53	23	23	0	0	0	0	0	0	131	76
3	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0	0
5	1	1	1	1	0	0	0	0	0	0	2	2
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	1	1	0	0	2	2	0	0	3	3
8	0	0	1	1	7	7	4	4	0	0	12	12
9	0	0	0	0	3	3	0	0	0	0	3	3
10	2	2	0	0	0	0	0	0	0	0	2	2
11	0	0	0	0	0	0	0	0	0	0	0	0
12	56	30	0	0	0	0	0	0	0	0	56	30
13	0	0	0	0	0	0	0	0	0	0	0	0
14	80	30	0	0	0	0	0	0	0	0	80	30
15	1	1	0	0	0	0	0	0	0	0	1	1
16	6	6	0	0	0	0	0	0	0	0	6	6
17	2	2	0	0	0	0	0	0	0	0	2	2
18	0	0	0	0	0	0	3	3	0	0	3	3
19	124	45	10	10	0	0	0	0	0	0	134	55
20	141	31	1	1	0	0	0	0	1	1	143	33
Total	521	201	39	39	10	10	9	9	1	1	580	260

Juvenile Salmonid Abundance, Distribution, Growth and Timing Patterns

The project total of target species captured was 580 fish, with 260 retained for sampling (Table 3). All were salmonid species except 1 three-spined stickleback (*Gasterosteus aculeatus*). 207 samples were collected during April (80% of the project total), and 53 samples were collected during May (20% of the project total). Sites that did not yield specimens over the course of the sampling months were Sites 3, 4, 6, 11, and 13.

The average length and weight of the salmonid specimens increased from April to May for pinks, chum, coho and sockeye (Table 4). Pink, chum, coho and sockeye salmon were captured during each sampling month. The only three-spined stickleback collected was sampled during April.

Table 4: Species weight and length averages by sampling month.

Species	Weight (g)		Length (mm)	
	April	May	April	May
Pink	0.4 (n=162)	2.0 (n=39)	35	56
Chum	0.7 (n=35)	2.1 (n=4)	42	57
Coho	9.8 (n=2)	20.8 (n=8)	95	121
Sockeye	6.5 (n=7)	6.6 (n=2)	88	87

Sea Lice Infestation

Lice Species Distribution

During the month of April a total of 8 *L. salmonis* were identified on samples from Sites 10, 14, 16, 19 and 20. In May a total of 17 *L. salmonis* were identified from Sites 2, 5, 8, 9 and 19. A total of 7 *C. clemensi* were identified during the April sampling at Sites 12, 14, 19, and 20. During May's sampling, a total of 141 *C. clemensi* were identified from Sites 2, 8, 9 and 19.

The mean prevalence (percentage of fish that were infested compared to the number of fish sampled), the mean abundance (average number of sea lice on all fish sampled) and the mean intensity (average number of sea lice on infested fish) were calculated for each species in Table 5 and for each species at each site in Tables 6-10.

Sea lice counts of both species observed (*L. salmonis* and *C. clemensi*) were combined for the prevalence and abundance calculations in Table 5. Over the four salmonid species sampled, 45 of 259 salmonids were found to be infested (17.4%). A total of 29 pink, 7 chum, 8 coho and 1 sockeye were found to be infested by sea lice. The highest prevalence of sea lice infestation was found in coho smolts (80.0%), in addition to the highest abundance (9.00). The highest average intensity was also found in coho smolts (11.25). Sea lice were not found on the three-spined stickleback collected, and therefore no stickleback data is included hereafter.

The juvenile pink salmon population sampled in Goletas Channel and the Shelter Bay area in 2018 had an overall sea lice prevalence of 14.4%, and abundance of 0.31, with an average intensity of 2.17 of identified sea lice.

Table 5: Overall prevalence/abundance/intensity of both *L. salmonis* and *C. clemensi* by fish species.

Species	Sample size (n)	Total number of lice	Total number of fish infested	Prevalence (%)	Abundance	Average Intensity
Pink	201	63	29	14.4%	0.31	2.17
Chum	39	18	7	17.9%	0.46	2.57
Coho	10	90	8	80.0%	9.00	11.25
Sockeye	9	2	1	11.1%	0.22	2.00
Total	259	173	45	17.4%	0.67	3.84

Lice Species Prevalence, Abundance and Intensity in Pink Salmon

A total of 201 pink salmon were retained and submitted to the lab for analysis (Table 6), 162 of which were caught during the April sampling, 39 during May's sampling. *L. salmonis* and *C. clemensi* were identified on juvenile pink salmon retained from both sampling months.

Table 6: Prevalence, abundance and intensity of *L. salmonis* and *C. clemensi* infestation at each sampling location where samples were retained for pink salmon.

Pink Salmon						
Site	<i>L. salmonis</i>			<i>C. clemensi</i>		
	Prevalence	Abundance	Intensity	Prevalence	Abundance	Intensity
2	9.43%	0.11	1.20	28.30%	0.75	2.67
5	100.00%	1.00	1.00	0.00%	0.00	0.00
10	50.00%	0.50	1.00	0.00%	0.00	0.00
12	0.00%	0.00	0.00	3.33%	0.03	1.00
14	3.33%	0.03	1.00	3.33%	0.03	1.00
15	0.00%	0.00	0.00	0.00%	0.00	0.00
16	16.67%	0.17	1.00	0.00%	0.00	0.00
17	0.00%	0.00	0.00	0.00%	0.00	0.00
19	4.44%	0.04	1.00	6.67%	0.09	1.33
20	3.23%	0.06	2.00	6.45%	0.10	1.50
Total	5.97%	0.07	1.17	10.95%	0.24	2.23

Lice Species Prevalence, Abundance and Intensity in Chum Salmon

A total of 39 chum salmon samples were retained and sent to the lab for analysis (Table 7). Of those samples, 35 were captured during April and 4 were captured during May. Due to a small sample size in May, results will not be further discussed.

Table 7: Prevalence, abundance and intensity of *L. salmonis* and *C. clemensi* infestation at each sampling location where chum were sampled.

Chum Salmon						
Site	<i>L. salmonis</i>			<i>C. clemensi</i>		
	Prevalence	Abundance	Intensity	Prevalence	Abundance	Intensity
1	0.00%	0.00	0.00	0.00%	0.00	0.00
2	0.00%	0.00	0.00	17.39%	0.61	3.50
5	0.00%	0.00	0.00	0.00%	0.00	0.00
7	0.00%	0.00	0.00	0.00%	0.00	0.00
8	0.00%	0.00	0.00	0.00%	0.00	0.00
19	20.00%	0.30	1.50	0.00%	0.00	0.00
20	0.00%	0.00	0.00	100.00%	1.00	1.00
Total	5.13%	0.08	1.50	12.82%	0.38	3.00

Lice Species Prevalence, Abundance and Intensity in Coho Salmon

A total of 10 coho salmon samples were retained for lab analysis (Table 8), 2 of which were captured during April's sampling and 8 during May's sampling. Due to a small sample size, results will not be further discussed. Refer to the methodologies section for further explanation.

Table 8: Prevalence, abundance and intensity of *L. salmonis* and *C. clemensi* at each sampling location where samples were retained for coho salmon.

Coho Salmon						
Site	<i>L. salmonis</i>			<i>C. clemensi</i>		
	Prevalence	Abundance	Intensity	Prevalence	Abundance	Intensity
8	71.43%	0.43	0.60	71.43%	6.00	8.40
9	66.67%	1.67	2.50	100.00%	13.33	13.33
Total	70.00%	0.80	1.14	80.00%	8.20	10.25

Lice Species Prevalence, Abundance and Intensity in Sockeye Salmon

A total of 9 sockeye salmon samples were retained for lab analysis (Table 9) 2 of which were captured during April's sampling and 7 during May's sampling. Due to a small sample size, results will not be further discussed. Refer to the methodologies section for further explanation.

Table 9: Prevalence, abundance and intensity of *L. salmonis* and *C. clemensi* at each sampling location where samples were retained for sockeye salmon.

Sockeye Salmon						
Site	<i>L. salmonis</i>			<i>C. clemensi</i>		
	Prevalence	Abundance	Intensity	Prevalence	Abundance	Intensity
7	0.00%	0.00	0.00	0.00%	0.00	0.00
8	0.00%	0.00	0.00	25.00%	0.50	2.00
18	0.00%	0.00	0.00	0.00%	0.00	0.00
Total	0.00%	0.00	0.00	11.11%	0.22	2.00

Louse Life Stage

Louse life stage was determined through lab analysis, and distribution is outlined in Table 11. Louse life stages include: parasitic copepodid (Co), chalimus stages (C1, C2, C3 and C4), pre adult males (PAM) and pre adult females (PAF) and viable adult males (AM) and adult females (AF).

Louse Life Stage on pink salmon

The most prevalent life stage of *L. salmonis* observed on pink salmon was the Co and C2 stages (43% each) followed by the C1 stage (14%). No *L. salmonis* of any other life stage were identified on the pink salmon samples during the lab analysis.

The most prevalent life stage of *C. clemensi* observed on pink salmon was the C1 stage (80%), followed by Co (12%), C2 (4%), and the AM and AF stages (2% each). No other life stages of *C. clemensi* were identified on the pink salmon samples during the lab analysis.

Louse Life Stage on chum salmon

The most prevalent life stage of *L. salmonis* observed on chum salmon was the C1 stage (67%) followed by the C2 stage (33%). No *L. salmonis* of any other life stage were observed on the chum salmon samples during the lab analysis.

The most prevalent life stage of *C. clemensi* observed on chum salmon was the C1 stage (73%), followed by the Co stage (20%) and the C2 stage (7%). No other life stages of *C. clemensi* were identified on the chum salmon samples during the lab analysis.

Louse Life Stage on coho salmon

The most prevalent life stages of *L. salmonis* observed on coho salmon was the Co stage (63%) followed by the C1 stage (37%). No other stages of *L. salmonis* were identified on the coho salmon samples during lab analysis.

The most prevalent life stage of *C. clemensi* observed on coho salmon was the C1 stage (77%) followed by Co stage (18%), C2 (4%), and AM stage (1%). No other life stages of *C. clemensi* were identified on the coho salmon samples during lab analysis.

Louse Life Stage on sockeye salmon

No *L. salmonis* were identified on sockeye salmon during lab analysis.

The most prevalent life stage of *C. clemensi* observed on sockeye salmon was the C1 stage (100%). No other life stages of *C. clemensi* were identified on the sockeye salmon samples during lab analysis.

Table 11: Lice life stage of *L. salmonis* and *C. clemensi* presented by fish species infested over the April and May sampling period

	Species	LEP Co	LEP C1	LEP C2	LEP C3	LEP C4	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
April	Pink	1	2	2	0	0	0	0	0	0	5	0	4	2	0	0	0	0	0	0	6
	Chum	0	2	1	0	0	0	0	0	0	3	0	0	1	0	0	0	0	0	0	1
	Coho	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sockeye	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Three-spined Stickleback	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May	Pink	5	0	4	0	0	0	0	0	0	9	6	35	0	0	0	0	0	1	1	43
	Chum	0	0	0	0	0	0	0	0	0	0	3	11	0	0	0	0	0	0	0	14
	Coho	5	3	0	0	0	0	0	0	0	8	15	63	3	0	0	0	0	1	0	82
	Sockeye	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
	Three-spined Stickleback	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Water Quality - Salinity and Temperature

Salinity and temperature were recorded at each sampling event at each site at the surface (0m), 1m depth and 4m depth. Surface salinity and temperature were recorded and are included in Table 12 for the entire study area. The full environmental data recorded at all depths is recorded in Appendix 2.

Average salinity decreased slightly from April to May for surface samples. During the month of April maximum salinity (30.60 ppt) was recorded at Site 9 in Goletas Channel. Minimum salinity (29.57 ppt) was recorded on the surface at Site 1 in Bull Harbour, Hope Island.

During the month of May, maximum salinity (29.07 ppt) was recorded at Site 20, south from Marsh Bay. Minimum salinity (28.41 ppt) was recorded at Site 18; north from Marsh Bay.

The average surface water temperature for the entire study area increased from April to May. Average water temperature at the surface was 8.5°C in April and 10.1°C in May. For the month of April, the lowest recorded temperature (8.1°C) was at Site 16, south from Shelter Bay. The highest temperature for April (8.9°C) was recorded at the surface at Site 19 at Marsh Bay. In May the lowest recorded temperature (8.7°C) was recorded at Site 20, south from Marsh Bay. The highest temperature recorded in May (11.3°C) was found at Site 12 in the Gordan Group.

Table 12: Water quality summary of temperature (°C) and salinity (ppt), by month and site. Please note the YSI meter used to measure the water parameters malfunctioned on May 24th, and Sites 1-5 were not measured.

Site	April		May	
	Temp (C)	Salinity (ppt)	Temp (C)	Salinity (ppt)
1	8.70	29.57		
2	8.70	30.35		
3	8.60	30.53		
4	8.70	30.34		
5	8.70	30.39		
6	8.70	30.41	10.30	29.00
7	8.80	30.39	9.60	28.99
8	8.60	30.47	10.70	29.02
9	8.50	30.60	10.50	28.63
10	8.60	30.14	10.60	28.64
11	8.50	30.58	10.50	28.61
12	8.50	30.39	11.30	28.45
13	8.50	30.39	9.90	28.51
14	8.30	30.50	9.30	28.85
15	8.40	29.78	10.90	28.58
16	8.10	30.46	10.20	28.59
17	8.20	30.21	9.80	28.63
18	8.40	30.13	9.80	28.41
19	8.90	29.64	9.90	28.39
20	8.60	30.08	8.80	29.07
Average	8.55	30.27	10.14	28.69

Discussion

Sample numbers

There were a total of 260 individual fish captured and retained for lab analysis from Goletas Channel and Queen Charlotte Strait for the 2018 study year. Overall this was a decrease from the 378 individual fish retained for sea lice analysis during the 2017 study year, the 2016 study year (598), 2015 study year (682) and the 2014 study year (579). The total number of sampled fish during this year's study was also fewer when compared to the totals for the 2011 and 2013 study years, which were 819 and 874 respectively.

Salmonids sampled this year included pink, chum, coho, and sockeye salmon. One three-spined stickleback was also captured. The majority of fish caught and retained for lab analysis were pinks (201 individuals). Smaller sample numbers of chum (39 individuals), coho (10 individuals) and sockeye (9 individuals) were also retained and analyzed in the lab.

Distribution

In order to facilitate comparisons between study years and simplify individual site analysis, the sites were renamed in 2017 to Sites 1-20, with the original names in Appendix 1 for further analysis where required.

There was some variability in sample size from April (207 samples retained) to May (53 samples retained). As suggested in reporting from previous years, variability in the success of sample capture may be linked to changes in fish behavior relative to the tide cycle (Pacificus 2013). It has been suggested that juvenile salmonids may have a tendency to migrate closer to shore on a rising tide; this may result in more successful sets during a rising tide. However, the data also indicates that certain sites have a tendency to have a higher incidence of capturing juvenile salmonids regardless of the tide cycle.

Water Quality

Water quality data for the 2018 study year was consistent when compared with past study years based on a comparison of mean water temperature and mean salinity from all study years with the exception of 2015. In previous study years (with the exception of 2015), water temperature increased from April to May which was consistent with 2018. Mean water temperature in 2015

showed a marked decrease (1°C) from April to May. Detailed water quality results for previous years are available in those reports.

Sea lice

Sea lice intensity (average number of lice per infested fish) was 2.17 for all sea lice infested pink salmon over the entire study period. Intensity of *L. salmonis* infestation on pink salmon was 1.25 in April and 0.89 in May, while intensity of *C. clemensi* infestation on pink salmon was 1.2 for April and 2.53 for May. Average weight for juvenile pink salmon was 0.4g in April, increasing to 2.0g in May. The threshold level for lethal infestation stated in Jones and Hargreaves 2009 is 7.5 lice (*L. salmonis*) per fish averaging less than 0.7g in weight. Based on the Jones and Hargreaves conclusion, lice intensity on juvenile pink salmon observed during this survey is well below the threshold for lethal infestation.

In Nendick et al (2011), experimental sea lice infestation (*L. salmonis*) on juvenile pink salmon negatively affected swimming performance of only the smallest fish ($\leq 0.34\text{g}$). In addition, reduction in maximum swimming velocity was dependant on sea lice life stage, and not infestation intensity; infestation with a single louse of chalimus 3 stage or higher would impact swimming performance in juvenile pink salmon weighing 0.34g or less.

Of the 76 individual juvenile pink salmon weighing less than 0.34g, two fish were infested, one with a chalimus copepodid, and one with a chalimus 2 stage *L. salmonis*. One fish was infested with one *C. clemensi* chalimus 1 stage. Based on the Nendick et al (2011) findings, maximum swimming velocity of these individuals would not be reduced. No other small fish (i.e. $\leq 0.34\text{g}$) were infested with a chalimus 3 stage or greater.

Based on the summary data in Table 12 and 13, *C. clemensi* was more prevalent than *L. salmonis* for the Goletas Channel and Queen Charlotte Strait study area in the 2018 study year. This trend remains similar to the trends observed in previous years.

Table 12. Overall infestation contribution of *L. salmonis* and *C. clemensi* for all infested samples.

Year	Total number of sea lice sampled (<i>L. salmonis</i> and <i>C. clemensi</i>)	Contribution of <i>L. salmonis</i> (%)	Contribution of <i>C.</i> <i>clemensi</i> (%)
2011	340	20	80
2013	66	24	76
2014	42	24	76
2015	696	12	88
2016	516	21	79
2017	92	21	79
2018	173	14	86

Through a comparison of data for juvenile pink salmon from all study years, sea lice prevalence was determined to be the third highest in the 2018 study year; 2015 remains the highest followed by 2016 (Table 13). Refer to Appendix 2 for raw data from 2011, 2013 and 2014.

Table 13: The prevalence, abundance and intensity of *L. salmonis* and *C. clemensi* infestation over the past 7 sampling years on pink juvenile salmon.

Year	<i>Lepeophtheirus salmonis</i>			<i>Caligus clemensi</i>		
	Prevalence	Abundance	Average Intensity	Prevalence	Abundance	Average Intensity
2011 (n = 611)	4%	0.04	1.09	13%	0.15	1.24
2013 (n = 612)	1%	0.01	1.00	4%	0.04	1.00
2014 (n = 500)	2%	0.02	1.00	5%	0.06	1.03
2015 (n = 460)	19%	0.13	1.17	21%	0.21	1.50
2016 (n = 336)	7%	0.07	1.14	16%	0.24	1.55
2017 (n = 189)	5%	0.07	1.30	10%	0.11	1.11
2018 (n = 201)	6%	0.07	1.17	11%	0.24	2.23

Pink salmon were the only species captured during all sampling months in all study years (2011, 2013, 2014, 2015, 2016 and 2017). Based on the 2011 and 2013 results for salmonid outmigration timing, sampling effort in 2014 and 2015 was focused on April and May. In 2016, sampling effort was planned for the months of April and May, however due to a lack of samples retained in May, sampling also occurred in June. In 2017, sampling returned to April and May, which was continued in 2018. As a result, sea lice prevalence and infestation rates on pink salmon were only compared for the months of April and May between the seven study years.

Over the last seven study years the prevalence of *L. salmonis* on juvenile pink salmon has followed a similar trend of increasing from the April sampling period to May, with the exception of 2016 and 2017, where the trend appeared to be reversed. Data from the past six study years show *L. salmonis* prevalence in April ranged from 0% to 9.0% and showed little-to-no increase into the month of May (0% to 3.4%) except in 2015 where prevalence in April was 9.0% and increased to 13.9% during the month of May, an increase of 4.9%. In 2017, the trend was slightly reversed showing a slight decrease (0.3%) from April to May, which may be

the result of a larger sample size (April n=154, May n=224). In 2018, the prevalence of *L. salmonis* on juvenile pink salmon was 2.5% in April (n=162), and increased to 20.5% (n=39) in the month of May, an increase of 18%.

With the exception of the 2011 study year, *C. clemensi* prevalence on juvenile pink salmon has followed a similar trend of increase from April to May. In 2011, *C. clemensi* prevalence showed a decrease from 9.1% in April to 1.8% in May. During the 2014 and 2015 study years *C. clemensi* prevalence in April was 1.15% and 6.0% respectively and increasing to 10.5% and 23.2% respectively in May. In 2016, *C. clemensi* prevalence on pink salmon was at 15% in April and increased to 17% in May, an increase of 2.0%. In 2017, *C. clemensi* prevalence on all samples taken were 12.3% in April, and 24.1% in May. During the 2018 study year, *C. clemensi* prevalence on pink salmon was at 3.1% in April, and increased to 43.6% in May, an increase of 40.5%.

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Appendix 1: Site Numbering Scheme Change

Former Name	New Site Number
Zone 1 Site 2	10
Zone 1 Site 3	8
Zone 2 Site 1	5
Zone 2 Site 2	4
Zone 3 Site 1	1
Zone 3 Site 2	2
Zone 3 Site 3	3
Zone 4 Site 2	6
Zone 4 Site 3	7
Zone 4 Site 4	9
Zone 5 Site 1	11
Zone 5 Site 2	12
Zone 5 Site 3	13
Zone 5 Site 4	14
Zone 6 Site 1	17
Zone 6 Site 3	16
Zone 6 Site 4	15
Zone 6 Site 5	19
Zone 6 Site 6	18
Zone 6 Site 7	20

Appendix 2: Environmental Data for 2018

Site	April						Site	May					
	Temperature(°C)			Salinity (ppt)				Temperature(°C)			Salinity (ppt)		
	Surface	1m	4m	Surface	1m	4m		Surface	1m	4m	Surface	1m	4m
1	8.70	8.80	8.80	29.57	29.80	30.34	1	10.30	10.30	10.03	29.00	29.03	29.08
2	8.70	8.70	8.70	30.35	30.35	30.44	2						
3	8.60	8.60	8.50	30.53	30.54	30.55	3						
4	8.70	8.60	8.60	30.34	30.43	30.46	4						
5	8.70	8.70	8.70	30.39	30.38	30.39	5						
6	8.70	8.70	8.70	30.41	30.41	30.45	6						
7	8.80	8.80	8.70	30.39	30.40	30.41	7						
8	8.60	8.60	8.60	30.47	30.47	30.47	8						
9	8.50	8.50	8.50	30.60	30.57	30.60	9						
10	8.60	8.60	8.60	30.14	30.39	30.45	10						
11	8.50	8.40	8.40	30.58	30.60	30.62	11						
12	8.50	8.50	8.60	30.39	30.46	30.44	12						
13	8.50	8.50	8.50	30.39	30.38	30.42	13						
14	8.30	8.30	8.30	30.50	30.51	30.52	14						
15	8.40	8.40	8.30	29.78	30.05	30.37	15						
16	8.10	8.10	8.10	30.46	30.46	30.42	16						
17	8.20	8.20	8.20	30.21	30.21	30.21	17						
18	8.40	8.30	8.30	30.13	30.14	30.14	18						
19	8.90	8.50	8.30	29.64	30.11	30.11	19						
20	8.60	8.60	8.40	30.08	30.09	30.11	20						

Appendix 3: Raw Field Data Summary of 2018

2018 Goletas Channel and Queen Charlotte Strait Beach Seine

Beach Seine Summary			Date	April 17-20							Site Total # Fish
Site #	Location	Sample	Pink	Chum	Coho	Sockeye	Chinook	Dolly Varden	Herring	Stickleback	
1	50° 54.753 N	retained		2							2
	127° 55.837 W	captured		2							2
2	50° 53.833 N	retained	30	19							49
	127° 54.220 W	captured	85	19							104
3	50° 53.698 N	retained									0
	127° 51.420 W	captured									0
4	50° 51.119 N	retained									0
	127° 52.011 W	captured									0
5	50° 50.782 N	retained		1							1
	127° 48.839 W	captured		1							1
6	50° 51.667 N	retained									0
	127° 46.712 W	captured									0
7	50° 51.692 N	retained		1		2					3
	127° 45.477 W	captured		1		2					3
8	50°49.487 N	retained		1	2	2					5
	127° 42.564 W	captured		1	2	2					5
9	50° 49.980 N	retained									0
	127° 39.147 W	captured									0
10	50°48.110 N	retained	2								2
	127° 37.890 W	captured	2								2
11	50°49.095 N	retained									0
	127° 33.311 W	captured									0
12	50°49.714 N	retained	30								30
	127°31.560 W	captured	56								56
13	50°48.831 N	retained									0
	127°28.678 W	captured									0
14	50°53.580 N	retained	30								30
	127° 29.362 W	captured	80								80
15	50° 58.577 N	retained	1								1
	127° 27.477 W	captured	1								1
16	50° 57.580 N	retained	6								6
	127° 27.254 W	captured	6								6
17	50° 55.920 N	retained	2								2
	127° 24.324 W	captured	2								2
18	50° 55.221 N	retained				3					3
	127° 22.516 W	captured				3					3
19	50° 54.241 N	retained	31	10							41
	127°19.289 W	captured	110	10							120
20	50° 53.990N	retained	30	1						1	32
	127° 17.859 W	captured	140	1						1	142
TOTAL RETAINED			162	35	2	7	0	0	0	1	207
TOTAL CAPTURED			482	35	2	7	0	0	0	1	527

Beach Seine Summary			Date	May 22-25, 2018							Site Total # Fish
Site #	Location	Sample	Pink	Chum	Coho	Sockeye	Chinook	Dolly Varden	Herring	Stickleback	
1	50° 54.753 N	retained									0
	127° 55.837 W	captured									0
2	50° 53.833 N	retained	23	4							27
	127° 54.220 W	captured	23	4							27
3	50° 53.698 N	retained									0
	127° 51.420 W	captured									0
4	50° 51.119 N	retained									0
	127° 52.011 W	captured									0
5	50° 50.782 N	retained	1								1
	127° 48.839 W	captured	1								1
6	50° 51.667 N	retained									0
	127° 46.712 W	captured									0
7	50° 51.692 N	retained									0
	127° 45.477 W	captured									0
8	50°49.487 N	retained			5	2					7
	127° 42.564 W	captured			5	2					7
9	50° 49.980 N	retained			3						3
	127° 39.147 W	captured			3						3
10	50°48.110 N	retained									0
	127° 37.890 W	captured									0
11	50°49.095 N	retained									0
	127° 33.311 W	captured									0
12	50°49.714 N	retained									0
	127°31.560 W	captured									0
13	50°48.831 N	retained									0
	127°28.678 W	captured									0
14	50°53.580 N	retained									0
	127° 29.362 W	captured									0
15	50° 58.577 N	retained									0
	127° 27.477 W	captured									0
16	50° 57.580 N	retained									0
	127° 27.254 W	captured									0
17	50° 55.920 N	retained									0
	127° 24.324 W	captured									0
18	50° 55.221 N	retained									0
18	127° 22.516 W	captured									0
19	50° 54.241 N	retained	14								14
	127°19.289 W	captured	14								14
20	50° 53.990N	retained	1								1
	127° 17.859 W	captured	1								1
TOTAL RETAINED			39	4	8	2	0	0	0	0	53
TOTAL CAPTURED			39	4	8	2	0	0	0	0	53

2017 Goletas Channel and Queen Charlotte Strait Beach Seine

Beach Seine Summary			April 9-12, 21, 2017					May 9-12, 2017				
Site #	Location	Sample	Pink	Chum	Coho	Sockeye	3Spine Stickle	Pink	Chum	Coho	Sockeye	3Spine Stickle
Zone 1 (VI south)												
Site 2	50°48.110 N	retained	5					2	6			
(Site 10)	127° 37.890 W	captured	5					2	6			
Site 3	50°49.487 N	retained	6						2			
(Site 8)	127° 42.564 W	captured	6						2			
Zone 2 (VI north)												
Site 1	50° 50.782 N	retained	2	4				1	6		1	
(Site 5)	127° 48.839 W	captured	2	4				1	6		1	
Site 2	50° 51.119 N	retained							8	30	30	
(Site 4)	127° 52.011 W	captured							8	400	200	
Zone 3 (Hope Isl)												
Site 1	50° 54.753 N	retained										
(Site 1)	127° 55.837 W	captured										
Site 2	50° 53.833 N	retained	1	2				2				
(Site 2)	127° 54.220 W	captured	1	2				2				
Site 3	50° 53.698 N	retained	2	1				7	8			
(Site 3)	127° 51.420 W	captured	2	1				7	8			
Zone 4 (Nigei Isl)												
Site 2	50° 51.667 N	retained	6	6							30	
(Site 6)	127° 46.712 W	captured	6	6							100	
Site 3	50° 51.692 N	retained			4			22	6		1	
(Site 7)	127° 45.477 W	captured			4			22	6		1	
Site 4	50° 49.980 N	retained	3							7	9	
(Site 9)	127° 39.147 W	captured	3							7	9	
Zone 5 (Gordon Isls)												
Site 1	50°49.095 N	retained										
(Site 11)	127° 33.311 W	captured										
Site 2	50°49.714 N	retained	30	4					1		1	
(Site 12)	127°31.560 W	captured	92	4					1		1	
April 9-12, 21, 2017								May 9-12, 2017				

Site #	Location	Sample	Pink	Chum	Coho	Sockeye	3Spine Stickle	Pink	Chum	Coho	Sockeye	3Spine Stickle
Site 3	50°48.831 N	retained										
(Site 13)	127°28.678 W	captured										
Site 4	50°53.580 N	retained										
(Site 14)	127° 29.362 W	captured										
Zone 6 (Shelter Bay)												
Site 1	50° 55.920 N	retained										
(Site 17)	127° 24.324 W	captured										
Site 3	50° 57.580 N	retained	30	6								
(Site 16)	127° 27.254 W	captured	103	6								
Site 4	50° 58.577 N	retained			2		1		1			5
(Site 15)	127° 27.477 W	captured			2		1		1			5
Site 5	50° 54.241 N	retained	30	3						2		
(Site 19)	127°19.289 W	captured	66	3						2		
Site 6	50° 55.221 N	retained	6					2				
(Site 18)	127° 22.516 W	captured	6					2				
Site 7	50° 53.990N	retained						30	2			
(Site 20)	127° 17.859 W	captured						33	2			
TOTAL RETAINED			121	26	6	0	1	66	40	39	72	5
TOTAL CAPTURED			292	26	6	0	1	69	40	409	312	5

2016 Goletas Channel and Queen Charlotte Strait Beach Seine

Beach Seine Summary			April 11-15, 2016								May 9-11								May 30, 31 June 2, 7								
Site #	Location	Sample	Pink	Chum	Coho	Sockeye	Chinook	Jolly Varde	Herring	Other	Pink	Chum	Coho	Sockeye	Chinook	Jolly Varde	Herring	Other	Pink	Chum	Coho	Sockeye	Chinook	Jolly Varde	Herring	Other	
Zone 1 (VI south)																											
Site 2	50°48.110 N	retained	3																								
	127° 37.890 W	captured	3																								
Site 3	50°49.487 N	retained	2																								
	127° 42.564 W	captured	2																								
Zone 2 (VI north)																											
Site 1	50° 50.782 N	retained	4	8	9	3																					
	127° 48.839 W	captured	4	8	9	3																					
Site 2	50° 51.119 N	retained																		2	30		3				
	127° 52.011 W	captured			47	2														2	72		3				
Zone 3 (Hope Isl)																											
Site 1	50° 54.753 N	retained										3	6	52			2					24					
	127° 55.837 W	captured										3	6	75			2					24					
Site 2	50° 53.833 N	retained	7	3							29	33															
	127° 54.220 W	captured	7	3							128	38															
Site 3	50° 53.698 N	retained	20	11																							
	127° 51.420 W	captured	20	11																							
Zone 4 (Nigei Isl)																											
Site 2	50° 51.667 N	retained	5																	1							
	127° 46.712 W	captured	5																	1							
Site 3	50° 51.692 N	retained	5	9		1																		3			
	127° 45.477 W	captured	5	9		1																		3			
Site 4	50° 49.980 N	retained	2																								
	127° 39.147 W	captured	2																								
Zone 5 (Gordon Isls)																											
Site 1	50°49.095 N	retained		1																							
	127° 33.311 W	captured		1																							
Site 2	50°49.714 N	retained	1																								
	127°31.560 W	captured	1																								
Site 3	50°48.831 N	retained																									
	127°28.678 W	captured																									
Site 4	50°53.580 N	retained	29	1																							
	127° 29.362 W	captured	42	1																							
Zone 6 (Shelter Bay)																											
Site 1	50° 55.920 N	retained		1																							
	127° 24.324 W	captured		1																							
Site 3	50° 57.580 N	retained	52	8																							
	127° 27.254 W	captured	192	8																							
Site 4	50° 58.577 N	retained	48	10																							
	127° 27.477 W	captured	63	47																							
Site 5	50° 54.241 N	retained	58	2																2		1		1			
	127°19.289 W	captured	90	7																2		1		1			
Site 6	50° 55.221 N	retained	14																			1		1			
	127° 22.516 W	captured	14																			1		1			
Site 7	50° 53.990N	retained	54	1																							
	127° 17.859 W	captured	54	33																							
TOTAL RETAINED			304	55	38	6	0	0	0	0	29	36	6	52	0	3	0	0	3	2	56	3	2	3	0	0	
TOTAL CAPTURED			504	129	56	6	0	0	0	0	128	41	6	75	0	3	0	0	3	2	98	3	2	3	0	0	

2015 Goletas Channel and Queen Charlotte Strait Beach Seine

Beach Seine Summary			April 7-10, 14 2015						May 11-14 2015						Site Total # Fish
Site #	Location	Sample	Pink	Chum	Coho	Pacific Herring	Chinook	Unidentified	Pink	Chum	Coho	Sockeye	Dolly Varden		
Zone 1 (VI south)															
Site 2	50°48.110 N	retained	1								1				2
	127° 37.890 W	captured	1								1				2
Site 3	50°49.487 N	retained	31	5	0		0		30	1	29	5			101
	127° 42.564 W	captured	41	5	0		0		63	1	29	5			144
Zone 2 (VI north)															
Site 1	50° 50.782 N	retained	9	1							6				16
	127° 48.839 W	captured	9	1							6				16
Site 2	50° 51.119 N	retained									30	30	1		61
	127° 52.011 W	captured									130	80	1		211
Zone 3 (Hope Isl)															
Site 1	50° 54.753 N	retained													0
	127° 55.837 W	captured													0
Site 2	50° 53.833 N	retained	15						30		2	5			52
	127° 54.220 W	captured	15						30		2	5			52
Site 3	50° 53.698 N	retained	11												11
	127° 51.420 W	captured	11												11
Zone 4 (Nigei Isl)															
Site 2	50° 51.667 N	retained							1	2					3
	127° 46.712 W	captured							1	2					3
Site 3	50° 51.692 N	retained	20	3	2	1									26
	127° 45.477 W	captured	20	3	2	1									26
Site 4	50° 49.980 N	retained													0
	127° 39.147 W	captured													0
Zone 5 (Gordon Isl)															
Site 1	50°49.095 N	retained	30	9							1	1			41
	127° 33.311 W	captured	77	9							1	1			88
Site 2	50°49.714 N	retained	11						41	9					61
	127°31.560 W	captured	11						400	9					420
Site 3	50°48.831 N	retained	34	0					30	30					94
	127°28.678 W	captured	80	0					600	100					780
Site 4	50°53.580 N	retained	30			2			30						62
	127° 29.362 W	captured	90			2			1000						1092
Zone 6 (Shelter Bay)															
Site 1	50° 55.920 N	retained	1												1
	127° 24.324 W	captured	1												1
Site 3	50° 57.580 N	retained	33	14					30	7					84
	127° 27.254 W	captured	300	14					300	7					621
Site 4	50° 58.577 N	retained							1						1
	127° 27.477 W	captured							1						1
Site 5	50° 54.241 N	retained	5												0
	127°19.289 W	captured	5												0
Site 6	50° 55.221 N	retained	3						1						4
	127° 22.516 W	captured	3						1						4
Site 7	50° 53.990N	retained	32	25											57
	127° 17.859 W	captured	550	25											575
TOTAL RETAINED			266	57	2	3	0	0	194	49	69	41	1		682

*** retained fish are first row for each site in bold, caught fish are second row for each site in regular print.

2014 Goletas Channel and Queen Charlotte Strait Beach Seine:

Beach Seine Summary		April 8-11 2014						May 12-15 2014				Site Total # Fish
Site #	Location	Pink	Chum	Coho	Sockeye	Chinook	Unidentified	Pink	Chum	Sockeye	Coho	
Zone 1 (VI south)												
Site 2	50°48.110 N	2	0	0	0	0	0	20	0	0	0	22
	127° 37.890 W	2	0	0	0	0	0	20	0	0	0	22
Site 3	50°49.487 N	11	1	0	0	0	0	0	0	0	0	12
	127° 42.564 W	11	1	0	0	0	0	0	0	0	0	12
Zone 2 (VI north)												
Site 1	50° 50.782 N	33	4	0	1	1	0	1	4	0	0	44
	127° 48.839 W	46	4	0	4	1	0	1	4	0	0	60
Site 2	50° 51.119 N	1	0	0	0	0	0	0	0	20	10	31
	127° 52.011 W	1	0	0	0	0	0	0	0	20	200	221
Zone 3 (Hope Isl)												
Site 1	50° 54.753 N	1	0	0	0	0	0	0	0	0	0	1
	127° 55.837 W	1	0	0	0	0	0	0	0	0	0	1
Site 2	50° 53.833 N	29	2	0	0	0	0	0	0	0	0	31
	127° 54.220 W	182	2	0	0	0	0	0	0	0	0	184
Site 3	50° 53.698 N	8	0	0	0	0	0	0	0	0	0	8
	127° 51.420 W	8	0	0	0	0	0	0	0	0	0	8
Zone 4 (Nigei Isl)												
Site 2	50° 51.667 N	2	3	0	0	0	0	0	0	0	0	5
	127° 46.712 W	2	3	0	0	0	0	0	0	0	0	5
Site 3	50° 51.692 N	2	0	0	10	0	1	31	1	0	1	46
	127° 45.477 W	2	1	20	10	0	1	32	1	0	1	68
Site 4	50° 49.980 N	0	0	0	0	0	0	0	0	0	0	0
	127° 39.147 W	0	0	0	0	0	0	0	0	0	0	0
Zone 5 (Gordon Isls)												
Site 1	50°49.095 N	31	0	0	0	0	0	0	0	0	0	31
	127° 33.311 W	300	0	0	0	0	0	0	0	0	0	300
Site 2	50°49.714 N	30	0	0	0	0	0	30	0	0	0	60
	127°31.560 W	650	0	0	0	0	0	6000	0	0	0	6650
Site 3	50°48.831 N	30	0	0	0	0	0	35	0	0	0	65
	127°28.678 W	500	0	0	0	0	0	10000	0	0	0	10500
Site 4	50°53.580 N	0	0	0	0	0	0	30	0	0	0	30
	127° 29.362 W	0	0	0	0	0	0	3000	0	0	0	3000
Zone 6 (Shelter Bay)												
Site 1	50° 55.920 N	30	0	0	0	0	0	1	0	0	0	31
	127° 24.324 W	49	0	0	0	0	0	1	0	0	0	50
Site 3	50° 57.580 N	31	2	0	0	0	0	30	0	0	10	73
	127° 27.254 W	78	3	0	0	0	0	400	0	0	10	491
Site 4	50° 58.577 N	1	0	0	0	0	0	30	0	0	0	31
	127° 27.477 W	1	0	0	0	0	0	37	0	0	0	38
Site 5	50° 54.241 N	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0
	127°19.289 W	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	0	0
Site 6	50° 55.221 N	0	0	0	0	0	0	0	0	0	0	0
	127° 22.516 W	0	0	0	0	0	0	0	0	0	0	0
Site 7	50° 53.990N	20	8	0	0	0	0	30	0	0	0	58
	127° 17.859 W	20	8	0	0	0	0	37	0	0	0	65
		1853	22	30	14	1	1	19528	5	20	211	21685
TOTAL RETAINED		262	20	0	11	1	1	238	5	20	21	579
*** retained fish are first row for each site in bold, caught fish are second row for each site in regular print.												

*** retained fish are first row for each site in bold, caught fish are second row for each site in regular print.

2013 Goletas Channel Beach Seine:

Beach Seine Dates		April 1-2, 2013			May 6-8, 2013				June 3-5, 2013					Site Total # Fish
Lab Analysis Dates		April 8, 2013			May 16-31, 2013				June 21-26 and July 4, 2013					Site Total # Fish
Site #	Location	Pink	Chinook	pn-salmon	Pink	Coho	Sockeye	Chum	Pink	Chinook	Coho	Sockeye	Dolly Varden	
Zone 1 (VI south)														
Site 1	50° 47' 13.115" N 127° 34' 36.832" W	1	1	1	0	0	0	0	0	0	5	0	2	10
		1	1	1	0	0	0	0	0	0	5	0	2	10
Site 2	50° 48' 6.617" N 127° 37' 55.582" W	4	2	0	30	0	0	15	1	0	0	0	0	52
		4	2	0	3000	0	0	15	1	0	0	0	0	3022
Site 3	50° 49' 26.579" N 127° 42' 36.213" W	7	0	0	30	0	0	10	30	0	2	0	0	79
		7	0	0	350	0	0	10	150	0	2	0	0	519
Zone 2 (VI north)														
Site 1	50° 50' 32.792" N 127° 48' 16.983" W	30	5	0	30	16	0	25	30	5	0	0	0	141
		94	5	0	275	16	0	25	3500	5	0	0	0	3920
Site 2	50° 51' 1.563" N 127° 51' 36.418" W	2	0	0	0	14	3	0	0	0	16	0	1	36
		2	0	0	0	14	3	0	0	0	65	0	1	85
Site 3	50° 52' 24.844" N 127° 54' 13.108" W	0	0	0	2	0	0	0	15	0	1	1	0	19
		0	0	0	2	0	0	0	15	0	1	1	0	19
Zone 3 (Hope Isl)														
Site 1	50° 54' 40.388" N 127° 55' 42.765" W	0	0	0	0	1	0	0	0	0	0	0	0	1
		0	0	0	0	1	0	0	0	0	0	0	0	1
Site 2	50° 53' 48.141" N 127° 53' 17.963" W	3	0	0	30	0	0	5	30	0	0	0	0	68
		0	0	0	3500	0	0	5	92	0	0	0	0	3597
Site 3	50° 53' 40.083" N 127° 51' 34.341" W	1	2	0	30	0	0	11	11	0	0	0	0	55
		1	2	0	3800	0	0	11	11	0	0	0	0	3825
Zone 4 (Nigei Isl)														
Site 1	50° 52' 12.580" N 127° 48' 40.430" W	0	0	0	0	0	0	2	1	0	0	0	0	3
		0	0	0	0	0	0	2	1	0	0	0	0	3
Site 2	50° 51' 42.071" N 127° 46' 33.619" W	4	0	0	30	0	0	8	1	0	0	0	0	43
		4	0	0	1400	0	0	8	1	0	0	0	0	1413
Site 3	50° 51' 42.928" N 127° 45' 30.676" W	3	0	0	30	0	0	3	0	1	0	0	0	37
		3	0	0	126	0	0	3	0	1	0	0	0	133
Site 4	50° 49' 54.803" N 127° 39' 12.223" W	1	0	0	30	0	0	2	30	0	0	0	0	63
		1	0	0	150	0	0	2	30	0	0	0	0	183
Zone 5 (Gordon Isls)														
Site 1	50° 49' 3.788" N 127° 33' 16.194" W	0	0	0	30	0	0	6	30	0	16	0	0	82
		0	0	0	350	0	0	6	250	0	37	0	0	643
Site 2	50° 49' 52.875" N 127° 30' 52.353" W	0	0	0	30	0	0	13	0	0	0	0	0	43
		0	0	0	700	0	0	13	0	0	0	0	0	713
Site 3	50° 48' 49.921" N 127° 28' 40.714" W	0	0	0	30	0	0	4	30	4	0	0	0	68
		0	0	0	3500	0	0	4	10000	4	0	0	0	13508
TOTAL RETAINED		55	11	1	344	15	19	95	213	10	30	2	4	799

*** retained fish are first row for each site in bold, caught fish are second row for each site in regular print. Please note: This data represents the field data recorded during beach seines and does not reflect corrections made during lab analysis of samples. Therefore, discrepancies may be present between field and lab data.

2013 Queen Charlotte Strait Beach Seine:

Beach Seine Summary		06-Jun-13			03-Jul-13			Site Total # Fish
Site #	Location	Pink	Coho	Chum	Pink	Chinook	Herring	
Shelter Bay								
Site 1	50°55'58.90"N	30	0	0	9	0	31	70
	127°24'19.94"W	500	0	0	9	0	500	1009
Site 2	50°56'42.39"N	0	0	0	n/a	n/a	n/a	0
	127°26'02.88"W	0	0	0				0
Site 3	50°57'41.21"N	0	3	0	1	1	0	5
	127°27'16.18"W	0	3	0	1	1	0	5
Site 4	50°58'37.90"N	0	0	0	0	0	0	0
	127°27'25.39"W	0	0	0	0	0	0	0
Site 5	50°59'15.24"N	0	0	0	0	0	0	0
	127°30'21.21"W	0	0	0	0	0	0	0
TOTAL RETAINED		30	3	0	10	1	31	75
		500	3	0	10	1	500	1014

2011 Goletas Channel Beach Seine:

Beach Seine Summary		March 30-April 1, 2011			April 27-29, 2011			May 30-June 3, 2011					June 28 30-July 4, 2011				Site Total # Fish
Site #	Location	Pink	Chum	Coho	Pink	Chum	Chinook	Pink	Chum	Coho	Herring	Dolly Varden	Pink	Chum	Coho	Herring	
Zone 1 (VI south)																	
Site 1	50° 47' 13.115" N	0	0	3	3	0	0	0	7	0	0	0	0	0	0	0	13
	127° 34' 36.832" W	0	0	3	3	0	0	0	7	0	0	0	0	0	0	0	13
Site 2	50° 48' 6.617" N	0	0	0	0	0	0	1	0	0	0	3	0	0	0	0	4
	127° 37' 55.582" W	0	0	0	0	0	0	1	0	0	0	6	0	0	0	0	7
Site 3	50° 49' 26.579" N	2	0	0	31	7	0	31	30	0	0	0	0	0	0	0	101
	127° 42' 36.213" W	2	0	0	731	7	0	68	171	0	0	0	0	0	0	0	979
Zone 2 (VI north)																	
Site 1	50° 50' 32.792" N	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3
	127° 48' 16.983" W	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	3
Site 2	50° 51' 1.563" N	0	0	0	1	0	0	0	3	45	0	0	0	0	0	0	49
	127° 51' 36.418" W	0	0	0	1	0	0	0	3	259	0	0	0	0	0	0	263
Site 3	50° 52' 24.844" N	0	0	0	18	0	0	0	0	0	0	5	0	0	0	0	23
	127° 54' 13.108" W	0	0	0	18	0	0	0	0	0	0	7	0	0	0	0	25
Zone 3 (Hope Isl)																	
Site 1	50° 54' 40.388" N	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
	127° 55' 42.765" W	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Site 2	50° 53' 48.141" N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	127° 53' 17.963" W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Site 3	50° 53' 40.083" N	0	0	0	34	11	2	0	0	0	0	0	35	36	0	0	118
	127° 51' 34.341" W	0	0	0	1000	11	2	0	0	0	0	0	40	42	0	0	1095
Zone 4 (Nigei Isl)																	
Site 1	50° 52' 37.046" N	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	127° 50' 2.288" W	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Site 2	50° 51' 42.071" N	4	0	0	1	0	0	3	0	0	0	0	0	0	1	0	9
	127° 46' 33.619" W	4	0	0	1	0	0	3	0	0	0	0	0	0	1	0	9
Site 3	50° 51' 42.928" N	0	0	0	0	0	0	44	33	5	30	0	0	0	0	30	142
	127° 45' 30.676" W	0	0	0	0	0	0	60	140	5	500	0	0	0	0	45	750
Site 4	50° 49' 54.803" N	0	0	0	36	4	0	0	0	0	0	0	0	0	0	0	40
	127° 39' 12.223" W	0	0	0	380	4	0	0	0	0	0	0	0	0	0	0	384
Zone 5 (Gordon Isls)																	
Site 1	50° 49' 3.788" N	0	0	0	1	0	0	0	30	0	0	0	0	0	0	0	31
	127° 33' 16.194" W	0	0	0	1	0	0	0	160	0	0	0	0	0	0	0	161
Site 2	50° 49' 52.875" N	0	0	0	31	6	0	30	30	0	0	0	46	30	14	0	187
	127° 30' 52.353" W	0	0	0	411	6	0	685	1331	0	0	0	1251	80	14	0	3778
Site 3	50° 48' 49.921" N	3	2	0	2	0	0	30	30	4	0	0	18	8	0	0	97
	127° 28' 40.714" W	3	2	0	2	0	0	36	70	4	0	0	18	8	0	0	143
TOTAL RETAINED		11	2	3	159	30	2	139	163	54	30	8	99	74	15	30	819

*** retained fish are first row for each site in bold, caught fish are second row for each site in regular print.

Appendix 4: Summarized Data from lab analysis**2016 Study Year**

Month	Species	Number sampled	Ave Weight (g)	Ave Length (mm)	L. salmonis					C. clemensi				
					Total # Lice	# Fish Infected	Prevalence	Abundundance	Intensity	Total # Lice	# Fish Infected	Prevalence	Abundundance	Intensity
April	Pink	304	0.50	37.13	25	22	7.2%	0.08	1.14	76	47	15.5%	0.25	1.62
	Chum	55	1.39	48.04	6	6	10.9%	0.11	1.00	16	12	21.8%	0.29	1.33
	Coho	38	9.57	93.00	0	0	0.0%	0.00	0.00	5	3	7.9%	0.13	1.67
	Chinook	0	0.00	0.00	0	0	0.0%	0.00	0.00	0	0	0.0%	0.00	0.00
	Sockeye	6	6.96	89.17	0	0	0.0%	0.00	0.00	3	2	33.3%	0.50	1.50
	Dolly Varden	0	0.00	0.00	0	0	0.0%	0.00	0.00	0	0	0.0%	0.00	0.00
May	Pink	29	1.69	54.34	0	0	0.0%	0.00	0.00	5	5	17.2%	0.17	1.00
	Chum	36	0.00	0.00	2	2	5.6%	0.06	1.00	2	2	5.6%	0.06	1.00
	Coho	6	23.23	117.33	1	1	16.7%	0.17	1.00	1	1	16.7%	0.17	1.00
	Chinook	0	0.00	0.00	0	0	0.0%	0.00	0.00	0	0	0.0%	0.00	0.00
	Sockeye	52	13.27	96.88	10	9	17.3%	0.19	1.11	95	32	61.5%	1.83	2.97
	Dolly Varden	3	112.97	184.33	7	1	33.3%	2.33	7.00	0	0	0.0%	0.00	0.00
June	Pink	3	3.09	64.67	0	0	0.0%	0.00	0.00	1	1	33.3%	0.33	1.00
	Chum	2	0.00	0.00	3	2	100.0%	1.50	1.50	11	2	100.0%	5.50	5.50
	Coho	56	18.93	112.98	38	29	51.8%	0.68	1.31	139	28	50.0%	2.48	4.96
	Chinook	2	261.49	213.00	1	1	50.0%	0.50	1.00	2	1	50.0%	1.00	2.00
	Sockeye	3	8.16	91.00	1	1	33.3%	0.33	1.00	1	1	33.3%	0.33	1.00
	Dolly Varden	3	75.64	188.00	13	3	100.0%	4.33	4.33	52	3	100.0%	17.33	17.33

2015 Study Year

Month	Species	Number sampled	Ave Weight (g)	Ave Length (mm)	L. salmonis					C. clemensi				
					Total # Lice	# Fish Infected	Prevalence	Abundundance	Intensity	Total # Lice	# Fish Infected	Prevalence	Abundundance	Intensity
April	Pink	266	0.40	36	30	24	9.0%	0.113	1.25	24	16	6.0%	0.090	1.50
	Chum	57	1.00	43	8	7	12.3%	0.140	1.14	6	6	10.5%	0.105	1.00
	Coho	2	11.31	102	0	0	0.0%	0.000	0.00	0	0	0.0%	0.000	0.00
	Herring	3	0.06	20	0	0	0.0%	0.000	0.00	0	0	0.0%	0.000	0.00
May	Pink	194	1.67	52	30	27	13.9%	0.155	1.11	71	45	23.2%	0.366	1.58
	Chum	49	1.45	47	10	8	16.3%	0.204	1.25	16	6	12.2%	0.327	2.67
	Coho	69	12.44	102	5	4	5.8%	0.072	1.25	409	69	50.7%	5.928	11.69
	Sockeye	41	6.47	78	0	0	0.0%	0.000	0.00	87	23	56.1%	2.122	3.78
	Dolly Varden	1	62.18	185	0	0	0.0%	0.000	0.00	0	0	0.0%	0.000	0.00

2014 Study Year

Month	Species	Number sampled	Avg Weight (g)	Avg Length (mm)	L. salmonis					C. clemensi				
					Total # Lice	# Fish Infected	Prevalence	Abundunance	Intensity	Total # Lice	# Fish Infected	Prevalence	Abundunance	Intensity
April	Pink	262	0.37	34.06	1	1	0.38%	0.004	1.00	3	3	1.15%	0.011	1.00
	Chum	20	0.49	36.70	0	0	0.00%	0.000	0.00	1	1	5.00%	0.050	1.00
	Chinook	1	0.05	39.00	0	0	0.00%	0.000	0.00	0	0	0.00%	0.000	0.00
	Sockeye	11	3.78	72.00	0	0	0.00%	0.000	0.00	0	0	0.00%	0.000	0.00
	non salmonid	1	0.92	43.00	0	0	0.00%	0.000	0.00	0	0	0.00%	0.000	0.00
May	Pink	238	1.18	48.43	8	8	3.36%	0.034	1.00	25	24	10.50%	0.105	1.04
	Chum	5	1.21	45.40	0	0	0.00%	0.000	0.00	1	1	20.00%	0.200	1.00
	Coho	21	13.83	104.19	0	0	0.00%	0.000	0.00	2	1	9.52%	0.095	2.00
	Sockeye	20	8.20	91.10	1	1	5.00%	0.050	1.00	0	0	0.00%	0.000	0.00

2013 Study Year: Goletas Channel

Month	Species	#	Avg wt (g)	Avg Ln(mm)	L. salmonis					C.clemensi				
					total # lice	# fish infected	Prevalance	Abundance	Intensity	total # lice	# fish infected	Prevalance	Abundance	Intensity
April	Pink	55	0.32	32.4	0	0	0.0%	0.00	0.0	1	1	1.8%	0.02	1.0
April	Chinook	11	0.39	35.6	0	0	0.0%	0.00	0.0	0	0	0.0%	0.00	0.0
April	non-salmonid	1	0.39	35	0	0	0.0%	0.00	0.0	0	0	0.0%	0.00	0.0
	Total	67												
May	Pink	344	0.82	42.1	2	2	0.6%	0.01	1.0	18	18	5.2%	0.05	1.0
May	Chum	95	1.19	46.7	2	2	2.1%	0.02	1.0	7	5	5.3%	0.07	1.4
May	Coho	15	9.19	92	0	0	0.0%	0.00	0.0	0	0	0.0%	0.00	0.0
May	Sockeye	19	6.23	82.58	2	2	10.5%	0.11	1.0	3	1	5.3%	0.16	3.0
	Total	473												
June	Pink	213	2.25	58.3	4	4	1.9%	0.02	1.0	7	7	3.3%	0.03	1.0
June	Chinook	6	5.12	76.8	0	0	0.0%	0.00	0.0	1	1	16.7%	0.17	1.0
June	Coho	30	23	121.6	2	2	6.7%	0.07	1.0	4	2	6.7%	0.13	2.0
June	Sockeye	2	3.6	68.5	0	0	0.0%	0.00	0.0	0	0	0.0%	0.00	0.0
June	Dolly Varden	4	26.7	136.2	1	1	25.0%	0.25	1.0	0	0	0.0%	0.00	0.0
	Total	255			13					41				

2013 Study Year: Queen Charlotte Strait

Month	Species	# Sampled	Avg wt (g)	Avg Ln(mm)	L. salmonis					C.clemensi				
					total # lice	# fish infected	Prevalance	Abundance	Intensity	total # lice	# fish infected	Prevalance	Abundance	Intensity
June	Pink	30	2.5	59.4	0	0	0.0%	0.00	0.0	1	1	3.3%	0.03	1.0
June	Coho	3	27.5	129.7	1	1	33.3%	0.33	1.0	0	0	0.0%	0.00	0.0
	Total	33												
July	Pink	9	1.86	59.1	0	0	0.0%	0.00	0.0	3	3	33.3%	0.33	1.0
July	Chinook	1	39.9	155	0	0	0.0%	0.00	0.0	0	0	0.0%	0.00	0.0
July	Herring	31	0.4	38.6	0	0	0.0%	0.00	0.0	7	6	19.4%	0.23	1.2
	Total	41												

2011 Study Year: Goletas Channel

Capture	Dates	Species	# of fish	Avg Lth (mm)	Avg wt (g)	<i>L. salmonis</i>					<i>C. clemensi</i>					Salinity ppm	Temperature °C
						total # lice	# fish infected	Prevalance	Abundance	Intensity	total # lice	# fish infected	Prevalance	Abundance	Intensity		
First Capture	March 30 - April 1, 2011	Pink	11	31.3	0.28	0	0	0%	0	0	2	1	9.1%	0.18	2.0	30.4	8.0
		Chum	2	36.0	0.46	0	0	0%	0	0	0	0	0.0%	0.00	0.0		
		Coho	3	80.0	4.93	0	0	0%	0	0	0	0	0.0%	0.00	0.0		
		Total	16														
Second Capture	April 27 - 29, 2011	Pink	164	36.8	0.55	0	0	0%	0	0	4	3	1.8%	0.02	1.3	30.5	8.2
		Chum	21	44.9	1.01	0	0	0%	0	0	5	4	19.0%	0.24	1.3		
		Non Salmonid	2	38.0	0.62	0	0	0%	0	0	0	0	0.0%	0.00	0.0		
		Total	187														
Third Capture	May 30 - June 3, 2011	Pink	298	53.8	2.20	12	12	4%	0.04	1	30	28	9.4%	0.10	1.1	31.0	10.3
		Chum	43	80.7	9.36	2	2	5%	0.05	1	18	13	30.2%	0.42	1.4		
		Coho	11	96.6	14.99	0	0	0%	0.00	0	1	1	9.1%	0.09	1.0		
		Herring	30	34.7	0.35	1	1	3%	0.03	1	8	7	23.3%	0.27	1.1		
		Dolly Varden	8	135.6	36.50	2	1	13%	0.25	2	3	2	25.0%	0.38	1.5		
		Total	391														
Fourth Capture	June 28 - July 4, 2011	Pink	138	85.8	9.20	12	10	7%	0.09	1.2	61	46	33.3%	0.44	1.3	31.1	9.9
		Chum	46	115.6	23.89	8	5	11%	0.17	1.6	16	11	23.9%	0.35	1.5		
		Coho	4	118.5	27.97	3	2	50%	0.75	1.5	1	1	25.0%	0.25	1.0		
		Herring	30	35.5	0.48	1	1	3%	0.03	1	60	23	76.7%	2.00	2.6		
		Total	218														