



BC Centre for Aquatic Health Science

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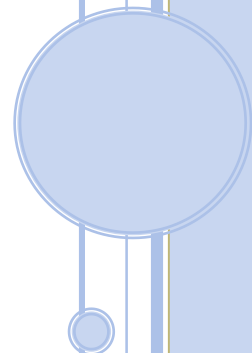
Reported by: BC Centre for Aquatic Health Sciences.

Report Date: August 8, 2019

Client Ref. no.: N/A

Submitter : Mowi Canada West.

Details of submission: 1276 frozen juvenile salmonids were submitted from the Klemtu area for sea lice assessment.



Juvenile Salmonid Sea Lice Assessment 2019: Klemtu

In 2005, the Kitasoo/Xaixais First Nation established a Juvenile Salmonid Sea Lice Assessment Program to establish sea lice infection levels on juvenile salmonids migrating through their traditional territory. 2019 marks the 15th year of the program.

Sampling took place in April, May and June of 2019. Sampling in early spring enables a better assessment of sea lice levels on juvenile salmonids as they emerge from rivers and move into their first few weeks in the near shore marine environment.

The methodology of sampling and assessment can be found in previous reports (Kitasoo Fisheries Wild Juvenile Pacific Salmon Sea Lice Monitoring Program – 2016).

In 2019, there were a total of 1270 juvenile salmonids assessed. Twenty-five (25) of the fish did not have any sampling dates associated with them. These 25 fish were sampled from Hird Point and were not included in the summary for analysis involving site specific information. Chum salmon (*Oncorhynchus keta*) made up 58% of the fish sampled, while Pink salmon (*Oncorhynchus gorbuscha*) made up the remaining 42%. Fish were examined for two species of sea lice: 1) *Lepeophtheirus salmonis* (*L. salmonis*) sometimes referred to as the ‘salmon louse’ since it is most commonly found on salmon in the ocean, and 2) *Caligus clemensi* (*C. clemensi*) found on many different fish species in the ocean.

Wild juvenile salmon were sampled by beach seine from near-shore zones at sites in the region of Mathieson and Finlayson Channels where salmon farming is present and in Laredo Inlet, located to the west where there are no salmon farms (Control) Figure 1. In total, 4 areas are represented; Control, Upstream, Near Farms, and Downstream.

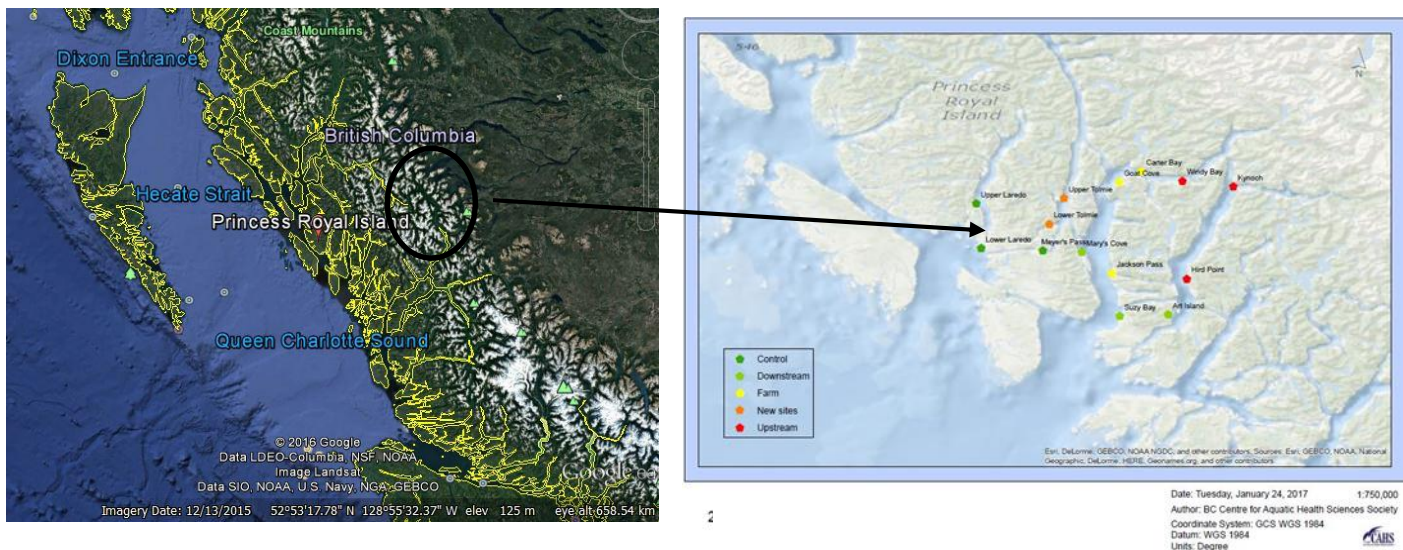


Figure 1. Sampling sites used in 2019 including areas: Control, Upstream, Near Farm, and Downstream.

Juvenile Salmonid Sea Lice Assessment 2019: Klemtu

The three most common terms used to describe sea lice distribution are: prevalence, abundance, and intensity. As identified in a Pacific Salmon Forum publication: “Protocols & Guidelines: A Reference Manual for Research Involving Wild/Cultured Fish Interactions with Sea Lice”, the definitions are as follows:

Prevalence is defined as the number of hosts infected with one or more sea lice divided by the number of hosts examined.

Abundance is defined as the total number of lice divided by the total number of hosts examined.

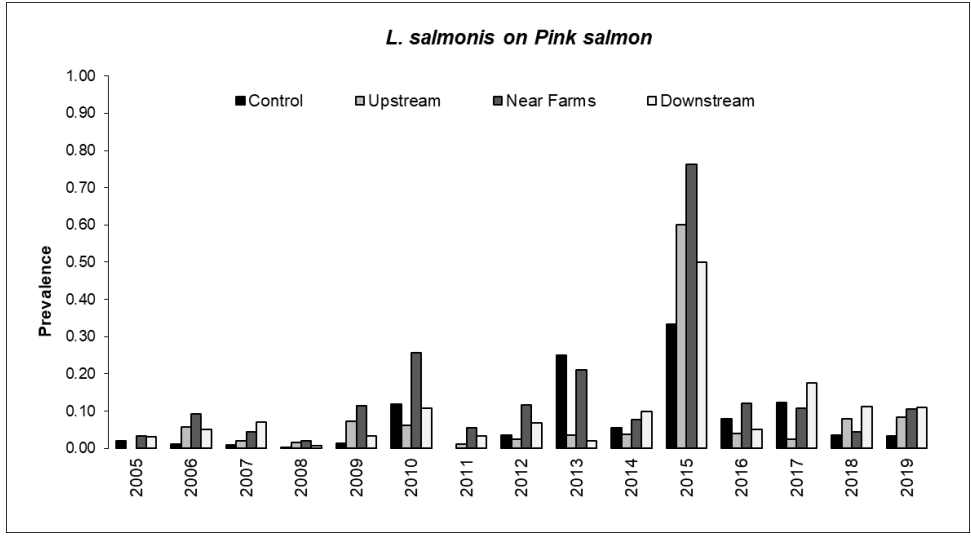
Intensity is defined as the number of lice on a single salmon. (Total number of lice divided by the number of hosts infected).

Year	N=	<i>Lepeophtheirus salmonis</i>			<i>Caligus clemensi</i>		
		Prevalence	Abundance	Average Intensity	Prevalence	Abundance	Average Intensity
2005	943	4%	0.0	1.1	13%	0.2	1.2
2006	1758	5%	0.1	1.1	4%	0.0	1.1
2007	1132	4%	0.0	1.0	5%	0.1	1.1
2008	1512	1%	0.0	1.0	2%	0.0	1.0
2009	1675	5%	0.1	1.2	1%	0.0	1.2
2010	1852	14%	0.2	1.5	9%	0.1	1.3
2011	2031	1%	0.0	1.0	9%	0.2	1.7
2012	2203	2%	0.0	1.2	3%	0.0	1.1
2013	2204	21%	0.8	3.7	10%	0.2	1.9
2014	1989	8%	0.1	1.1	4%	0.1	1.3
2015	1155	61%	3.0	4.9	14%	0.2	1.5
2016	1355	7%	0.1	1.2	10%	0.1	1.3
2017	1702	14%	0.2	1.2	8%	0.1	1.5
2018	1303	6%	0.1	1.2	5%	0.1	1.1
2019	1276	9%	0.1	1.2	21%	0.3	1.5

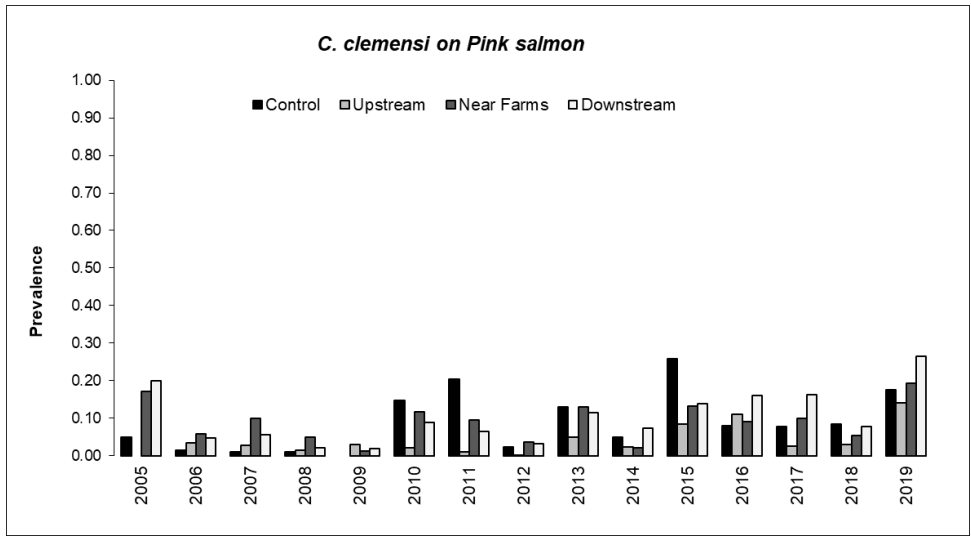
Table 1. Summary of Prevalence, Abundance, and Average Intensity 2005 – 2019

Table 1 illustrates the overall sea lice prevalence, abundance, and intensity on wild juvenile salmonids. 2019 has an overall prevalence of *L. salmonis* of 9% and an overall prevalence of *C. clemensi* of 21%. Prevalence of *C. clemensi* is higher in 2019 than previous years.

Juvenile Salmonid Sea Lice Assessment 2019: Klemtu



a.



b.

Juvenile Salmonid Sea Lice Assessment 2019: Klemtu

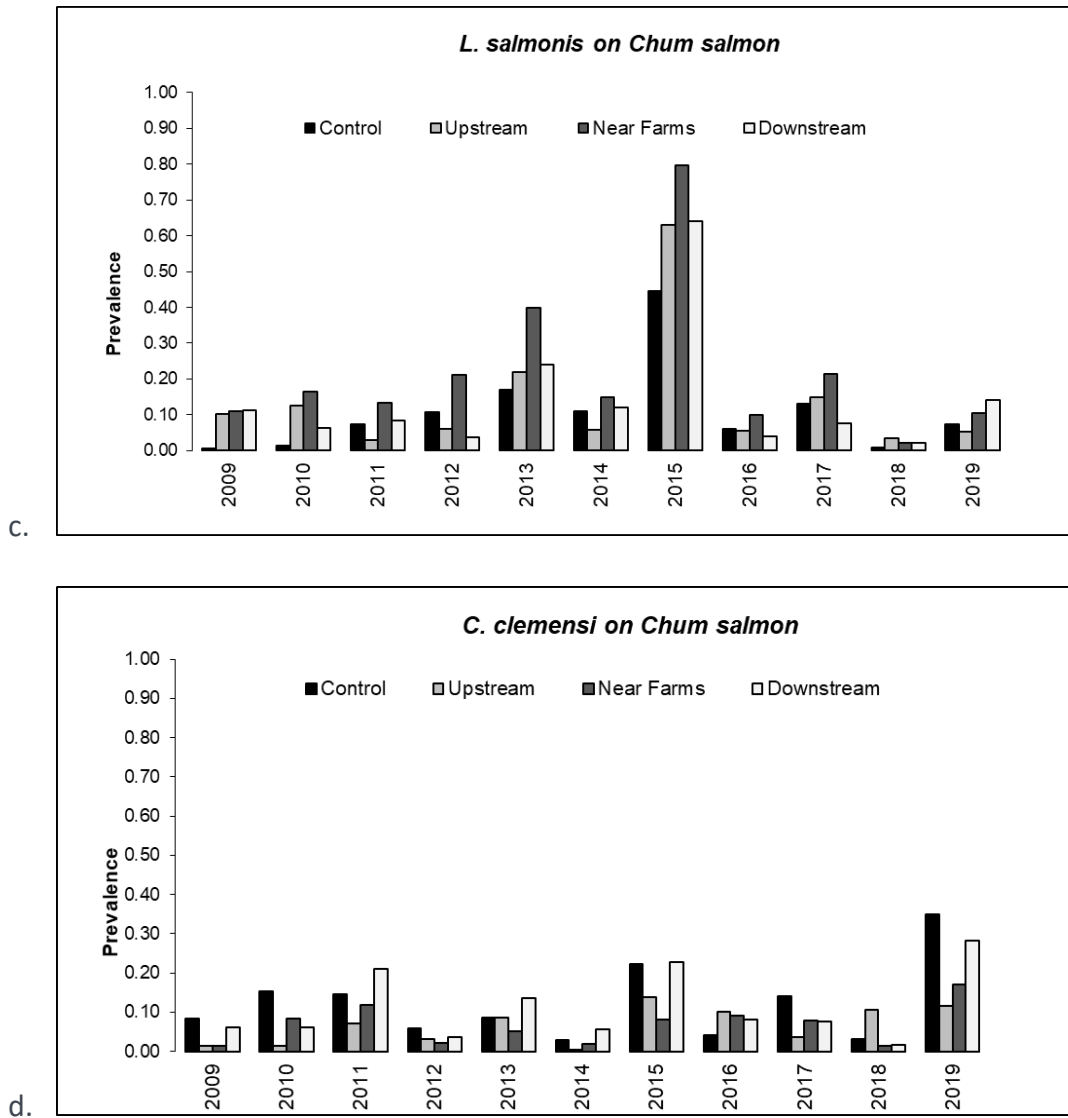


Figure 2. Summary of *L. salmonis* and *C. clemensi* prevalence on Pink (a and b) and Chum (c and d) salmon by area.

Figure 2 summarizes the prevalence of *L. salmonis* and *C. clemensi* on Pink and Chum juvenile salmonids sampled in 2009-2019.

Juvenile Salmonid Sea Lice Assessment 2019: Klemtu

Area	Site	Month	Total Fish	No. of each species		<i>Lepeophtheirus salmonis</i>		<i>Caligus clemensi</i>	
						Prevalence	Average	Prevalence	Average
							Intensity		Intensity
				Pink	Chum				
Control	Lower Laredo	May	50	41	9	4%	1.0	14%	1.3
	Meyers Pass	May	75	14	61	11%	1.3	59%	2.2
	Upper Laredo	May	75	36	39	1%	1.0	4%	1.3
Upstream	Hird Point	May	75	13	62	3%	1.0	5%	1.0
	Kynoch	May	75	41	34	5%	1.0	12%	1.1
		June	25	18	7	0%	0	16%	1.3
	Windy Bay	May	75	40	35	11%	1.3	11%	1.3
Near Farm	Carter	May	100	35	65	10%	1.1	13%	0.0
	Goat Cove	May	75	23	52	17%	1.2	21%	1.4
		June	25	16	9	33%	1.3	0%	0.0
	Jackson Pass	April	25	13	12	4%	1.0	0%	0.0
		May	76	62	14	4%	1.0	0%	0.0
	Lower Tolmie	May	101	10	91	9%	1	21%	1.2
Upper Tolmie	May	75	13	62	1%	0.0	16%	1.1	
Downstream	Arthur Is.	May	124	48	76	13%	1.2	27%	1.5
	Mary's Cove	April	25	11	14	4%	1.0	12%	1.3
		May	100	39	61	13%	1.3	29%	1.4
	Suzy Bay	April	25	25	0	0%	0.0	16%	1.0
		May	50	31	19	22%	1.2	40%	2.2

Table 2. Summary of Prevalence and Intensity by area and by month for 2019.

Table 2 illustrates the prevalence and intensity of *L. salmonis* and *C. clemensi* by month at each site sampled in each area.

Juvenile Salmonid Sea Lice Assessment 2019: Klemtu

		<i>Lepeophtheirus salmonis</i>			<i>Caligus clemensi</i>		
Area	N=	Prevalence	Abundance	Average	Prevalence	Abundance	Average
				Intensity			Intensity
Control	200	6%	0.1	1.2	27%	0.5	2.0
Upstream	275	7%	0.1	1.2	13%	0.1	1.1
Near Farm	477	10%	0.1	1.1	18%	0.2	1.2
Downstream	325	13%	0.2	1.2	27%	0.4	1.6

Table 3. Summary of Prevalence, Abundance, and Average Intensity of *L. salmonis* and *C. clemensi* area.

Table 3 summarizes the prevalence, abundance, and intensity of both types of sea lice and tabulates the parameters by area.

	April		May		June	
	Temp.	Salinity	Temp.	Salinity	Temp.	Salinity
	(°C)	(ppt)	(°C)	(ppt)	(°C)	(ppt)
Control	-	-	11.0	28.3	-	-
Upstream	-	-	12.1	25.5	12.2	24.8
Farm	9.5	25.4	11.2	27.2	11.7	26.5
Downstream	8.9	28.2	11.6	28.1	-	-

Table 4. Summary of mean temperature and salinity at 1.0m by zone and month.

Table 4 outlines the environmental parameters of Temperature and Salinity for each area and month.