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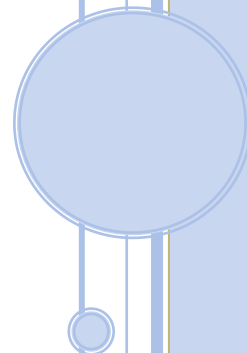
Reported by: BC Centre for Aquatic Health Sciences.

Report Date: Dec. 9, 2020

Client Ref. no.: N/A

Submitter : Mowi Canada West.

Details of submission: 1652 frozen juvenile salmonids were submitted from the Klemtu area for sea lice assessment.



Juvenile Salmonid Sea Lice Assessment 2020: 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. 2020 marks the 16th year of the program.

Sampling took place in April, May and June of 2020. 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 2020, there were a total of 1652 juvenile salmonids assessed. Twenty-five (25) of the fish did not have a sample date associated with them. These 25 fish were sampled in May and were not included in the summary for analysis involving site specific information. Chum salmon (*Oncorhynchus keta*) made up 32% of the fish sampled, and Pink salmon (*Oncorhynchus gorbuscha*) made up 68% of the total fish samples. All 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 2020, three new sites were introduced in the Downstream zone. In total, 4 areas are represented; Control, Upstream, Near Farms, and Downstream.

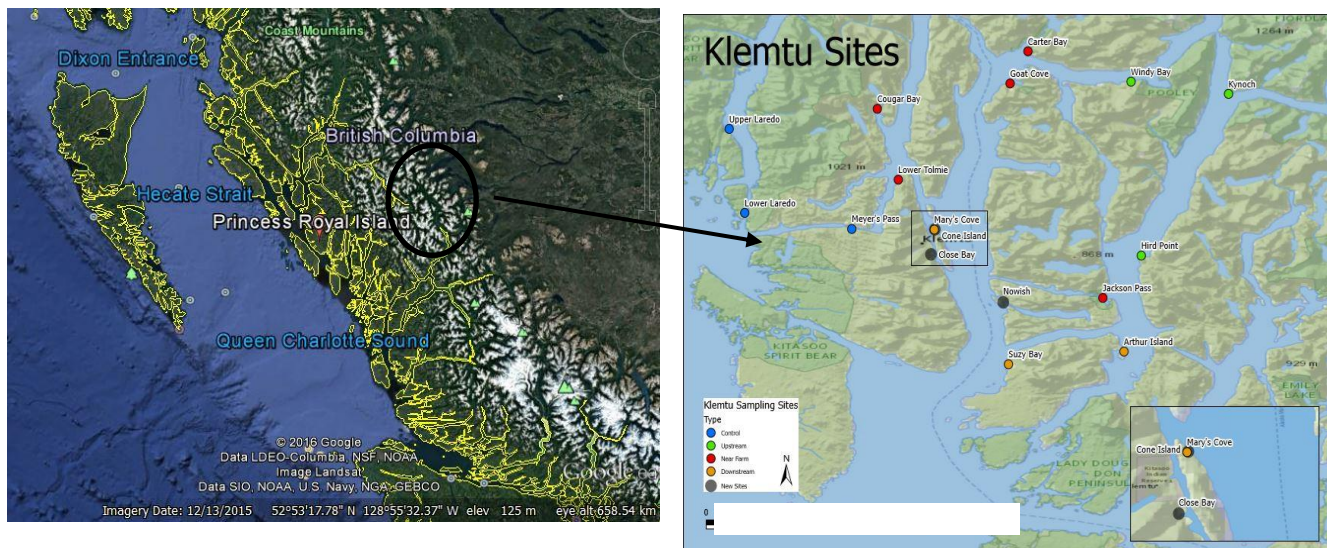


Figure 1. Sampling sites used in 2020 including areas: Control, Upstream, Near Farm, and Downstream and new sites added in 2020.

Juvenile Salmonid Sea Lice Assessment 2020: 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).

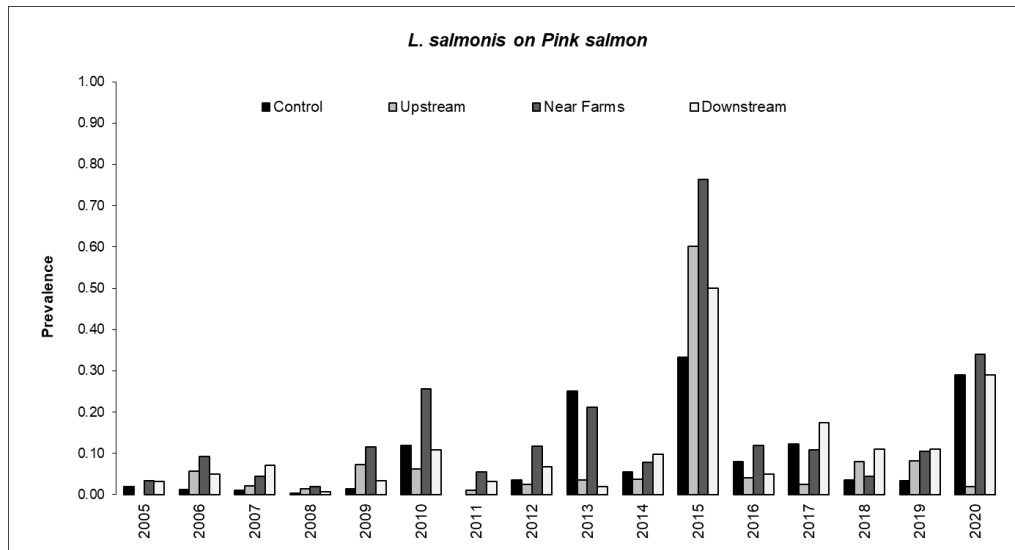
		<i>Lepeophtheirus salmonis</i>			<i>Caligus clemensi</i>		
		Prevalence	Abundance	Average	Prevalence	Abundance	Average
Year	N=			Intensity			Intensity
2005	943	4%	0.0	1.1	13%	0.2	1.2
2006	1758	5%	0.1	1.1	4%	0.0	1.1
2007	1132	4%	0.0	1.0	5%	0.1	1.1
2008	1512	1%	0.0	1.0	2%	0.0	1.0
2009	1675	5%	0.1	1.2	1%	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	1277	9%	0.1	1.2	21%	0.3	1.5
2020	1652	22%	0.5	2.4	18%	0.3	1.6

Table 1. Summary of Prevalence, Abundance, and Average Intensity 2005 – 2020

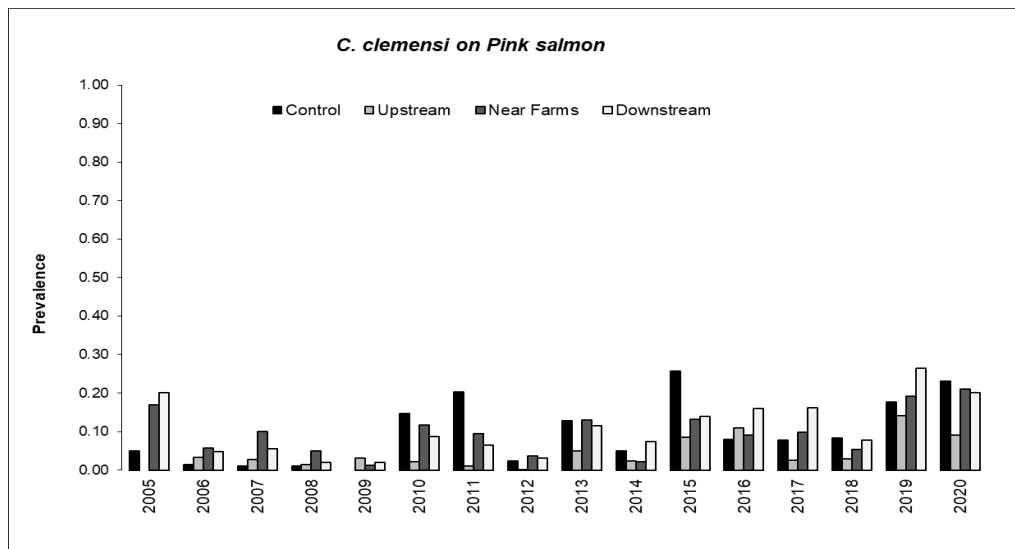
Table 1 illustrates the overall sea lice prevalence, abundance, and intensity on wild juvenile salmonids. 2020 has an overall prevalence of *L. salmonis* of 22% and an overall prevalence of *C. clemensi* of 18%.

Juvenile Salmonid Sea Lice Assessment 2020: Klemtu

a.



b.



Juvenile Salmonid Sea Lice Assessment 2020: Klemtu

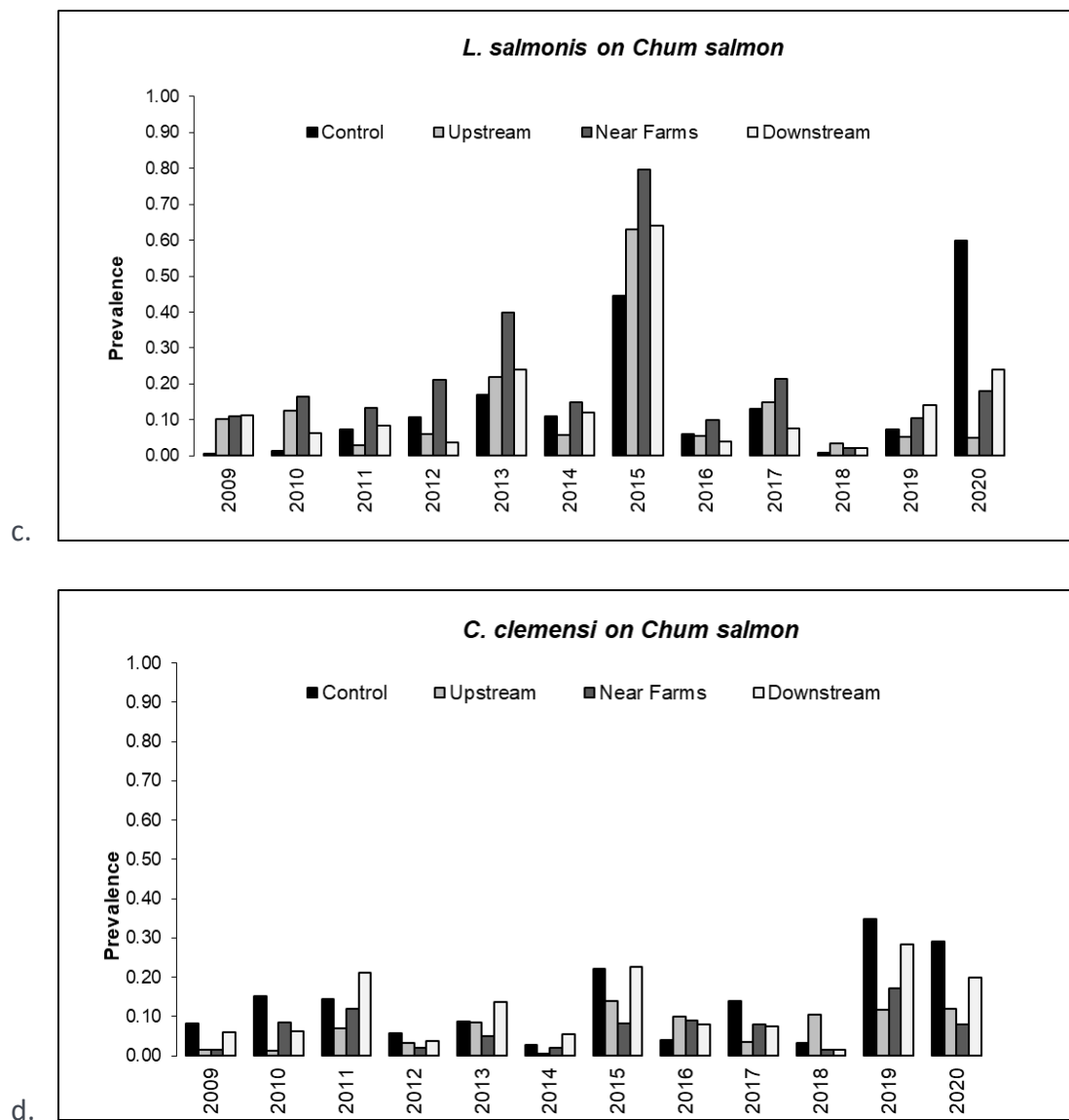


Figure 2. Summary of *L. salmonis* and *C. clemensi* prevalence on Pink (a and b) and Chum (c and d) salmon by area.

Figure 2 summarizes the prevalence of *L. salmonis* and *C. clemensi* on Pink and Chum juvenile salmonids sampled in 2009-2020.

Juvenile Salmonid Sea Lice Assessment 2020: Klemtu

Table 2. Summary of Prevalence and Intensity by area and by month for 2020

Area	Site	Month	Total Fish	No. of each species		Lepeophtheirus salmonis		Caligus clemensi	
						Prevalence	Average Intensity	Prevalence	Average Intensity
				Pink	Chum				
Control	Lower Laredo	April	25	25	0	0%	0.0	24%	2.2
		May	51	48	3	8%	1.0	24%	1.6
	Upper Laredo	April	25	22	3	4%	1.0	8%	1.5
		May	75	66	9	3%	1.0	4%	1.0
		June	25	10	15	52%	1.6	28%	1.3
	Meyer's Pass	April	25	25	0	52%	1.9	16%	2.0
		May	75	49	26	75%	2.3	44%	2.4
		June	25	23	2	84%	5.0	44%	2.5
Upstream	Hird Point	April	25	4	21	4%	1.0	0%	0.0
		May	50	37	13	0%	0.0	14%	1.0
		June	25	24	1	8%	1.0	16%	1.0
	Kynoch	April	25	25	0	0%	0	4%	1.0
		May	50	19	31	0%	0.0	8%	0.0
		June	25	21	4	4%	1.0	0%	0.0
	Windy Bay	April	50	21	29	2%	1.0	0%	0.0
		May	76	31	45	5%	1.0	5%	1.3
Near Farm	Carter	April	50	29	21	10%	1.1	2%	1.0
		May	75	29	46	15%	2.4	1%	1.0
	Goat Cove	April	51	24	52	0%	0.0	0%	0.0
		May	76	24	52	14%	1.6	12%	1.2
	Cougar Bay	May	23	22	1	39%	1.8	9%	1.0
	Jackson Pass	April	25	15	10	0%	0.0	0%	0.0
		May	76	65	11	36%	1.5	24%	1.4
	Lower Tolmie	April	50	26	24	28%	2.0	22%	1.6
		May	75	66	9	64%	1.8	36%	1.7
		June	25	20	5	40%	1.7	40%	1.6
	Upper Tolmie	April	50	33	17	35%	1.4	24%	1.6
		May	49	39	9	35%	1.4	24%	1.6
		June	25	15	10	4%	1.0	4%	1.0
Downstream	Arthur Is.	April	25	11	14	0%	0.0	36%	1.1
		May	50	44	6	16%	1.0	20%	1.2
		June	25	22	3	40%	1.4	12%	2.7
	Mary's Cove	April	25	18	7	52%	1.2	12%	2.7
		May	50	44	6	48%	2.1	40%	1.3
	Suzy Bay	April	25	20	5	24%	1.3	12%	1.0
		May	24	19	5	8%	1.0	13%	1.0
	Close Bay	June	25	5	20	84%	3.4	44%	1.5
	Cone Island	May	25	24	1	40%	1.7	8%	1.0
	Nowish	May	50	38	12	34%	1.5	28%	1.4

Juvenile Salmonid Sea Lice Assessment 2020: Klemtu

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

Area	N=	<i>Lepeophtheirus salmonis</i>			<i>Caligus clemensi</i>		
		Prevalence	Abundance	Average Intensity	Prevalence	Abundance	Average Intensity
Control	326	34%	0.9	2.5	24%	0.5	2.1
Upstream	326	3%	0.0	1.0	6%	0.1	1.1
Near Farm	651	27%	0.5	1.7	16%	0.2	1.5
Downstream	324	34%	0.7	1.9	24%	0.3	1.4

Table 3. Summary of Prevalence, Abundance, and Average Intensity of *L. salmonis* and *C. clemensi* by 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. (°C)	Salinity (ppt)	Temp. (°C)	Salinity (ppt)	Temp. (°C)	Salinity (ppt)
Control	9.4	26.0	10.9	26.1	10.6	23.6
Upstream	9.5	25.6	11.3	24.7	11.1	22.7
Farm	9.1	26.5	10.7	26.7	10.4	26.6
Downstream	8.9	27.2	10.4	26.7	10.5	28.0

Table 4. Summary of mean temperature and salinity at 1.0m by zone and month 2020.

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