

BC CAHS
871A Island Hwy
PO Box 25070 Tyee
Campbell River,
BC V9W 0B7
Phone: 250-286-6102
Fax: 250-286-6103

Report BC CAHS case no.: V0213

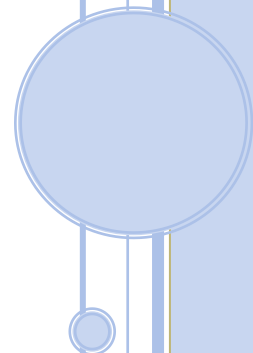
Reported by: BC Centre for Aquatic Health Sciences.

Report Date: Sept. 30, 2021

Client Ref. no.: N/A

Submitter: Mowi Canada West.

Details of submission: 1517 frozen juvenile salmonids were submitted from the Klemtu area for sea lice assessment.



Juvenile Salmonid Sea Lice Assessment 2021: 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. 2021 marks the 17th year of the program.

Sampling took place in April, May and June of 2021. 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 2021, there were a total of 1518 juvenile salmonids assessed; this included one chinook and one herring. Twenty-five (25) of the fish were sampled at Wilby Point which was not assigned an area. These 25 fish were sampled in June and were included in the overall summary for analysis but were not assigned to one of the 4 sample areas. Chum salmon (*Oncorhynchus keta*) made up 26% of the fish sampled, and Pink salmon (*Oncorhynchus gorbuscha*) made up 74% 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 total, 4 areas are represented; Control, Upstream, Near Farms, and Downstream.

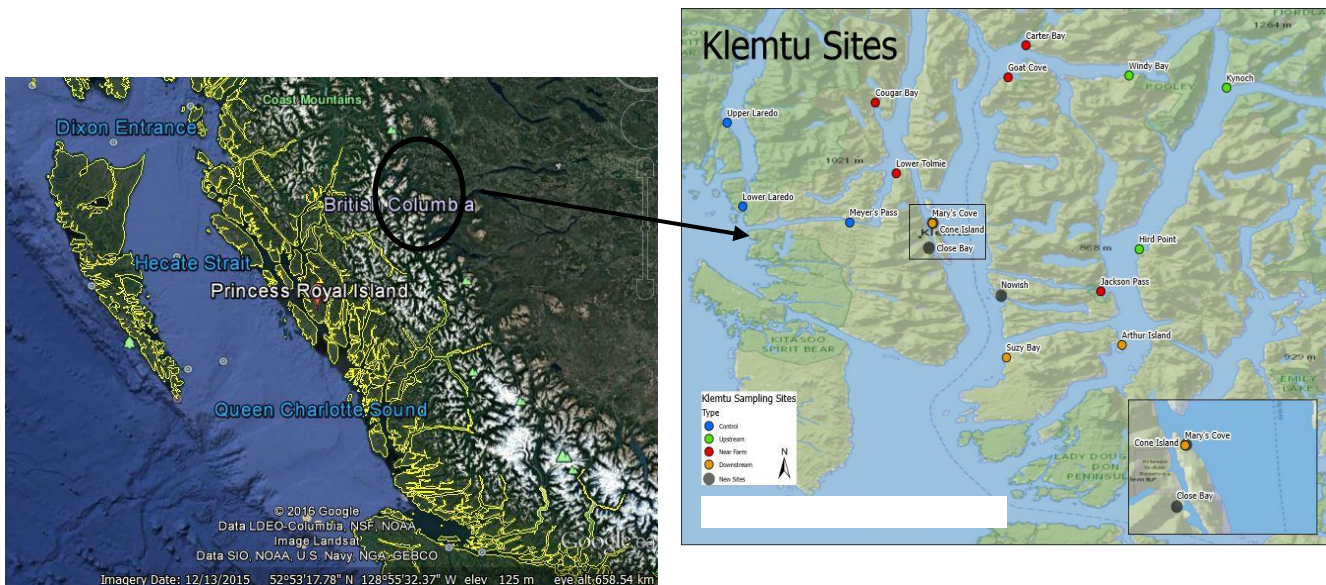


Figure 1. Sampling sites used in 2021 including areas labeled as: Control, Upstream, Near Farm, and Downstream

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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.

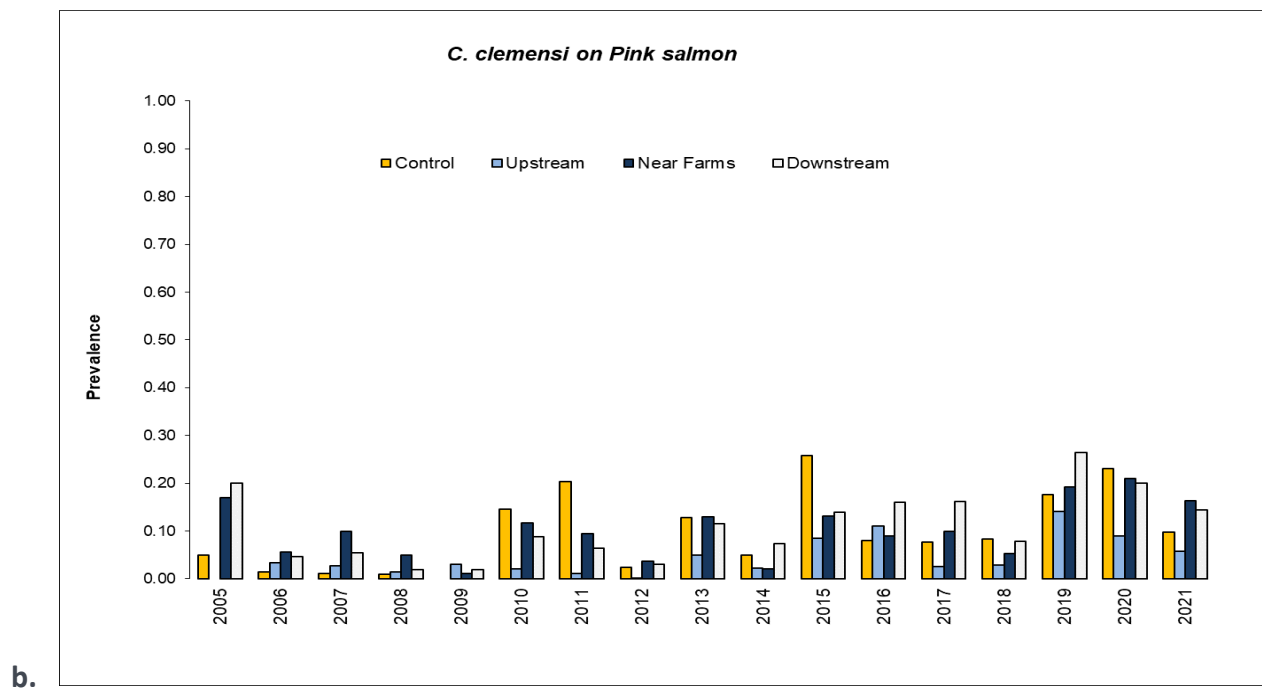
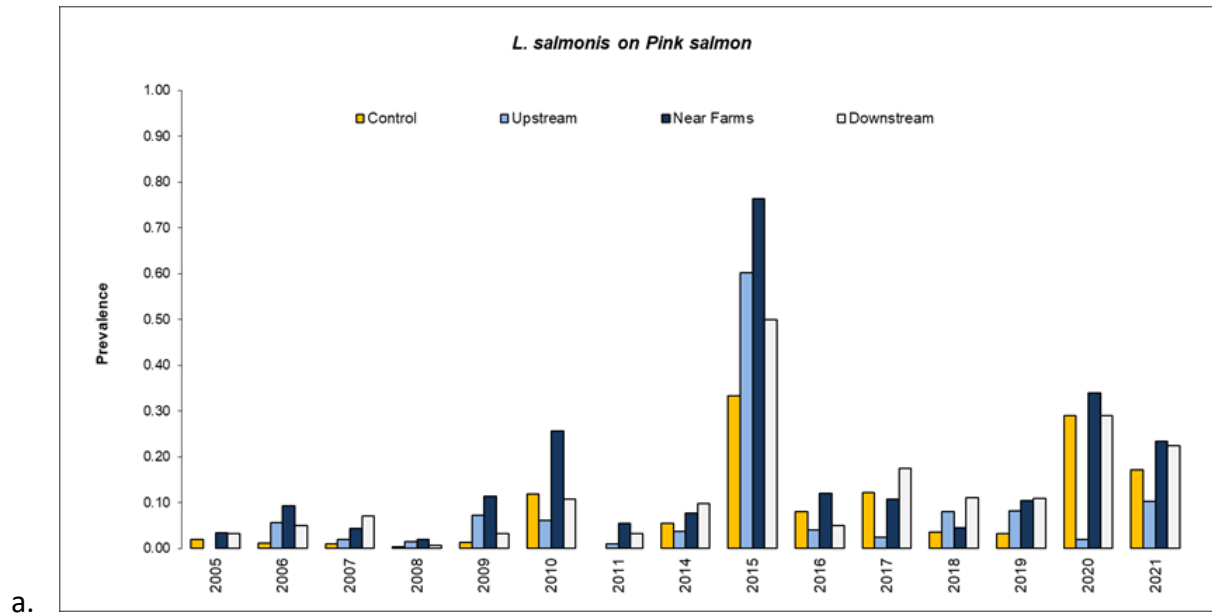
Intensity is defined as the number of lice on a single salmon. (Total number of lice divided by the number of hosts infected).

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	1277	9%	0.1	1.2	21%	0.3	1.5
2020	1652	22%	0.5	2.4	18%	0.3	1.6
2021	1518	21%	0.3	1.5	13%	0.2	1.6

Table 1. Summary of Prevalence, Abundance, and Average Intensity 2005 – 2021

Table 1 illustrates the overall sea lice prevalence, abundance, and intensity on wild juvenile salmonids. 2021 has an overall prevalence of *L. salmonis* of **21%** and an overall prevalence of *C. clemensi* of **13%**.

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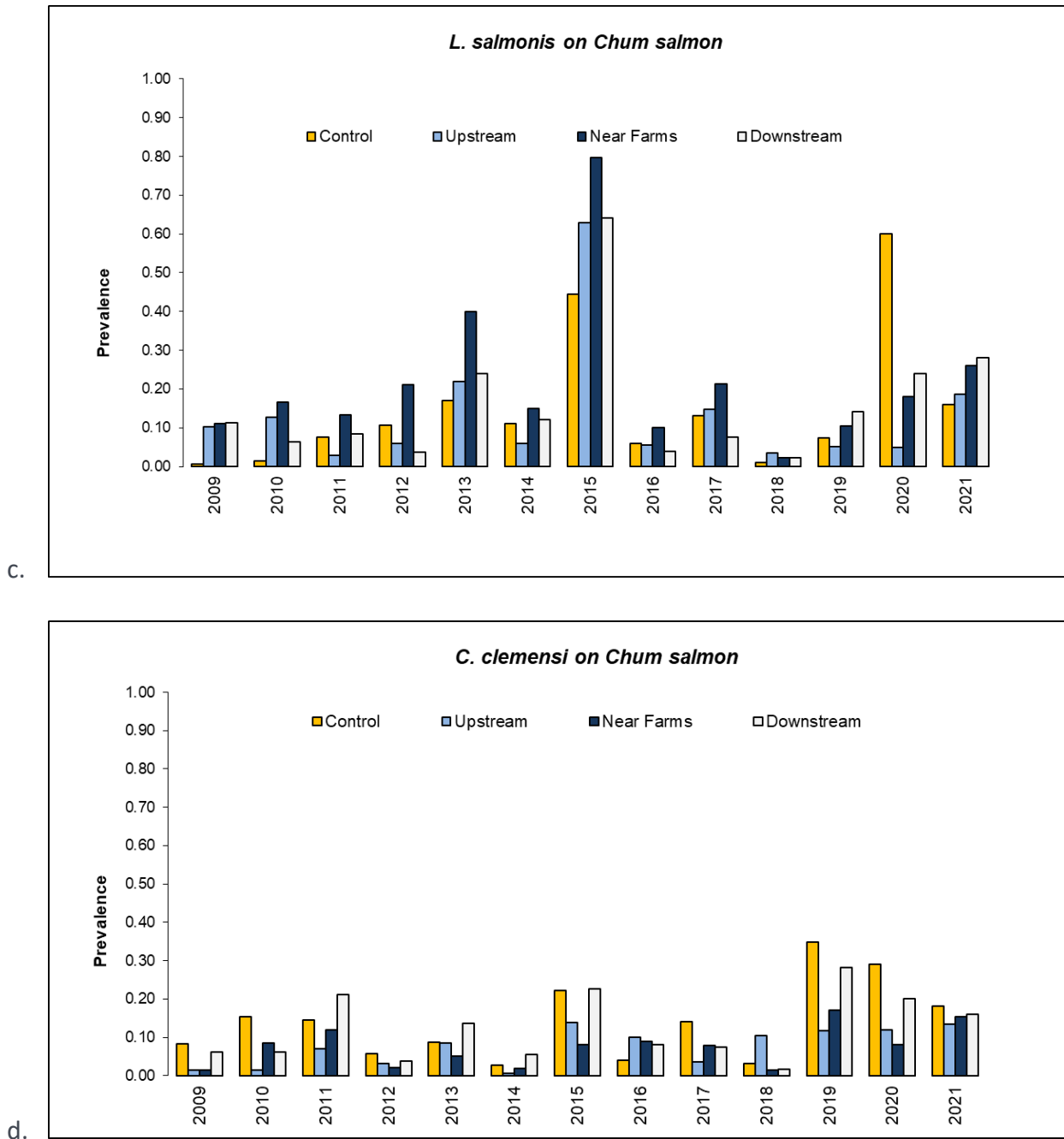


Figure 2. Summary of *L. salmonis* and *C. clemensi* prevalence on Pink (a and b) and Chum (c and d) salmon by area.

Figure 2 a-d. Summary of prevalence of *L. salmonis* and *C. clemensi* on Pink and Chum juvenile salmonids sampled 2009-2021.

Juvenile Salmonid Sea Lice Assessment 2021: Klemtu

Table 2. Summary of Prevalence and Intensity by area and by month for 2021

Area	Site	Month	Total Fish	No. of each species		<i>Lepeophtheirus salmonis</i>		<i>Caligus clemensi</i>	
						Prevalence	Average	Prevalence	Average
				Pink	Chum		Intensity		Intensity
Control	Lower Laredo	April	25	21	4	8%	0.0	16%	1.0
		May	25	23	2	8%	1.5	12%	1.3
	Upper Laredo	April	25	24	1	16%	1.5	8%	1.0
		May	25	0	25	0%	0.0	0%	0.0
	Meyer's Pass	April	24	0	24	0%	0.0	0%	0.0
		May	25	25	0	16%	1.0	8%	1.5
June		50	50	0	56%	1.4	26%	1.5	
Upstream	Hird Point	April	25	24	1	16%	1.0	4%	0.0
		May	50	48	2	14%	0.0	6%	1.0
		June	25	25	0	12%	1.0	0%	0.0
	Kynoch	April	25	16	9	8%	0	4%	1.0
		May	50	39	11	6%	0.0	12%	0.0
		June	25	25	0	8%	1.0	0%	0.0
	Windy Bay	April	25	23	2	20%	1.0	20%	0.0
		May	50	29	21	18%	1.0	12%	1.5
		June	44	15	29	14%	1.0	14%	1.5
Near Farm	Carter	April	25	21	4	10%	1.1	4%	1.0
		May	50	34	16	24%	1.2	2%	1.0
		June	25	4	21	20%	1.0	8%	1.5
	Goat Cove	April	25	3	22	8%	0.0	12%	0.0
		May	50	1	49	4%	8.0	32%	1.6
		June	50	10	40	42%	1.5	20%	1.3
	Jackson Pass	April	25	22	3	4%	0.0	4%	0.0
		May	75	74	1	29%	1.6	29%	1.3
		June	25	4	21	8%	1.0	16%	1.0
	Lower Tolmie	April	25	10	15	20%	1.2	4%	1.0
		May	50	35	15	40%	1.5	16%	1.4
		June	50	47	3	50%	1.4	16%	1.4
	Upper Tolmie	April	25	4	21	26%	1.2	10%	1.4
		May	50	39	9	26%	1.2	10%	1.4
		June	50	47	3	30%	1.7	0%	0.0
Downstream	Arthur Is.	April	25	18	7	16%	1.0	8%	1.0
		May	50	47	3	14%	1.0	12%	1.0
		June	50	49	1	12%	1.3	4%	1.0
	Mary's Cove	April	25	23	2	16%	1.3	8%	1.0
		May	75	68	7	23%	1.4	17%	1.2
		June	25	25	0	68%	2.8	16%	1.8
	Suzy Bay	April	25	25	0	8%	1.0	4%	1.0
		May	75	70	5	36%	2.1	21%	1.3
		June	24	24	0	25%	1.8	25%	1.0
Unknown area	Wilby Point	June	25	25	0	24%	1.7	12%	1.3

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

		<i>Lepeophtheirus salmonis</i>			<i>Caligus clemensi</i>		
				Average			Average
Area	N=	Prevalence	Abundance	Intensity	Prevalence	Abundance	Intensity
Control	200	20%	0.3	1.3	12%	0.2	1.4
Upstream	319	12%	0.1	1.1	8%	0.1	1.3
Near Farm	600	27%	0.4	1.4	16%	0.2	1.3
Downstream	374	28%	0.5	1.7	16%	0.2	1.0

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.	Salinity	Temp.	Salinity	Temp.	Salinity
	(°C)	(ppt)	(°C)	(ppt)	(°C)	(ppt)
Control	11.8	24.7	11.8	24.3	12.1	24.3
Upstream	13.5	22.3	11.9	21.0	11.1	21.4
Farm	10.0	27.2	9.8	25.2	11.1	24.2
Downstream	10.9	25.1	10.4	26.1	12.6	23.6

Table 4. Summary of mean temperature and salinity at 1.0m by zone and month 2021.

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