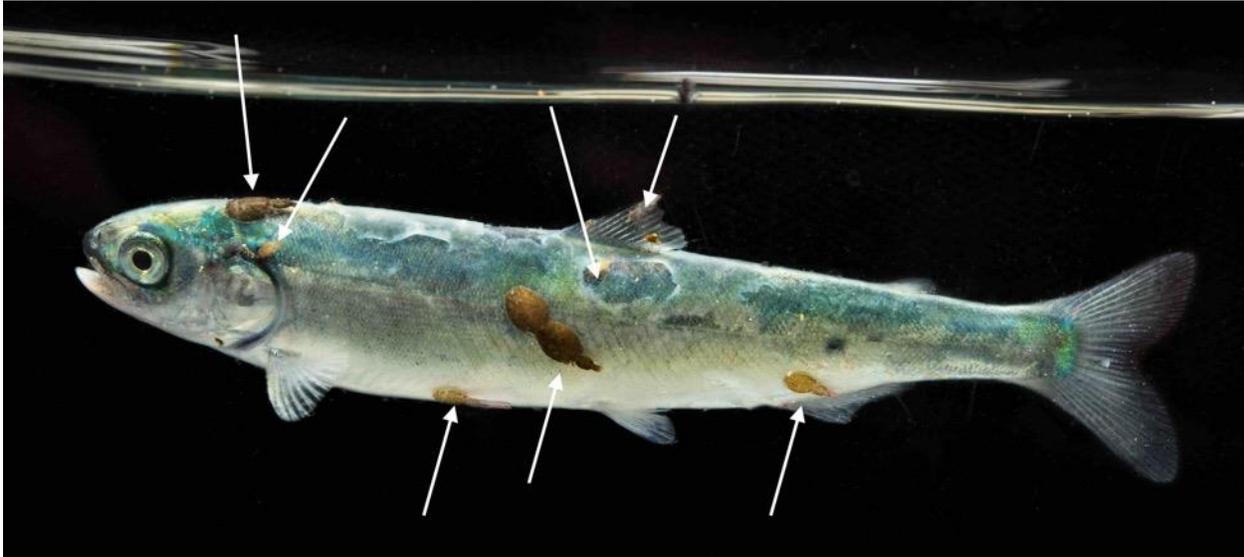


Sea Lice Survey Four Regions of BC Coast 2020

Preliminary Report

Prepared by Alexandra Morton

July 25, 2020



Summary

This spring, 37% of salmon farms coastwide exceeded the sea lice levels that government considers safe for young juvenile salmon migrating past the farms. This is according to data published by Mowi, Cermaq and Grieg on their websites. At the same time, the most significant sea louse outbreak in 20 years was recorded on juvenile wild salmon exposed to these infected farms, 99% of sockeye migrating through the Discovery Islands infected at levels known to reduce their survival and an average of 26 lice on young sockeye trying to migrate to sea past Port Hardy. Fifteen years ago, government set a limit on the number of lice per farm salmon to protect wild salmon. On March 1, 2020 they issued new salmon farm Conditions of Licence granting the companies permission to exceed safe lice levels, with no upper limit, for six weeks during the time period that young wild salmon are migrating to sea past the farms. Even if the farms come into compliance after 6 weeks, there is no remedy to save the infected wild fish. The only place where the farms stayed under the limit was in the Broughton Archipelago, where five salmon farms and several million Atlantic salmon were recently removed under First Nation authority. Sea lice infection in the Broughton significantly lower on wild salmon than in any of the other areas where this research was conducted.

Using standard published methods juvenile salmon were examined for sea lice in the Broughton Archipelago, Nootka Sound, Queen Charlotte Strait, the Discovery Islands and Clayoquot (Clayoquot data provided by Cedar Coast Field Station). Salmon lice were never reported on juvenile salmon in BC prior to salmon farming. Research conducted 2001-present reports that sea lice originate from salmon farms and the levels reported this spring are considered

extremely harmful to young wild salmon. The 2020 sea lice outbreak has significantly reduced the number of wild salmon that made it to sea.

Methods

Beach and hand-purse seines were set from small speedboats to catch juvenile salmon in nearshore marine waters. In the Broughton, sampling began April 1 and occurred weekly through June, at three sites that have been sampled annually for 20 years since 2001 (Morton et al 2004, Bateman et al 2015). These fish were examined alive with a hand lens and released as per Krkosek et al (2005). Due to COVID-19 crew restrictions, fish from Nootka, Johnstone Strait, Queen Charlotte Strait and Discovery Islands were placed in individual whirlpak bags, frozen and viewed through a microscope. Sampling in Discovery Islands began May 17 and covered 70km of the Fraser salmon migration corridor through Discovery Islands to Blenkinsop Bay, Johnstone Strait. Sampling in Nootka occurred from May 19 - June 5. Sampling in Clayoquot occurred from April 18 – June 12. Sampling in Queen Charlotte Strait occurred on July 13 and is ongoing.

Fork length was recorded on the live samples and length and weight were recorded for the lethally sampled fish. The lice were identified to species, sex and age – class. Visible conditions of the fish were recorded such as; eroded gills, hemorrhaging, predation scarring, and a cloudy formation in the pupil. Salinity and temperature were recorded for each site.

Farm salmon sea lice infection data were obtained from the websites of Mowi (<https://mowi.com/caw/>), Cermaq (<https://www.cermaq.com/wps/wcm/connect/cermaq-ca/cermaq-canada/our+sustainable+choice/public-reporting/sea-lice-information>) and Grieg (<https://www.griegseafoodcanada.com/fish-farms/>)

Farm infection, drug resistance?

Nineteen out of the 52 farms operating coast-wide (37% of active sites) exceeded the government sea lice recommendation considered safe for young wild salmon, 3 motile lice per farm salmon, at some point this spring. While Cermaq and Grieg have reported sea lice numbers on farm salmon weekly, Mowi reports once per month with an approximate 6-week delay in reporting. Five salmon farms in the Discovery Island region exceeded the government limit from February to June 2020. Four of these are owned by Mowi; Sonora Point, Shaw Point, Althorpe and Lees and two are owned by Cermaq; Brent Island and Venture Point. This represents 50% of the farms in that region. Internal DFO emails suggest that farms exceeded even the 42-day grace period granted in the March 1, 2020 Conditions of Licence. Drug resistance is increasing in the lice infected BC salmon farms, and this is the cause of the rising outbreaks spreading from farms to wild salmon. To date resistance has only been noted on the central coast and west coast of Vancouver Island. Has this dangerous scenario spread to the Fraser sockeye migration route?

Sea lice counts updated on February 27, 2020.

Sample results are average abundance for the farm, uploaded every Thursday for the previous 7 days.

Sea Site	Motile <i>Lepeophtheirus salmonis</i> (average number per fish)	Comments
Bare Bluff		Inactive
Bawden		No sampling required in last 7 days
Bedwell		Inactive
Binns Island		Inactive
Brent Island		Planned SLICE treatment
Burdwood		Inactive

On Feb 27, the Cermaq Brent Island site in Okisollo Channel, Discovery Islands reported a “Planned SLICE treatment”. By May 1 there 5.41 motile lice per farm salmon, almost double the safe limit. On May 12, Cermaq reported there was a “Treatment with Slice.” Was this farm also treated in February? If so, the high number of lice just three months later suggests that drug resistance is building along

eastern Vancouver Island. If the site was not treated in February, why not? Reducing lice on farms in the Discovery Islands is critical to Fraser salmon survival. If Cermaq knew a treatment was needed, why wait until May which caused juvenile wild salmon to be exposed to high lice numbers for three months?

Results

In Broughton, the species examined were pink and chum salmon, in Nootka Sound the fish were predominantly chum, but also a few sockeye and Chinook, in the Discovery Islands pink, chum and sockeye were examined. In Clayoquot chum, coho and Chinook were examined. In Queen Charlotte Strait pink, chum and sockeye were examined. The percent of fish infected with sea lice was lowest in the Broughton Archipelago and highest off Port Hardy (Queen Charlotte Strait) and the Discovery islands (Table 1).

	# of Fish	# Sites	Temperature C°	Salinity ppt	% Infected	Average # Lice
Broughton	551	3	9.6	28.8	34%	1.3
Nootka	303	5	15.5	23.8	87%	9
Discovery Islands	385	6	11.5	29.4	94%	7
Clayoquot Sound*	929	4	12.1	23.1	72%	3.1
Queen Charlotte Strait	128	2	11	31.2	100%	26

Table 1. The number of fish examined, number of sites, average temperature and salinity, prevalence and abundance of sea lice on juvenile salmon. Broughton data included here are only from the time period when sampling occurred in other regions, overall in the Broughton

sea lice infection April – June 1 was .71 lice/per juvenile wild salmon. *Data courtesy of Cedar Coast Field Station

In Nootka Sound, at the site most distant from salmon farms, at the head of Tahsis Inlet, only 39% of juvenile wild salmon were infected with an average of .5 lice per fish. In contrast, at the three sites near salmon farms 99% of juvenile wild salmon were infected with an average of 10.6 sea lice per fish. There were no detectable juvenile salmon in Esperanza on the sampling date, and so it appears that the relatively clean fish in Tahsis Inlet migrated south through the inlet and became part of the highly infected population passing the farms to reach the open ocean.

High salinity i.e. well over 30 parts per thousand elevates sea louse reproduction, but salinity was not exceptionally high or low across all sites in this study and is not considered a contributing factor to the pattern or intensity of this outbreak.

The most heavily infected species was sockeye in the Discovery Islands and off Port Hardy. The sockeye smolts in Discovery Islands were most likely from the Fraser River and the offspring of the sockeye that returned to the river in 2018, which is considered the most abundant cycle. Of the millions observed migrating through the Discovery Islands 99% were infected with an average of 9 lice per fish. Infection levels were equal between the pink and chum in the Discovery Islands salmon.

Species	# of Fish	Weight	% Infected	Average # Lice	White Eyes
Pink	227	2.2g	90%	5	20%
Sockeye	103	13.5g	99%	9	53%
Chum	55	3.6g	90%	5	25%

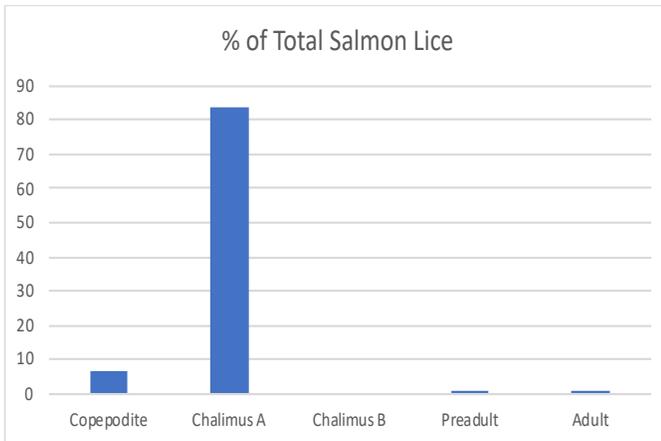
Table 2. The average weight, sea lice load and percent of infected fish in the Discovery Islands, also the percent of fish with a cloudy white formation in the pupil of their eyes, a phenomenon of concern.



Queen Charlotte Strait

The infection observed on young salmon in Queen Charlotte Strait was exceptional in both the number and age composition of the lice. The fish captured in Port Alexander, ~ 7km west of the Mowi fish farm site, Duncan Island, and at Charlie Island, both near Port Hardy had an average of 26 lice per fish. In 20 years of sea lice research in BC levels this high have never been recorded. One 10cm chum was infected

with 89 lice. None of these fish are expected to survive.



The lice at Port Alexander were divided into 2 distinct age groups: very young and mature. Missing almost entirely were the middle stages Chalimus B and preadult. Out of the 1,382 sea lice 90% had only been on the salmon for a matter of days. There were also 14 adult lice that were adults and thus approximate 1 month old. Sea lice moult every few days for the first month on a fish and so residency time on the fish is known.

This means that these fish were infected over a month ago, earlier in their migration and thus likely somewhere well east of Port Hardy, such as the Broughton, or Discovery Islands. Then the fish migrated for a period of weeks with no new lice settling on them until they got near Port Alexander where they were infected with more lice than has ever been observed before.

Review of the Mowi website reveals that freshwater sea lice treatment was scheduled for Duncan Island in mid-July and marinetraffic.com reveals that the well boat *Aqua Tromoy* was engaged in sea lice removal during the collection of the young salmon off Port Hardy. In addition, there is a Mowi farm salmon processing plant in Port Hardy. As sea lice were so much higher than has been recorded near salmon farms, an investigation on the release of live sea lice eggs from the *Aqua Tromoy* and the holds of vessels delivering farm salmon to the processing plant needs to be investigated.

Farm infections

From the data offered on the company websites 37% (19/52) of the salmon farms that were stocked this spring exceeded the government sea louse limit that was recommended by government 15 years ago to protect juvenile salmon (Figure 1). The high lice infections occurred in farms in Klemtu, Queen Charlotte Strait, Quatsino, Nootka, Clayoquot, Sechelt and Discovery Islands, but not the Broughton Archipelago. In southern Nootka 100% and in Discovery Islands 50% of operating farms exceeded the government limit set to protect wild salmon.

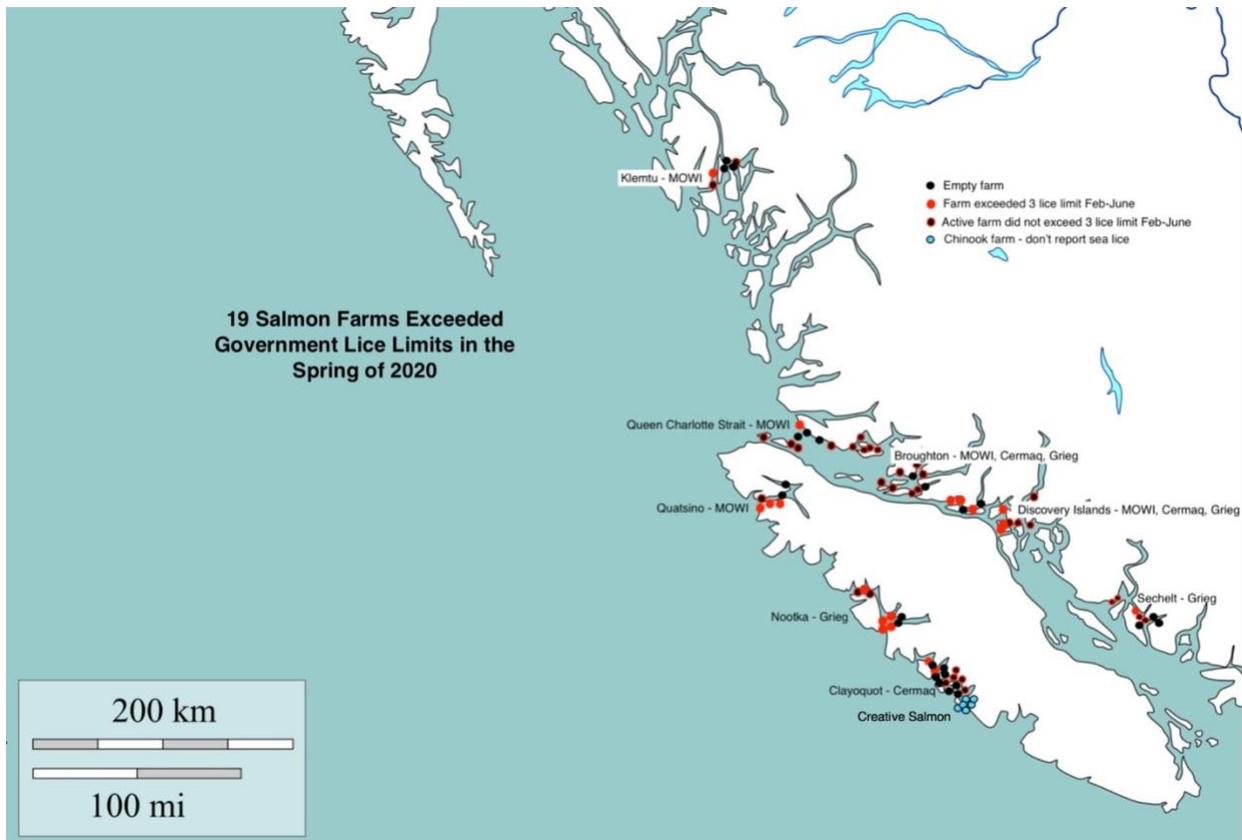


Figure 1: The number of sea lice per farm salmon exceeded the 3 motile lice limit set by government as the trigger for de-lousing treatment, in all farmed regions of the BC coast, except the Broughton Archipelago. This data is from Mowi, Cermaq and Grieg websites. Mowi (<https://mowi.com/caw/>), Cermaq (<https://www.cermaq.com/wps/wcm/connect/cermaq-ca/cermaq-canada/our+sustainable+choice/public-reporting/sea-lice-information>) and Grieg (<https://www.griegseafoodcanada.com/fish-farms/>). Creative salmon which operates off Tofino, does not provide this information.

Sea louse outbreaks on young wild salmon exposed to salmon farms were first discovered on the BC coast in 2001 in the Broughton Archipelago¹ (Figure 2). This triggered government to establish a limit on the number lice per farm salmon (three adult-stage “motiles” per farm salmon). This year, DFO permitted salmon farm infections to rise unregulated for 42 days as young wild salmon were migrating past the farms and so infection on young salmon exposed to salmon farms rose to exceed 2001 levels, except in the Broughton where five farms and several million Atlantic salmon were removed permanently by First Nations.

¹ <https://www.canadianfieldnaturalist.ca/index.php/cfn/article/view/834>

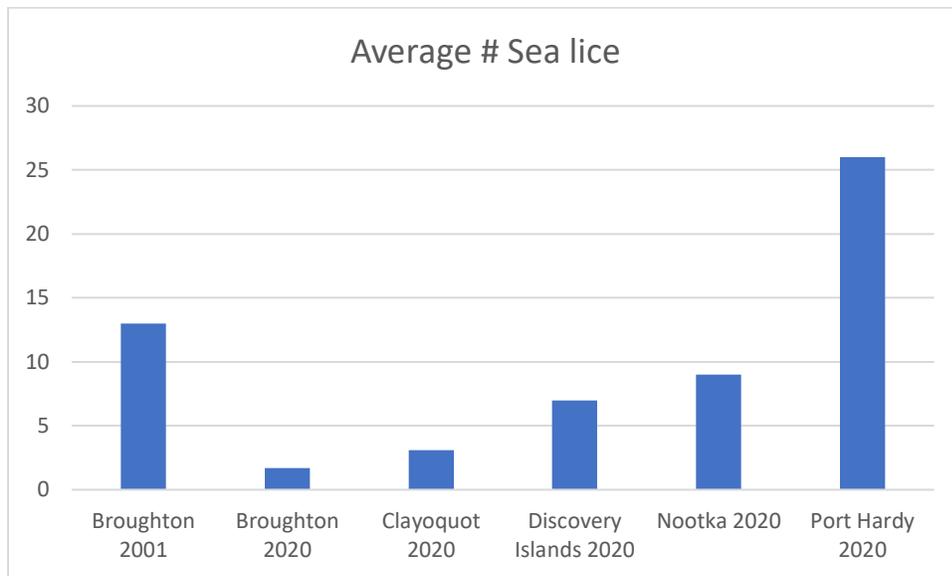


Figure 2: The average number of sea lice per juvenile wild salmon in 2001 was 13.

Discussion

Sea lice infestations only occur on young wild salmon that are exposed to salmon farms and are associated with wild salmon population declines in BC and the North Atlantic (Krkosek et al 2007, Costello 2009, Krkosek et al 2011).

Where there are no farms, young wild salmon are not infected with sea lice (Morton et al 2004, Price et al 2011). When farm salmon are removed, sea lice numbers on young wild salmon decline steeply (Morton et al 2005) and wild salmon rebound significantly (Beamish et al 2006).

The damage caused by sea lice on young wild salmon in 2020 is obvious (see image gallery below). As well, research has shown that even low numbers of lice are lethal to young wild salmon (Morton & Routledge 2006). The smaller the fish, the fewer sea lice it can tolerate. It has additionally been shown that sea lice on juvenile Fraser River sockeye have a sublethal impact making it harder for them to feed, which reduces growth and lowers survival (Godwin et al 2011, 2015, 2017). Decades of research on juvenile salmon prior to salmon farming did not report salmon lice outbreaks. While sea lice are natural to this coast, the placement of large, over-wintering, stationary schools of Atlantic salmon (600,000 – 1,000,000) on the juvenile salmon migration routes has caused an unnatural collision between billions of larval lice drifting out of the pens (Orr 2007) and very young salmon which are simply not large enough to survive so many lice.

Drug resistant sea lice

Salmon lice infestations on BC juvenile pink salmon were first detected in the Broughton Archipelago in 2001 (Morton & Williams 2006). A profound collapse of that generation occurred in all 7 Broughton rivers, amid good returns elsewhere on the coast. In response, the

Province of BC enacted the “Pink Salmon Action Plan” which cleared one pink salmon migration route through the Broughton. Survival of that generation of pink salmon was “exceptional” (Beamish et al 2006). A few years later, government put a limit on the number of sea lice per farm salmon that would trigger delousing, so as to protect wild salmon. For a few years the industry successfully controlled its lice using the drug *Slice* which is soaked into the feed. Then, in 2015 lice numbers began rising on juvenile salmon in the Broughton (Bateman et al 2016). Internal DFO documents obtained under the Freedom of Information Act reveal that beginning in 2013 in Klemtu, 2014 in Quatsino, 2016 Nootka and 2018 Clayoquot Sound, the drug *Slice* was no longer killing enough lice on farm salmon (ATIP A-2019-00569, page 590). The lice were becoming drug resistant in BC as they have elsewhere in the world. The government lice limit was only a *guideline* and so as farm lice escalated in some regions of BC, there was nothing DFO field staff could do to force the companies to comply with the limit.

Drug resistant sea lice are considered a serious threat to wild salmon populations in the Pacific and the Atlantic (Torrison et al 2013). Salmon farms provide ideal conditions for this parasite to multiply and shed billions of larvae into the marine currents (Orr 2007) and if they cannot be controlled, they will kill both wild and farmed fish. Drug resistance is not on or off, it builds as the resistant lice breed and dominate the lice population. Following publication of graphic images of sea lice on young wild salmon in Clayoquot Sound, the previous Minister of Fisheries, Jonathan Wilkinson, issued a warning to Cermaq to get its lice epidemic under control (<https://thetyee.ca/News/2019/06/11/Sea-Lice-Plagues-Return/>) and the Ahousaht First Nation “put Cermaq on notice” (<https://hashilthsa.com/news/2019-06-20/fish-farms-%E2%80%98put-notice%E2%80%99-ahousaht-after-sea-lice-problems-continue>).

In response, the salmon farming industry imported \$80 million in high-tech delousing ships from Norway. These vessels were described as a “game changer,” “a big step forward” and would “revolutionise treatment of sea lice in British Columbia’s water”ⁱ. They worked by sucking the farm salmon into onboard tanks and applying a variety of treatments – hours long freshwater bathes, shorter hydrogen peroxide treatments, wherein the lice are released live, or a form of power-washing that dislodges the lice.

The industry data presented here, suggests that the vessels did not perform well enough to bring the industry into compliance with the government limits considered safe for wild salmon. This is not unexpected as these types of boats also could not control sea lice on salmon farms in Norway. Sea lice have proven to be remarkably adaptable to all types of treatment and have grown into one of the biggest economic impacts on the salmon farming industry globally. If the industry follows the same course here, as in Norway, the next steps will be government release of drugs with a history of negative impact on marine life. Already the hydrogen peroxide treatments are a concern to the shrimp industry in Norwayⁱⁱ.

The greatest concern in 2020 is that this drug resistance has spread to eastern Vancouver Island and is harming the sockeye salmon of the Fraser River, which are salmon of national importance to Canada.



Chile entered 2020 with the highest sea lice levels in eight years. Photo: IntraFish

As sea lice build resistance, Chile's farmed salmon producers search for new strategies

There's no one-size-fits-all solution for attacking the costly parasite, but all companies are working toward solutions.

RELATED NEWS

15 June 2020 6:02 GMT UPDATED 15 June 2020 14:35 GMT
By John Evans



Broughton

The Broughton Archipelago is one of the most studied regions in the world for impact of sea lice on young wild salmon. As recently as 2019, sea lice levels there reached over 90% at some sites. The collapse of pink salmon in this area was predicted (Krkosek et al 2007). Closing commercial fisheries did not reverse this decline and in 2019, the pink salmon return to the Broughton's largest river, the Glendale River, fell to .1% of recent broodyears. Pink salmon in the Ahta River, which is unlogged, also collapsed. This year, there are five fewer salmon farm tenures in the Broughton Archipelago and three of the most dangerous farms to young wild salmon were not operating for most of the out-migration period (2 permanently closed, one fallow). Sea lice infection of young wild salmon in this region fell to the lowest of anywhere examined on the BC coast. The industry is on schedule to decommission more farms every year under the authority of local First Nations. This will be the first region worldwide where the impact of removing salmon farms will continue to be measured against 20 years of data on infection rates.

DFO – dual mandates

DFO may not be able to respond effectively to any damage to wild salmon from salmon farms because the agency is constrained by an impossible dual mandate to both “promote” salmon farming and protect wild salmon. Cohen Commission recommendation #3 advises that the mandate to promote salmon farms should be removed from DFO. Justice Bruce Cohen writes:

“when one government department (in this case DFO) has mandates both to conserve wild stocks and to promote the salmon-farming industry, there are circumstances in which it may find itself in a conflict of interest because of divided loyalties”

As sea lice on salmon farms become increasingly impossible to control, DFO will increasingly face a conflict of interest, caught between the policy to assist growth of salmon farms and provide the conditions that wild salmon require to survive. Indeed, the March 1, 2020 Conditions of Licence suggest that DFO is placing a higher priority on managing farmed, not wild salmon.

In twenty years of scientific publication of research on sea lice in BC and elsewhere in the world by major universities and institutions, DFO has consistently refused to accept the evidence that sea lice from salmon farms are responsible for population-level loss of wild salmon. DFO often proposes the existence of unidentified populations of fish carrying large sea lice loads that are infecting the young salmon. However, 1.) they have not provided evidence that such a body of fish exists and 2.) they have not explained why this unidentified body of fish only occurs at salmon farms. Sea lice are like tags with a built-in timer. Because they change their body shape rapidly for the first 30 days on a fish, we can see where they are attaching to salmon and how long they have been there. In depth studies have shown that as young salmon pass farms, they are infected with new lice and this is what we are seeing this spring.

As recently as the winter of 2019/2020, DFO informed First Nations that stickleback are the significant source of lice, however this theory was disproven in 2007 when it was reported that sea lice appear unable to breed on stickleback (Krkosek et al 2007). DFO has also argued that sea lice do not harm juvenile salmon and while non-government research demonstrates the harm, there is also the visual evidence portraying catastrophic wounding and disfigurement. Salmon must maintain top athletic condition to complete their challenging life history and it is unreasonable to look at these images (below) and propose that the survival of these salmon is unaffected.

Concerned DFO field staff and conservation officers have pushed senior management for stiffer sea lice regulations so that they could make the industry comply with the lice levels (Appendix 1). However, when DFO reissued the Conditions of Licence (COL) for salmon farms on March 1, 2020, they granted the industry a 42-day period, during the juvenile salmon outmigration during which the companies are allowed to exceed, without limit, the number of sea lice thought safe for wild salmon (<https://www.pac.dfo-mpo.gc.ca/aquaculture/licence-permis/docs/licence-cond-permis-mar/licence-cond-permis-mar-eng.pdf>, page 12). This means that the three Norwegian-run companies releasing dangerous lice levels into the path of young wild salmon are protected while the Canadians who depend on wild salmon are not. If the company does lower the number of lice within 42 days, the juvenile wild salmon remain infected, unable to heal and as the lice on them begin reproducing any fish that survive will infect schoolmates. Recent internal documents, however, suggest that at least one of the companies was unable to meet even this lax condition (A-2020-00170, pg 151, Appendix 2).

Cohen Commission

The \$26 million Cohen Inquiry into the Decline of the Sockeye Salmon of the Fraser River held 133 days of hearings, engaged 95 lawyers and invited 21 groups to participate. In the 1,191 page final report there were 75 recommendations deemed necessary to restore Fraser River sockeye salmon. Eleven of these are directed at salmon farms. In particular, Cohen Commission recommendation #19 states:

On September 30, 2020, the minister of fisheries and oceans should prohibit net-pen salmon farming in the Discovery Islands (fish health sub-zone 3-2) unless he or she is satisfied that such farms pose at most a minimal risk of serious harm to the health of migrating Fraser River sockeye salmon. The minister's decision should summarize the information relied on and include detailed reasons. The decision should be published on the Department of Fisheries and Oceans' website.

Cohen Commission recommendation #19 to remove salmon farms by September 30, 2020 is the only response that will increase survival in the Fraser River sockeye generation that will pass through the Discovery Islands in 2021. These fish will be the progeny of the run which Minister Jonathan Wilkinson told Canadians was the lowest in the history of Canada, until this year when the run fell even lower.

Conclusion

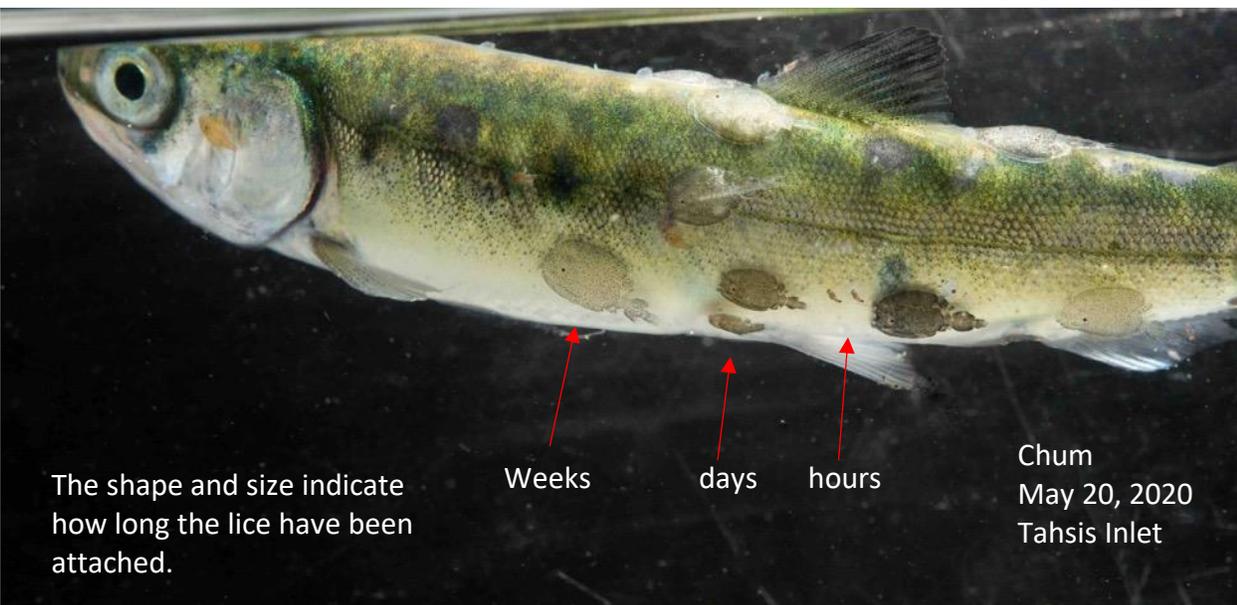
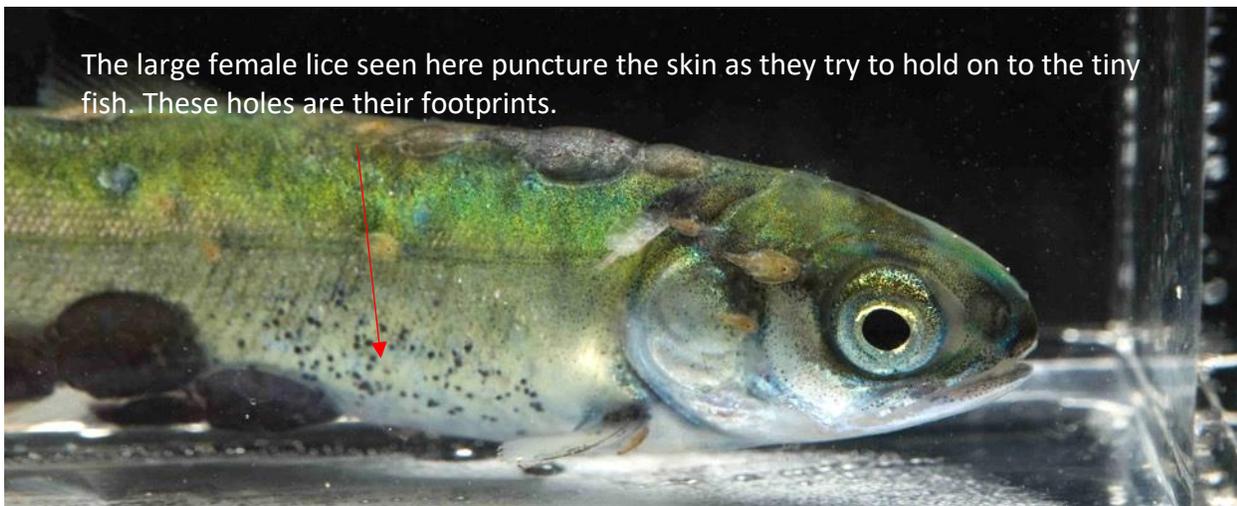
There is no jurisdiction anywhere in the world that BC can look to and learn how to resolve the impact of sea lice from salmon farms on wild salmon. No region, country or company has succeeded in keeping control of the sea lice multiplying in salmon farms. The question is whether there are enough wild salmon to sustain both the losses from sea lice and also return to spawn in viable numbers. In a sense, sea lice from salmon farms are absorbing the quotas once distributed among First Nations and other fisheries, they are taking the fish before fisheries are occurring. Meanwhile in the Broughton Archipelago, where the Nations have removed 5 farms and continue to remove more every year, as per agreement with the federal and provincial governments and the companies, sea lice have plummeted on both the wild and farmed salmon. This is the first region globally where scientists will have the opportunity to study what happens to wild salmon when salmon farms are removed.

The Fraser River sockeye salmon will go extinct if sea lice from salmon farms continue to prevent these fish from reaching the Pacific Ocean.

Photos



The sea lice have removed much of the protective mucus layer and caused pinching of the body cavity of this young pink salmon around the area where the sea louse is attached.



Sockeye
May 28, 2020
Blenkinsop Bay, Johnstone Strait

The lice have wounded this sockeye by grazing through the scales into the skin, opening the fish to waterborne infection.



Chum
June 13, 2020
Cyrus Rocks
Discovery Islands



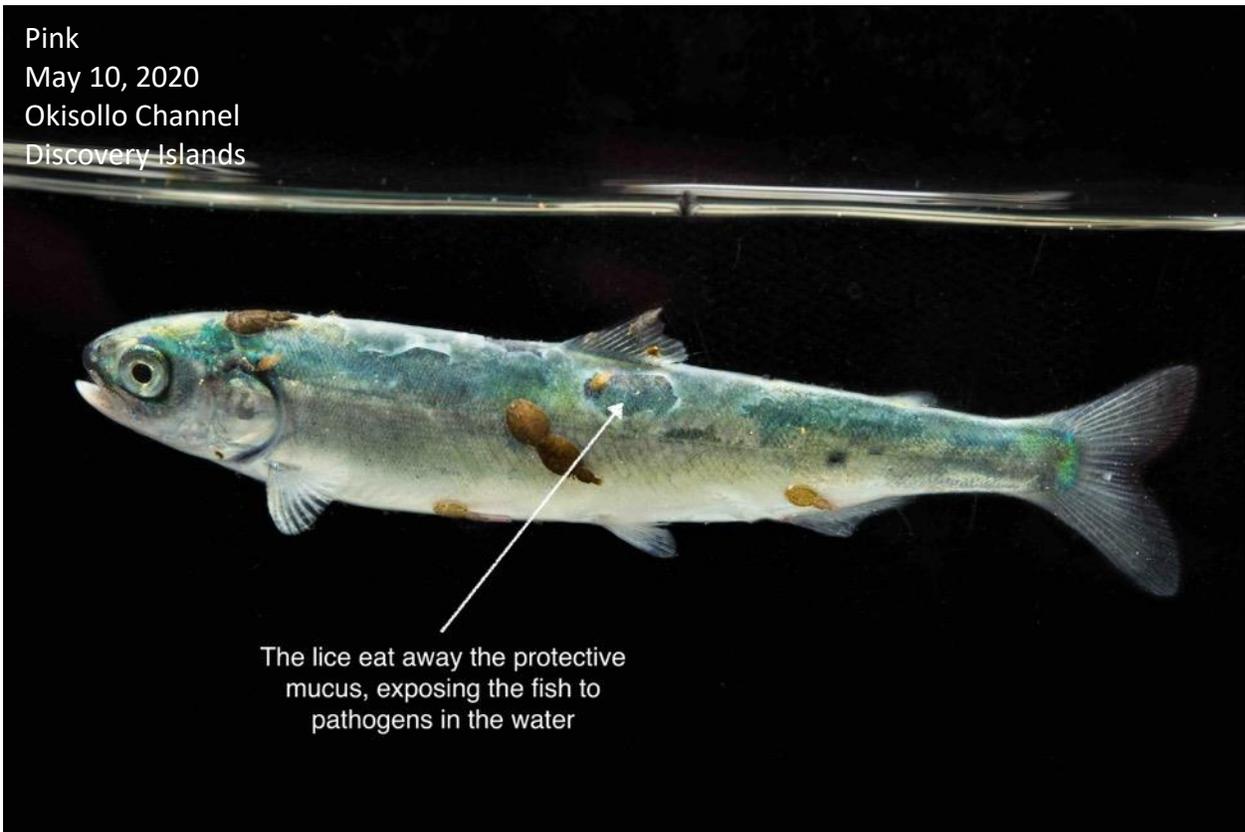
“white eye” has become increasingly common in young salmon exposed to salmon farms. Cause unknown.

Coho
May 19, 2020
Nootka



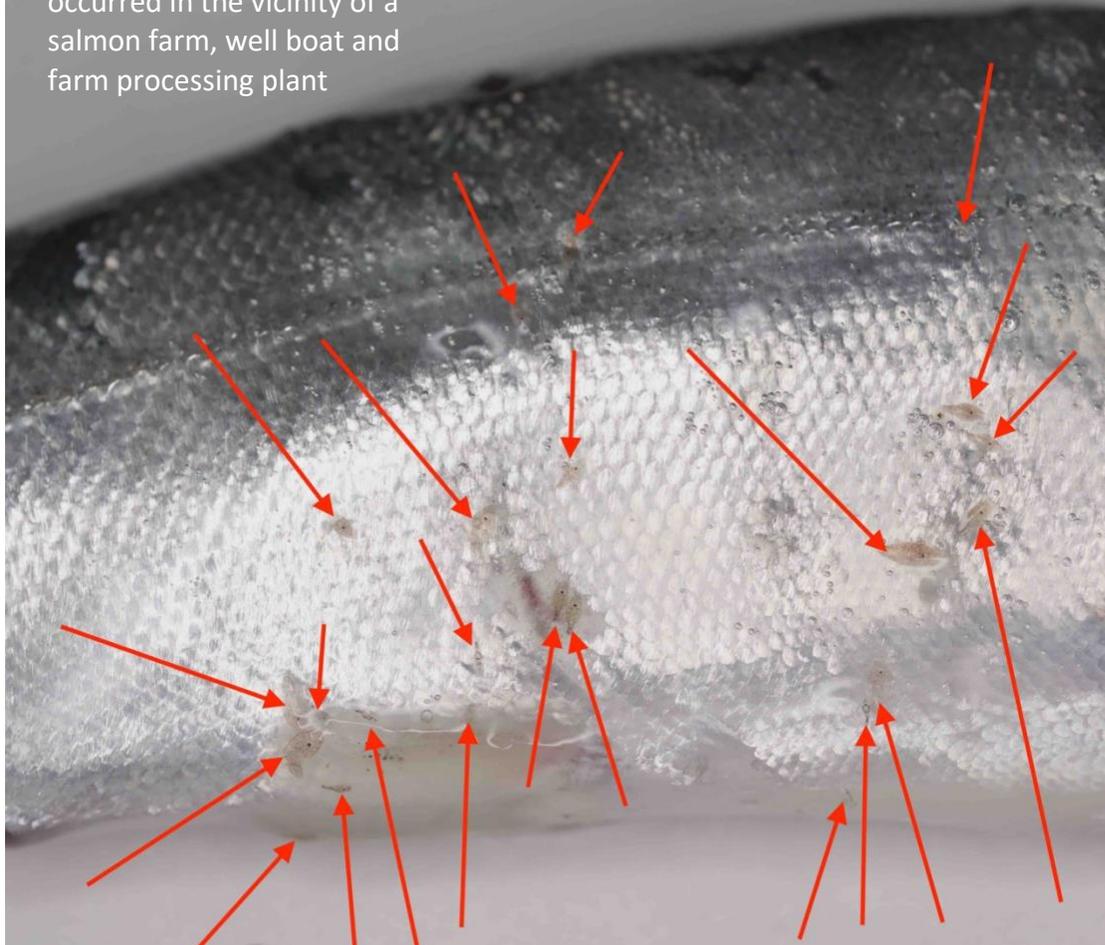
Even the earliest stages of sea lice cause significant damage, grazing away the protect scales that salmon require to maintain their health

Pink
May 10, 2020
Okisollo Channel
Discovery Islands



The lice eat away the protective mucus, exposing the fish to pathogens in the water

Juvenile sea lice on young sockeye, likely from Nimpkish River. This is a local infection that occurred in the vicinity of a salmon farm, well boat and farm processing plant



Sockeye
Port Hardy
July 30, 2020
QLS2020-112

Chum salmon
April 2, 2020
Broughton Archipelago



Appendix 1

Document Released Under the Access to Information Act / Document divulgué en vertu de la Loi sur l'accès à l'information.

Waddington, Zac

From: Waddington, Zac
Sent: May-18-18 9:30 AM
To: Jensen, Neil; Doucette, Claire
Cc: Walde, Kirsty; Knight, Joe; Manore, Chris; Paylor, Adrienne
Subject: RE: Clayoquot sea lice graphs

Thanks very much for looking into this. I was not yet working for DFO in the spring of 2017 with the Esperanza lice issue, but from my understanding, this situation is different, [REDACTED]

[REDACTED] We have graphed the absolute sea lice inventory on farms over threshold, and found that the management plan submitted by Cermaq (harvesting), did not meet the criteria of reducing absolute sea lice inventory in the month of March, and graphs for the month of April are pending. I shared the graphs with Claire and can redistribute if necessary (or you can also just speak to Krista S. directly).

All that said, I recognize and agree that our COL are very weak in many areas, and would support opening the licence to change and strengthen our conditions to make them enforceable. In the interim, I was just hoping that this situation in Clayoquot could be reviewed [REDACTED] Unlike the previous situation in Esperanza, here we have documentation demonstrating the failure of their plan to reduce absolute sea lice inventory as per a condition of licence.

Zac

From: Jensen, Neil
Sent: May-17-18 9:05 AM
To: Doucette, Claire; Waddington, Zac
Cc: Walde, Kirsty; Knight, Joe; Manore, Chris
Subject: RE: Clayoquot sea lice graphs

Hi Claire and Zac,

C&P staff looked at this COL in the past and recommended a change as it was not viewed as enforceable. As I understand it, despite the recommendation, no changes were made to the COL and the current wording became fixed for the duration of the licence. A major limitation of the multi-year licences is that COLs may not be amended except for "the purposes of the conservation and protection of fish" (Fishery (General) Regulations, sec. 22(2)). This issue came up last year with an issue of large numbers of sea lice at Grieg on the West coast of Vancouver Island and C&P was asked investigate. However, the only thing that the company can be compelled or held legally accountable for is "implementing a plan" – whatever that means. There is no measure or quantifiable action that we can determine happened or not (i.e. within a prescribed time period). As long as the company has a plan and implements it, they are in compliance of the COL. For example, if they discovered the sea lice and ordered up hydrogen peroxide treatments and a well boat, but it will take 6 months to get in place in order to reduce the number of sea lice, they would be compliant. [REDACTED]

The only avenue that I can recommend is that you try to convince Allison [REDACTED] that the COL needs to be changed for conservation and protection reasons (for wild fish). They may have considered this last year, but I wasn't involved in

s.21(1)(b)

1 s.23

000626

Appendix 2

From: Waddington, Zac
Sent: April-20-20 2:13 PM
To: Paylor, Adrienne
Subject: RE: Marine audits & upcoming hatchery visits

Yeah we have a call tomorrow to go over the latest sea lice numbers in Nootka and everywhere else. But it looks like they've exceeded for more than 42 days at one and potentially two sites. So we will need to confirm this and then look at non-compliance. It's no where near as over threshold as in years past however.

Zac

From: Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Sent: Monday, April 20, 2020 1:31 PM
To: Waddington, Zac <Zac.Waddington@dfo-mpo.gc.ca>
Subject: RE: Marine audits & upcoming hatchery visits

No I have a call in ½ hr but our table said we (AMD) would reassess at the end of April so I think they waiting to see what we recommend to them at that time. I told Andy the lice were low so not as much worry about thresholds.....but Howie was worried about Nooka so should I change my tune on the priority and risk levels to get back out there?

References

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Papers Published by A. Morton <https://www.alexandramorton.ca/the-science/>

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i <https://seawestnews.com/sea-lice-game-changer-ship-arrives-in-british-columbia/>

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ii Article translated from Norwegian “*The drugs the aquaculture industry uses for salmon lice can be far more toxic to the environment than previously thought, a new report shows.*”

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