From: Sitter, Laura
Sent: Tuesday, March 15, 2022 3:07 PM
To: 'Geduld, Jennifer (HC/SC)'; Oswell, Alexandria; Price, Derek
Cc: Tatone, Elise (HC/SC); Struthers, Alistair
Subject: RE: Draft EDR refusal response

Hi Jennifer,

Thank you for informing us of your communication with other stakeholders for these requests.

First, we have discussed these within our Fish Health team, and would like to share our support for these specific requests as they pertain to sea lice management. We believe that Cermaq has considered all available management options for sea lice mitigation in this region and that this request is reasonable. The information they have provided about available treatments and appropriate use is accurate. Additionally, these fish will be entered into a site where other cultured fish currently exist, therefore the infection pressure from those cohorts will be higher on these new entries. It is likely that these transferred fish would require sea lice mitigation before reaching the 500g minimum treatment size for non-medicinal products in order to achieve regulatory compliance under their PAR licences. While there have been recent changes to licencing of Cermaq sites (i.e. Discovery Islands Decision to phase out farms), I cannot say that these changes have directly impacted these smolts. We would like to emphasize that we have reviewed these requests from a sea lice management perspective and the potential effects of sea lice on wild fish as well. We cannot comment on other potential environmental effects.

Second, I have read the letter you have drafted and in light of the decision to refuse the request, it looks fine. I would suggest making a change to one of the last sentences which currently reads "You are strongly encouraged to plan and consider all available alternative treatment and management options to control sea lice". I think the applicant (as you've restated in this letter) has demonstrated that they have already considered all available alternative treatment and management options to control sea lice. Perhaps something like "Please continue to employ the strategies currently available to control sea lice in your region" or other language.

Finally, I will emphasize what I believe other colleagues have suggested recently, which is that the salmon farming industry needs more tools in order to manage sea lice on farms to minimize the potential impact to wild salmon. The tools they have implemented especially over the last 5 years have been, and continue to be, largely effective. Emamectin benzoate is the only treatment option in BC that provides residual protection and while it is effective in many regions of the coast, resistance has been demonstrated including in Clayoquot Sound. There continues to be a lack of treatments that give residual protection against sea lice which leads to other issues including health and welfare concerns. While I understand that the report from Elanco presenting the results from their environmental monitoring program is still pending, it would be beneficial to discuss other tools (including drugs and pesticides) that could be employed, as well as regulatory pathways to have those tools quickly approved while still supporting responsible environmental management.

Thank you for involving us in this process and we look forward to working with you again!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Geduld, Jennifer (HC/SC) <jennifer.geduld@hc-sc.gc.ca>
Sent: Friday, March 11, 2022 12:24 PM
To: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Tatone, Elise (HC/SC) <elise.tatone@hc-sc.gc.ca>; Struthers, Alistair <Alistair.Struthers@dfo-mpo.gc.ca>
Subject: Draft EDR refusal response

Good afternoon,

Thank you again for meeting with us on Wednesday to hear about the updates with respect to the Emergency Drug Release (EDR) requests for IMVIXA from [redacted] for 2x10 kg of the unapproved drug, IMVIXA (lufenuron 10%, Elanco Canada) to treat approximately [redacted] farmed salmon in British Columbia before transfer to the marine site [redacted] to prevent against sea lice infestation.

Following our conversation, we have had internal discussions within the Veterinary Drugs Directorate and with our Healthy Environment, Consumer Product Safety Branch colleagues who conduct the environmental risk assessments for EDR requests. After careful consideration, VDD is going to move ahead with a refusal to [redacted] request and would very much appreciate your review and input to the attached draft letter.

Thank you and looking forward to your input. Please don't hesitate to reach out.

Jennifer

Jennifer Geduld
Director/Directrice
Clinical Evaluation Division/Division de l'évaluation clinique
Veterinary Drugs Directorate/Direction des medicaments vétérinaires
Health Canada/Santé Canada
613-316-2624
Jennifer.Geduld@canada.ca

s.20(1)(b)

From: Diamond, Maria
Sent: Friday, March 18, 2022 11:31 AM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie
Subject: Compliance Summary
Attachments: Compliance Summary to March 19, 2022.docx

FYI

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary March 11-19, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
Dec 2	Mar 13	Rant	100 day follow-up

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
Mar 11	Mar 11	Noo-la	MR treatment
Mar 11	Mar 14	Esperanza	MR treatment
Mar 10	Mar 15	Bedwell	MR treatment
Mar 12	Mar 15	Esperanza	MR treatment
Mar 15	Mar 15	Bare Bluff	MR treatment
Mar 15	Mar 15	Steamer	MR treatment – all pens

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
Mar 15	Mar 11	Sargeaunt Pass	Hydrolicer (even side pens)
Mar 16	Mar 14	Dixon Pass	Hydrolicer
Mar 19	Mar 16	Cougar Bay	FW bath treatment

Sea Lice Events

Incident Date	Date Report	Facility	Details
Mar 9	Mar 11	Shelter Pass	Follow-up 2wks post-SLICE 2.31 (tx ended Feb. 20)
Mar 12	Mar 14	Bawden	Pre-tx 21.69 avg hydrolicer
Mar 13	Mar 14	Bawden	Post-mech 3.34
Mar 13	Mar 15	Fortune	Pre-tx 6.59 hydrolicer
Mar 16	Mar 16	Fortune	Post-mech 0.79 avg
Mar 14	Mar 15	Kid Bay	Pre-tx 4.83 avg

Mar 15	Mar 16	Cougar Bay	Exceed 6.30 avg 3 pen count
Mar 17	Mar 17	Sir Ed	Follow-up 21 d post-SLICE 1.13 avg. (Apr 6 = 42d post-SLICE)

No information has been removed or severed from this page

From: Sitter, Laura
Sent: Friday, March 18, 2022 1:26 PM
To: Shaw, Kerra; McCorquodale, Brenda
Subject: SL and FH update: March 18, 2022

Hi Brenda and Kerra,

Here are your sea lice and fish health updates for the week. A reminder that since we are past the first week of the Outmigration window, a sea lice exceedance is not a violation of the COLs. Farms have to get their numbers back below threshold within 42 days from the date they exceeded. I have highlighted changes from last report. Also, farms are required to count every 2 weeks and report if they have exceeded the threshold. If they have not exceeded then they submit their numbers for the whole month by April 15th and we will evaluate to ensure they were compliant with COLs.

- **Sea lice update**
  - **Broughton-** 7 active, 0 over
  - **Central Coast-** 3 active, 2 over (Kid Bay, Cougar- new; FW treatment planned for both)
  - **Clayoquot North-** 4 active, 3 over (Bawden (hydrolicer), Dixon (hydrolicer), Ross (harvest))
  - **Clayoquot South-** 7 active, 2 over (Saranac (harvest), Bedwell (hydrolicer)), update from last week: Fortune now underthreshold
  - **Esperanza –** 2 active, 0 over
  - **Nootka-** 5 active, 0 over
  - **Port Hardy-** 4 active, 0 over
  - **Quatsino-** 3 active, 0 over
  - **Sunshine Coast –** 5 active, 0 over
  - **Summary: 40 sites, 7 over.** We met with C&P earlier this week [redacted] Glen Lehtovaara has been attending our weekly Compliance Meetings.
- **Field update**
  - 3 sites on the Sunshine Coast were visited this week. Fish Health audits were conducted March 15th at Ahlstrom, Vantage, and Salten. There were no compliance issues noted, and sea lice numbers are all lower than 2 motiles/fish. The area just finished a SLICE treatment so numbers are expected to remain low for the next several weeks.
  - All marine audits for Quarter 1 have been completed. Field activity will resume in April.
- **Other updates**
  - We have had no new updates about the VHSv detection in herring at Bedwell in Clayoquot Sound. I spoke with the CFIA vet on Monday to confirmed that VHSv detections in the Pacific Ocean are verified by their labs and if the strain of the virus is the same as the one that is endemic then no further actions are required. A reminder that VHSv detections occur in February and March with the herring spawn and usually resolve without significant farmed fish mortality.
  - AEO Data Team found a discrepancy with the inventory numbers at Golden Eagle Sablefish in Kyuquot Sound. The response from the company has been unsatisfactory and they will be working with C&P to resolve this issue.

Let me know if you have any questions!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

s.16(1)(c)

From: Price, Derek
Sent: Monday, March 21, 2022 12:05 PM
To: Sitter, Laura
Subject: RE: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal

Hi Laura,

I wrote this, but I'm not sure where it fits.

"A recent analysis of our data revealed that farmers have shifted to the use of bath treatments and mechanical delousing to effectively control sea lice. This shift might be at least partially explained by the appearance of resistance. However, we have not observed low treatment efficacy, so if resistance is present it has resulted in avoidance of the product and not treatment failure."

I think that in general we should stress that although we don't monitor resistance, we do monitor treatment efficacy which is the part of the equation that ensures companies are effectively controlling sea lice on farms.

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, March 18, 2022 4:10 PM
To: Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: RE: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal

Hey Derek,

I've started looking at these and need some more information. I can get Mel to help on Monday, but maybe you know some of this already?

KERRA: New study shows sea lice in the Broughton Archipelago rapidly becoming resistant to SLICE (emamectin benzoate). Was DFO aware of this growing resistance? If so, when did DFO become aware?

- In 2020, DFO implemented new conditions of licence for netpen salmon farms that requires companies to submit sea lice numbers before and after sea lice treatments in BC to determine the success of the treatment. This applies to all sea lice treatments including SLICE, mechanical removal, and bath treatments.
- This condition was put in place to more closely monitor the effectiveness of different types of sea lice treatments around the coast.
- Another condition that was put in place in 2020 was if a treatment did not reduce sea lice numbers by at least 60%, then farms would not be allowed to use that treatment again on the same group of fish.

KERRA: Has DFO done sea louse bioassays on BC farms? If so, what do they show and why not publicly available?

- DFO performs on-site audits of salmon farms approximately 120 times per year, and evaluates sea lice numbers, fish health data, and compliance with conditions of licence.
- Occasionally DFO performs sea lice bioassays for a specific treatment type when a need is identified. The last time this was performed for SLICE was in XXXX in XXXX. (I think it was 2017 in Esperanza- I need to dig a little bit)

KERRA: Why were other methods of sea louse control not approved in BC for so long? Are there ways of controlling sea lice? If not what does that mean for the future of sea louse control on B.C. salmon farms

- For several years, SLICE and harvesting fish were the only tools available to reduce sea lice numbers on

farmed salmon in BC.

- Recent advances in technology have allowed for new sea lice treatment methods to be developed including mechanical removal, bath treatments with freshwater and hydrogen peroxide, all of which are used in BC today.
- DFO encourages an "integrated pest management approach" to managing sea lice on farms in BC. This means that farms use multiple tools to manage sea lice on farms. By using many different tools, it reduces the risk that resistance to one tool may develop.

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Friday, March 18, 2022 2:59 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: FW: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal

Can you please draft for me? Thank you!

From: Coutts, Alexandra <Alexandra.Coutts@dfo-mpo.gc.ca>
Sent: Friday, March 18, 2022 2:13 PM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Cc: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal

Hi Kerra and Krista,

We received a media inquiry from The Narwhal regarding a study from Sean Goodwin that alleges that sea lice in the Broughton are becoming resistant to SLICE treatment. I have asked the reporter if she can share a copy of the study with us and she is checking. I was hoping you both could take a look at the questions below and provide a few lines to address them!

Krista, I wasn't sure if you would be the best person for number 3? Please advise if there is someone else who can speak to why bioassay info is not shared online (or if it is, that would be great too so we can share with the reporter).

No need to respond to the questions that are not highlighted. We have asked MINO if they would like to take those questions.

Thanks,
Alex

REPORTER'S DEADLINE | ECHEANCIER **s.19(1)**
Tuesday, March 22, 2022 2:00 PM PT (HP)

Status | Statut	Active Media Calls // Appels en cours
Location | Lieu	1 | In region / En région

Category | Catégorie	[CAT 4]
Call Type | Type d'appel	Interview Request/ Demande d'entrevue
Outlet | Média	The Narwhal

Reporter | Journaliste [redacted]

Context(e) / Questions

I am doing a story on an about-to-be-published study showing sea lice on salmon at Broughton Archipelago salmon farms have developed a resistance to SLICE, so outbreaks, spreading lice to wild fish, will be difficult to control.

Response | Réponses

1. KERRA: New study shows sea lice in the Broughton Archipelago rapidly becoming resistant to SLICE (emamectin benzoate). Was DFO aware of this growing resistance? If so, when did DFO become aware?

2. KERRA: Has DFO done sea louse bioassays on BC farms? If so, what do they show and why not publicly available?

3. KRISTA: Why is information from industry and government not publicly available? The results used in this study were possible because, under the Broughton agreement, companies had to share data with First Nations. Why are industry bioassay results not required to be made public like their sea louse counts?

4. MINO: If ocean salmon farms continue to exist in B.C., should the Broughton agreement be a template for other regions?

5. KERRA: Why were other methods of sea louse control not approved in BC for so long? Are there ways of controlling sea lice? If not what does that mean for the future of sea louse control on B.C. salmon farms?

6. MINO: When will Minister Murray make a decision on the 79 salmon farming licences up for renewal at the end of June?

7. MINO: She has committed removing open-net salmon farms by 2025. Is that the date to complete a plan or to have the farms out of the water?

8. MINO: What happens if some First Nations want the farms in their territory?

s.19(1)

From: Sitter, Laura
Sent: Monday, March 21, 2022 5:06 PM
To: Price, Derek
Subject: RE: Question regarding Wild Salmon migration and impact on sea lice

Stunning

From: Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Sent: Monday, March 21, 2022 12:43 PM
To: Tatone, Elise (HC/SC) <elise.tatone@hc-sc.gc.ca>
Cc: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: RE: Question regarding Wild Salmon migration and impact on sea lice

Hi Elise,

Thanks for including us in the meeting and taking the time to listen to our feedback. I hope you don't mind, but I added Laura to the conversation in case I miss something.

Regarding the control of sea lice burden on farms, our main goal is to minimize the impact of farm-originated sea lice on out-migrating wild salmon juveniles. To achieve this, between March and June of every year farms must be able to maintain a low sea lice abundance and implement control measures if a threshold of 3 motile lice per fish is reached. Our concern with these particular fish is that the farmer won't be able to use any of the treatment/intervention options available to them during the out-migration window. This could lead to an increase in the abundance of sea lice beyond their control, and possibly impact nearby wild juvenile salmon populations.

We are less concerned about the impact of migrating wild salmon on farms as they make their way into their spawning grounds. This occurs during the fall months and we usually see an increase in sea lice abundance on farms. However, by next fall these fish should be big enough for the farm to use their mechanical delouser to reduce their sea lice abundance before they enter their second out-migration window.

Please let me know if this was of any help, and feel free to set up a call if you want to discuss this further.
Regards,

Derek Price, MV, PhD

Epidemiologist, Aquaculture Fish Health
Aquaculture Management Division / Fisheries and Oceans Canada
Derek.Price@dfo-mpo.gc.ca
Tel: 250-703-0929 Cell: 250-850-9362

From: Tatone, Elise (HC/SC) <elise.tatone@hc-sc.gc.ca>
Sent: Monday, March 21, 2022 5:35 AM

To: Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: Question regarding Wild Salmon migration and impact on sea lice

Good Morning Derek,

Thank you for participating the call we had the other week regarding the use of Imvixa for smolts to be placed in [redacted] I was wondering if you could help me understand the impact and timing of the Wild Salmon migration on the sea lice burden in the area.
What is a rough idea of the expected timing of the migration and would it change the sea lice burden or merely the regulatory enforcement of the sea lice burden in the farmed salmon?

I hope those aren't silly questions. Any help you could provide would be greatly appreciated.

Thanks!
Elise

Elise Tatone, DVM PhD Dipl. ACVPM (she|elle)
Senior Science Advisor, Clinical Evaluation Division
Veterinary Drug Directorate, Health Canada

s.20(1)(b)

From: Shaw, Kerra
Sent: Tuesday, March 22, 2022 12:44 PM
To: Sitter, Laura; Price, Derek
Cc: Oswell, Alexandria; Barry, Melanie
Subject: RE: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal [redacted]

Thank you guys for pulling together some answers. Was hoping to answer some a bit more directly though – please see below.

New study shows sea lice in the Broughton Archipelago rapidly becoming resistant to SLICE (emamectin benzoate). Was DFO aware of this growing resistance? If so, when did DFO become aware?
Have we seen evidence of this? If so, when did we become aware? You mention 2 times there was reduced efficacy in the Broughton – was that resistance related?

Has DFO done sea louse bioassays on BC farms? If so, what do they show and why not publicly available?
What has our bioassay work shown us? I think we can also add a bullet that industry does bioassay work and they provide us with that data? If correct, can you please write a bullet saying that?

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Monday, March 21, 2022 11:29 AM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Barry, Melanie <Melanie.Barry@dfo-mpo.gc.ca>
Subject: RE: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal [redacted]

Hi Kerra,

I have drafted some bullets for the questions flagged for you, with Derek's help. I highlighted two points in yellow for your information but don't think we would include these in the response. Let me know what you think!

KERRA: New study shows sea lice in the Broughton Archipelago rapidly becoming resistant to SLICE (emamectin benzoate). Was DFO aware of this growing resistance? If so, when did DFO become aware?

- In 2020, DFO implemented new conditions of licence for netpen salmon farms that requires companies to submit sea lice numbers before and after sea lice treatments in BC to determine the success of the treatment. This applies to all sea lice treatments including SLICE, mechanical removal, and bath treatments.
- This condition was put in place to more closely monitor the effectiveness of different types of sea lice treatments around the coast.
- DFO reviews all incidents of reduced efficacy of treatments and gathers additional information to determine the potential causes. Treatments can be less successful than anticipated for a number of reasons including environmental events that disrupt treatment, fish eating less medication than required, as well as resistance.
- FYI- I'm not sure if we include this? Since this requirement was implemented in 2020, there have only been 2 notifications of reduced treatment efficacy of SLICE in the Broughton.
- Another condition that was put in place in 2020 was if a treatment did not reduce sea lice numbers by at least 60%, then farms would not be allowed to use that treatment again on the same group of fish.

KERRA: Has DFO done sea louse bioassays on BC farms? If so, what do they show and why not publicly

available?

- DFO performs on-site audits of salmon farms approximately 120 times per year, and evaluates sea lice numbers, fish health data, and compliance with conditions of licence.
- Occasionally DFO performs sea lice bioassays for a specific treatment type when a need is identified. (I don't know how often this has been done but I believe the last time was in Esperanza in 2017. It has not been done since I started in 2019)

KERRA: Why were other methods of sea louse control not approved in BC for so long? Are there ways of controlling sea lice? If not what does that mean for the future of sea louse control on B.C. salmon farms

- For several years, SLICE and harvesting fish were the only tools available to reduce sea lice numbers on farmed salmon in BC.
- Recent advances in technology have allowed for new sea lice treatment methods to be developed including mechanical removal, bath treatments with freshwater and hydrogen peroxide, all of which are used in BC today. Analysis has shown that companies are using these other technologies more and more often.
- DFO encourages an "integrated pest management approach" to managing sea lice on farms in BC. This means that farms use multiple tools to manage sea lice on farms. By using many different tools, it reduces the risk that resistance to one tool may develop.

Laura

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Friday, March 18, 2022 2:59 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: FW: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal (

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From: Coutts, Alexandra <Alexandra.Coutts@dfo-mpo.gc.ca>
Sent: Friday, March 18, 2022 2:13 PM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Cc: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: FOR INPUT | Media Inquiry | Sea lice resistance to SLICE and open net pens | The Narwhal (

Hi Kerra and Krista,

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Thanks,
Alex

REPORTER'S DEADLINE | ECHEANCIER
Tuesday, March 22, 2022 2:00 PM PT (HP)

Status | Statut	Active Media Calls // Appels en cours
Location | Lieu	1 | In region / En région
Category | Catégorie	[CAT 4]
Call Type | Type d'appel	Interview Request/ Demande d'entrevue
Outlet | Média	The Narwhal
Reporter | Journaliste	[redacted]

Context(e) / Questions

I am doing a story on an about-to-be-published study showing sea lice on salmon at Broughton Archipelago salmon farms have developed a resistance to SLICE, so outbreaks, spreading lice to wild fish, will be difficult to control.

Response | Réponses

1. KERRA: New study shows sea lice in the Broughton Archipelago rapidly becoming resistant to SLICE (emamectin benzoate). Was DFO aware of this growing resistance? If so, when did DFO become aware?

2. KERRA: Has DFO done sea louse bioassays on BC farms? If so, what do they show and why not publicly available?

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6. MINO: When will Minister Murray make a decision on the 79 salmon farming licences up for renewal at the end of June?

7. MINO: She has committed removing open-net salmon farms by 2025. Is that the date to complete a plan or to have the farms out of the water?

s.19(1)

8. MINO: What happens if some First Nations want the farms in their territory?

No information has been removed or severed from this page

From: Sitter, Laura
Sent: Tuesday, March 22, 2022 12:53 PM
To: Lehtovaara, Glen; Shaw, Kerra; Gray, Trevor
Cc: Manchester, Howie; Oswell, Alexandria
Subject: Compliance referral forms- outmigration
Attachments: Occur refferals template- [redacted]. Occur refferals template- AFH.[redacted]; Occur refferals template- AFH.[redacted]; Occur refferals template- [redacted]

Hi Glen, Trevor, and Kerra,

Thanks for meeting last week to discuss the compliance issues related to sea lice in the first week of March. I have completed and attached the referral forms to this email for the 4 sites. Please let me know how else we can assist with these files!

Laura

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

s.16(1)(c)

Pages 17 to / à 20

are withheld pursuant to sections

sont retenues en vertu des articles

16(1)(c), 19(1)

of the Access to Information Act

de la Loi sur l'accès à l'information

16 (1) The head of a government institution may refuse to disclose any record requested under this Part that contains

•

(a) information obtained or prepared by any government institution, or part of any government institution, that is an investigative body specified in the regulations in the course of lawful investigations pertaining to

o

(i) the detection, prevention or suppression of crime,

o

(ii) the enforcement of any law of Canada or a province, or

o

(iii) activities suspected of constituting threats to the security of Canada within the meaning of the Canadian Security Intelligence Service Act, if the record came into existence less than twenty years prior to the request;

•

(b) information relating to investigative techniques or plans for specific lawful investigations;

•

(c) information the disclosure of which could reasonably be expected to be injurious to the enforcement of any law of Canada or a province or the conduct of lawful investigations, including, without restricting the generality of the foregoing, any such information

o

(i) relating to the existence or nature of a particular investigation,

o

(ii) that would reveal the identity of a confidential source of information, or

o

(iii) that was obtained or prepared in the course of an investigation; or

Personal Information

Marginal note:Personal information

•

19 (1) Subject to subsection (2), the head of a government institution shall refuse to disclose any record requested under this Part that contains personal information.

From: Barry, Melanie
Sent: Tuesday, March 22, 2022 2:44 PM
To: Shaw, Kerra
Cc: Sitter, Laura; Oswell, Alexandria
Subject: Non-Compliance Letter - draft
Attachments: 20220322 Letter of non-compliance Clayoquot North 6.6 March 2022.doc

Good Morning Kerra,

Ok here's a draft of the non-compliance letter we discussed. I've put all the sites together in the one letter, but can split them out into four separate letters if you'd prefer.

I left the details about the exemptions relating to the Chaetoceros bloom highlighted – let me know how that sounds. I can adjust as needed.

Laura and Alex – please let me know if I've made any mistakes in these details. I just pulled info out of the compliance spreadsheet and SL graphs.

Thanks,
Mel

Melanie Barry
Aquatic Science Biologist / Biologiste en sciences aquatiques
Fisheries and Oceans Canada / Pêches et Océans Canada
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March 22, 2022

Cermaq Canda
203-919 Island Highway
Campbell River, BC V9W 2C2

Dear Licence Holder,

Subject: **Dixon Bay, REF #234 Non-Compliance**
Millar Channel, REF #1507 Non-Compliance
Ross Pass, REF #314 Non-Compliance
Bawden, REF #227 Non-Compliance

The aquaculture licence that has been issued to you under the authority and provisions of the *Fisheries Act* and the *Pacific Aquaculture Regulations* contains specific Conditions of Licence. These, along with the requirements set out in the *Aquaculture Activities Regulations*, allow you to conduct aquaculture activities at the licenced location in a prescribed manner.

This letter is to inform you that Fisheries and Oceans Canada ("the Department") has conducted a review of your **Condition of Licence 6.6** which states:

> *"The Licence Holder must ensure that sea lice numbers are below threshold 6.2 at the time of the first Counting Event of the Out-migration Window"*

We have determined that you have failed to comply in the following manner;

- The sea lice numbers were above threshold 6.2 at Dixon bay at the time of the first Counting Event of the Out-migration
  - First Out-migration Counts completed on March 7, 2022, indicated an average of 4.73 motile *Lepeophtheirus salmonis*
- The sea lice numbers were above threshold 6.2 at Millar Channel at the time of the first Counting Event of the Out-migration
  - First Out-migration Counts completed on March 2, 2022, indicated an average of 6.27 motile *Lepeophtheirus salmonis*
- The sea lice numbers were above threshold 6.2 at Ross Pass at the time of the first Counting Event of the Out-migration
  - First Out-migration Counts completed on March 3, 2022, indicated an average of 11.53 motile *Lepeophtheirus salmonis*

Canada

- The sea lice numbers were above threshold 6.2 at Bawden at the time of the first Counting Event of the Out-migration
    - First Out-migration Counts completed on March 2, 2022, indicated an average of 14.05 motile *Lepeophtheirus salmonis*

The Department understands that there were extenuating circumstances relating to a Chaetoceros algae bloom that resulted in the Licence Holder being unable to count sea lice prior to the Out-migration, as per 6.9(a)(iii), which states:

> *"The Licence Holder:*
> *(a) is not required to count sea lice in an individual Containment Structure if:*
> *(iii)an ongoing environmental issue would reasonably lead to additional fish stress or harm is handled"*

The Department also understands that due to deterioration of water quality associated with the Chaetoceros bloom, the fish could not be treated for sea lice as per section 2.4.1 of the Salmonid Health Management Plan, which states that in the event of deterioration of water quality:

> *"..Cessation of feeding is immediate. Water quality monitoring is enhanced to determine the problem and to estimate how long the problem may persist. Fish are monitored more closely for the duration of the event and will not be handled until water quality is deemed acceptable."*

This occurrence of non-compliance is being recorded and will form part of your compliance history, which will be considered in the event of future occurrences. You should be aware that Section 78.1 of the *Fisheries Act* states "Where any contravention of this Act or the regulations is committed or continued on more than one day, it constitutes a separate offence for each day on which the contravention is committed or continued". This letter does not preclude any legal action this Department may take with respect to this matter.

Please note that if the information requested is not received as requested, this file may be turned over to Conservation and Protection Fishery Officers.

Fisheries and Oceans is committed to working with you to resolve this issue. Please feel free to contact Kerra Shaw (Kerra.Shaw@dfo-mpo.gc.ca) if you have any questions or concerns regarding this matter at 250-286-5831. All reports are to be sent to the following E-Mail address: AQFF.FishHealth@dfo-mpo.gc.ca

Sincerely,

Kerra Shaw
Regional Manager, Aquaculture Fish Health

Fisheries and Oceans Canada | Peches et Oceans Canada
103-2435 Mansfield Drive | 103-2435 Drive Mansfield
Courtenay, BC V9N 2M2 | Courtenay (C.-B.) V9N 2M2

Cc: Conservation & Protection Aquaculture Unit

No information has been removed or severed from this page

From: Price, Derek
Sent: Tuesday, March 22, 2022 3:38 PM
To: Sitter, Laura; Oswell, Alexandria; Shaw, Kerra
Subject: FW: New paper on parasiticide resistance on BC salmon farms
Attachments: resistance_ms.pdf; figure2.tiff

FYI

From: Sean Godwin <sean.godwin@gmail.com>
Sent: Tuesday, March 22, 2022 12:21 PM
To: sean.godwin@gmail.com
Subject: New paper on parasiticide resistance on BC salmon farms

Dear colleagues,

I am writing to you about an upcoming paper co-authored by myself, Andrew Bateman (PSF), Anna Kuparinen (University of Jyväskylä), Rick Johnson (Kwikwasut'inuxw Haxwa'mis FN), John Powell (Mamalilikulla FN), Kelly Speck ('Nąmgis FN), and the late Jeffrey Hutchings (Dalhousie University). The paper is being released online on Monday March 28, and we felt you might appreciate an early copy (attached).

In this manuscript, we found strong evidence for the evolution of sea-louse resistance to parasiticide treatments on BC salmon farms. Emamectin benzoate (EMB, or trade name SLICE®) has been the primary tool for controlling sea lice on BC salmon farms for the past two decades. Atlantic-farming regions have had to contend with rapidly evolved resistance to EMB, but here in the Pacific, increased EMB tolerance had been noted a couple times but appeared to be localized and ephemeral.

We analysed long-term sea-louse bioassay and count data provided by the salmon-farming industry to the Mamalilikulla, 'Nąmgis, and Kwikwasut'inuxw Haxwa'mis First Nations as part of Indigenous-led agreements with the companies. These data show that EMB sensitivity (from bioassays) has dramatically decreased since 2010, concurrent with a marked decrease in the field efficacy of EMB treatments on farms (from counts before and after treatments).

Our results suggest that sea lice in BC have recently evolved resistance to EMB, and that sea-louse outbreaks on farms will therefore be more difficult to control in the coming years.

Please do not hesitate to contact me with questions or comments regarding this manuscript. I would be happy to make myself available to discuss these results over the phone if that would be helpful. Please note that this manuscript is under embargo until its release date, so we ask for now that you do not share it beyond those that absolutely need to know.

Best regards,
Sean Godwin

Dr. Sean Godwin
Liber Ero Postdoctoral Fellow

[redacted]
Department of Biology
Dalhousie University
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s.19(1)

Title: Salmon lice in the Pacific Ocean show evidence of evolved resistance to parasiticide treatment

Authors: Sean C. Godwin[1,2,*], Andrew W. Bateman[2,3], Anna Kuparinen[4], Rick Johnson[5], John Powell[6], Kelly Speck[7], Jeffrey A. Hutchings[1,8,9]

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Abstract

Parasitic salmon lice (*Lepeophtheirus salmonis*) threaten the economic and ecological sustainability of salmon farming, and their evolved resistance to treatment with emamectin benzoate (EMB) has been a major problem for salmon farming in the Atlantic Ocean. In contrast, the Pacific Ocean, where wild salmon are far more abundant, has not seen widespread evolution of EMB-resistant lice. Here, we use EMB bioassays and counts of lice on farms from the Broughton Archipelago, Canada – a core region of salmon farming in the Pacific – to show that EMB sensitivity has dramatically decreased since 2010, concurrent with marked decrease in the field efficacy of EMB treatments. Notably, these bioassay data were not made available through public reporting by industry or by the federal regulator, but rather through Indigenous-led agreements that created a legal obligation for salmon-farming companies to provide data to First Nations. Our results suggest that salmon lice in the Pacific Ocean have recently evolved substantial resistance to EMB, and that salmon-louse outbreaks on Pacific farms will therefore be more difficult to control in the coming years.

Keywords

emamectin benzoate, SLICE, bioassay, sea lice, *Lepeophtheirus salmonis*, resistance, Indigenous stewardship

Introduction

Salmon farming is one of the most valuable forms of aquaculture worldwide (Food and Agriculture Organization of the United Nations (FAO) 2021), but its economic and ecological sustainability is continuously threatened by the salmon louse (*Lepeophtheirus salmonis*) (Finstad et al. 2011). This ectoparasitic copepod transfers between farmed and wild salmon throughout the northern hemisphere, and can impact hosts at the cellular, individual, and population levels (Finstad et al. 2011). In many parts of the world, the preferred method of control for salmon lice has been an in-feed parasiticide called emamectin benzoate (EMB; trade name SLICE®) (Igboeli et al. 2012), but rapidly evolved resistance has contributed to the chemical being used more sparingly and in combination with many other treatments in Atlantic-Ocean farming regions (Aaen et al. 2015, Sutherland et al. 2015, Hannisdal et al. 2020).

In stark contrast to the situation in the Atlantic, salmon lice in the Pacific Ocean appeared to have avoided widespread evolution of EMB resistance (Kreitzman et al. 2018) despite EMB being virtually the only treatment option used in the region until roughly 2017. Canada is the main salmon-farming country in the north Pacific, and genetic evidence has revealed only localized ephemeral resistance here (Messmer et al. 2018), potentially due to the large wild Pacific salmon populations that act as untreated refuges for susceptible lice (Kreitzman et al. 2018, Bateman et al. 2020). Pacific Canada is unique globally for having substantial populations of *both* farmed and wild salmon (Food and Agriculture Organization of the United Nations (FAO) 2021). Management decisions for salmon aquaculture in Pacific Canada are thus unmatched worldwide for their potential impacts on the natural systems that depend on salmon.

Resistance to EMB is typically identified through bioassays in which hundreds of salmon

lice, grouped by sex, are placed in baths of different concentrations along a gradient of EMB for 24 hours (Saksida et al. 2013), which differs from the host-dependent exposure that lice on farms experience due to in-feed administration of EMB. For each bioassay, the effective concentrations at which 50% of lice survive (EC_{50}) are calculated, and if EC_{50} values increase over time then EMB resistance in salmon lice is inferred. Male salmon lice are generally more resistant to EMB than females, for reasons that are unclear (Igboeli et al. 2014). Salmon-farming companies in Pacific Canada regularly conduct bioassays to assess EMB sensitivity of lice on their farms, but the raw data have never been publicly available. Summarized bioassay data were last made available in 2012 (Saksida et al. 2013).

Here, we assess whether Pacific salmon lice have evolved EMB resistance by analyzing bioassay, treatment, and salmon-louse count data from 2010-2021 in the Broughton Archipelago (BA), British Columbia (BC) (Fig. 1), long a focus of salmon-farm research and management in the Pacific (Krkosek 2010).

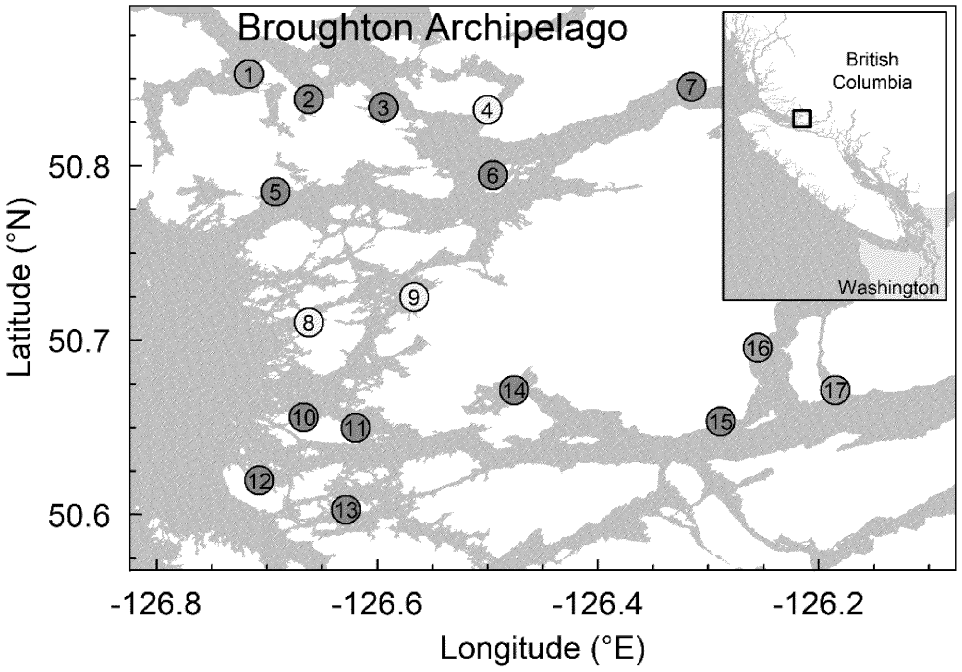

Fig. 1. Map of salmon farms active between 2010 and 2021 in the traditional territories of the Mamalilikulla, 'Namgis, and Kwikwasut'inuxw Haxwa'mis First Nations in the region now known as the Broughton Archipelago, British Columbia, Canada. Orange points represent farms that performed at least one bioassay, pink points are farms that performed EMB treatments but no bioassays, and grey points are farms that performed neither EMB treatments nor bioassays (between 2010 and 2021). Numbers correspond to the Farm IDs in Table S1. The spatial extent of the main panel is indicated by the black rectangle in the inset.

Results

Salmon lice collected from BA salmon farms exhibited a decline in EMB sensitivity over time (2010 to 2021). The highest EC_{50} observed was 907 (95% CI: 744, 1189) ppb for male lice and 840 (695, 1073) ppb for females (Fig. 2A) from a bioassay performed in July 2021. These EC_{50} values constitute a 5-fold increase for males and a 16-fold increase for females compared to

the EC_{50} values from the initial bioassay at the same farm in 2010 (approximately 40-50 louse generations). Our most parsimonious description of the EC_{50} data, which included effects for sex and previous treatment and a quadratic effect for time, indicated a drastic increase in EC_{50} over the past few years (Fig. 2A). Previous treatment increased EC_{50} values by a factor of 1.23 (0.95, 1.59). We found no support (0% by Akaike weight) for EMB sensitivity remaining constant over time.

Field efficacy of EMB also decreased over time, with salmon-louse counts on farms displaying reduced responses to treatment in recent years. Prior to 2019, post-treatment counts were 8.6% ± 1.6% (mean ± SE) of pre-treatment counts (Fig. 2B), and only one of the 56 relative post-treatment counts (1.8%) was over 0.5. In contrast, between 2019 and 2021, seven of the 17 relative counts (41%) were over 0.5. The three least effective treatments all occurred in 2021, and all three resulted in higher counts post-treatment than pre-treatment, suggesting treatment failure. The most parsimonious description of the relative-count data (i.e., the post-treatment counts divided by the pre-treatment counts) was one that included an effect for previous treatment and a quadratic effect of time. Relative post-treatment counts increased dramatically in recent years (Fig. 2B), signifying a severe, recent decrease in treatment efficacy. Previous treatment increased non-zero relative post-treatment counts by a factor of 2.18 (1.12, 4.24). We found no support (0% by Akaike weight) for relative post-treatment counts remaining constant over time.

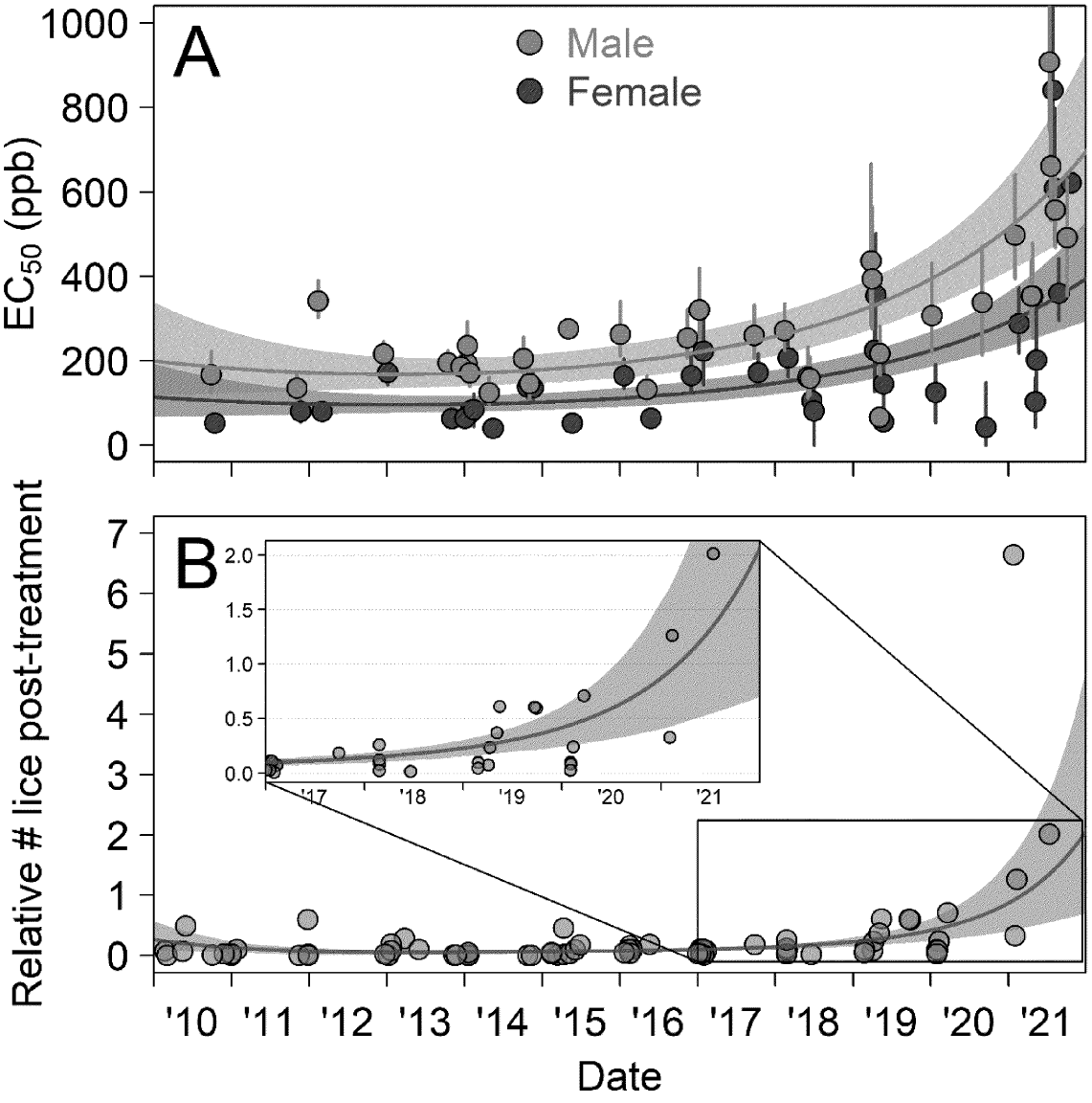

Fig. 2. Increasing trends in: (A) salmon-louse resistance to emamectin benzoate (EMB), and (B) relative salmon-louse counts after EMB treatment. Points in panel A represent the effective concentrations required to kill 50% of male (blue) or female (red) salmon lice (EC_{50}) in bioassays. Points in panel B show the relative post-treatment counts (i.e., the post-treatment counts divided by the pre-treatment counts). Lines depict the mean predictions from the top-ranked models. Error bars and shaded regions give 95% confidence intervals.

Discussion

Salmon lice in the Pacific Ocean appear to have evolved EMB resistance based on two lines of evidence. First, lice from BA salmon farms experienced decreased sensitivity to EMB in bioassays conducted between 2010 and 2021. Second, field efficacy of EMB treatments on these farms declined over the same time period. The five highest EC_{50} values for males (492-907 ppb) and the four highest for females (360-840 ppb) all occurred in 2021; these are comparable to, or higher than, those for treatment-resistant strains of salmon lice in Atlantic Canada (329-840 ppb for males and 170-304 ppb for females) (Igboeli et al. 2012, Igboeli et al. 2014, Sutherland et al. 2015). Importantly, these data, and therefore our findings, were not shared via public reporting by industry or the federal regulator, but instead through an Indigenous-led monitoring agreement.

The apparently resistant salmon lice from the recent bioassays are obvious candidates for follow-up genetic analyses. Such genetic work is beyond the scope of the present study, in part because the lice were not retained by the salmon-farming companies to the First Nations. Although there are still no diagnostic genetic tests for EMB resistance of Pacific salmon lice, a rare louse genotype (with characteristic single nucleotide polymorphisms) was recently linked to ephemeral EMB tolerance in BC (Messmer et al. 2018). These signs of nascent resistance, evident in samples from nearly a decade ago, strongly suggest that the trends we document here have a genetic basis and are not merely plastic changes. Our results highlight the need for assessments of the frequency of this rare genotype, ideally with full public reporting and independent verification, as an integral part of EMB bioassays until a full diagnostic test is developed.

While this is the first published account with evidence for the evolution of EMB resistance in the Pacific Ocean, it seems quite likely that industry and the federal regulator have been aware of this emerging issue for some time. EMB tolerance was reported in 2013 as a localized and short-lived phenomenon in one farm in BC (Saksida et al. 2013), and again in 2018 (Messmer et al. 2018), which presumably raised concerns internally about resistance becoming a pervasive problem. Treatment failures (Messmer et al. 2018, Simmons 2019), alternative treatments (Messmer et al. 2018, Simmons 2019), persistently elevated counts (Godwin et al. 2021b), and concerning bioassays (Messmer et al. 2018) have occurred in other parts of Pacific Canada at earlier dates than in the BA. Combined with our findings, this suggests that EMB resistance is widespread and well established in BC. Whether large returns of wild salmon could impart some relief to farms by providing an influx of treatment-susceptible lice will be a situation to monitor over the coming years, but is probably unlikely given the trends we report here across 11 farms.

Despite the local and global forewarnings of EMB resistance, industry was exclusively permitted to use EMB for delousing treatments in the BA until late 2019, a strategy which imposes strong selection and likely resulted in accelerated evolution of resistance (Coates et al. 2021) (but see (Kreitzman et al. 2018, Bateman et al. 2020)). Three additional treatment options (i.e., freshwater baths, hydrogen peroxide baths, and jets of pressurized water) have since been introduced and are now used frequently; these other treatments accounted for 62% of treatments in 2021. With EMB effectiveness declining, industry has had to (and will continue having to) reactively (rather than proactively) diversify its approaches to louse control in order to better align with the integrated pest management strategies used in other countries. A suite of non-

chemical preventative methods (e.g., barriers to limit surface interactions between fish and lice) have had promising results elsewhere, and many other chemical, mechanical, and biological treatment options are also available (see review by Coates et al. (Coates et al. 2021)). Each of these treatment options has its own drawbacks, however (e.g., resistance to chemotherapeutants (Aaen et al. 2015, Coates et al. 2021), welfare issues from mechanical treatments (Overton et al. 2019), and pathogen transmission with cleaner fish (Erkinharju et al. 2021)), some of which will worsen with climate change, necessitating a diverse set of strategies for louse control.

Independent scientists have long requested bioassay data from industry and the federal regulator to allow the evidence for EMB resistance to be assessed. Bioassay data have not been publicly released since 2012 (Saksida et al. 2013), and even then they were reported in summarized rather than raw form. The data presented here were made available through legal agreements between First Nations and the relevant salmon farming companies (MOWI Canada West and Cermaq). In 2018, the BC provincial government agreed it would not renew the tenures for 17 fish farms in the Broughton Archipelago unless the Mamalilikulla, 'Namgis, and Kwikwasut'inuxw Haxwa'mis First Nations consented to their renewal. As a result of the First Nations not consenting to these renewals, those 17 fish farms are undergoing an orderly transition from the Broughton Archipelago. As of January 1, 2021, nine of the seventeen farms in the region have been decommissioned. As part of the orderly transition, these three First Nations formed agreements in 2019 with the two salmon-farming companies working in their territories to govern the monitoring, management, and potential removal of the remaining salmon farms over the next few years. These landmark agreements, implemented in accordance with the United Nations Declaration on the Rights of Indigenous Peoples (UN General Assembly 2007),

mandated the sharing of historical data collected by the salmon-farming companies with these three First Nations. In a province with a long history of industrial exploitation of resources in Indigenous territories (Booth and Skelton 2011, Nikolakis and Nelson 2015, Papillon and Rodon 2017), these agreements and their outcomes represent a compelling example of Indigenous self-governance that may become more prevalent as First Nations endeavour to gain more control over industrial operations in their traditional erritories.

Until recently, the Pacific Ocean was considered the last stronghold of treatment-susceptible salmon lice (Kreitzman et al. 2018), but our results suggest that resistance has now emerged. EMB resistance in BC could have arisen from depleted wild salmon populations (Kreitzman et al. 2018, Atkinson 2020), ill-advised reliance on a single treatment (Coates et al. 2021), or insufficiently aggressive treatment on the part of farms (Bateman et al. 2020, Lam et al. 2020), any of which would suggest a failure of management at some level. Whatever the cause, the emergence of resistant salmon lice in the Pacific poses serious challenges for controlling outbreaks to protect wild salmon in the coming years, further exacerbating the negative consequences of lice on salmon predicted in a warming climate (Godwin et al. 2020).

Methods

Bioassays

Salmon-louse bioassays were performed by the BC Centre for Aquatic Health Sciences (CAHS) as described in Saksida et. al (Saksida et al. 2013). Briefly, motile (i.e., pre-adult and adult) *L. salmonis* were collected from 11 salmon farms in the Broughton Archipelago (BA) between 2010 and 2021 and transported to CAHS in Campbell River, BC. Within 18 hours of

collection, healthy lice were separated by sex and randomly placed into petri dishes each containing approximately 10 lice (mean ± SD = 9.6 ± 1.1) and subjected to one of six EMB concentrations (either 0, 31.3, 62.5, 125, 250, and 500 ppb or 0, 62.5, 125, 250, 500, and 1000 ppb, depending on suspected variation in EMB sensitivity (Igboeli et al. 2014)). Each collection corresponded to one bioassay, and each bioassay contained roughly four replicates for each sex (4.0 ± 1.3 for females and 3.6 ± 0.9 for males). After 24 hours of EMB exposure, lice were classified as alive if they could swim and attach to the petri dish, or moribund/dead otherwise. Lice were kept at 10 °C throughout the process. In total, 34 bioassays were conducted from 11 farms between October 2010 and November 2021.

We analysed the proportion of lice that survived exposure to EMB, using standard statistical descriptions that accounted for within-assay dependencies (generalized linear mixed models (GLMMs) with logit link functions, fitted separately to the data from each bioassay). The models included fixed effects for EMB concentration, sex, and the interaction between the two, as well as a random intercept for petri dish. For each analysis, we centered concentration values and scaled them by one standard deviation. We used the GLMM fits to calculate the effective concentrations at which 50% of the lice survived (EC_{50}) in each bioassay. The GLMM for one bioassay produced a singular fit because there was not enough variation in the female survival data to warrant the random-effects structure. We retained the EC_{50} values resulting from this singular fit because re-fitting without the random intercept yielded identical EC_{50} values, and removing the entire bioassay from the overall dataset did not qualitatively affect the subsequent analysis.

To assess whether the sensitivity of salmon lice to EMB has decreased over time, we

fitted a set of five standard GLMs with gamma error distributions and log link functions to the maximum-likelihood EC_{50} estimates. Each of these five models included binary effects for sex and for whether the farm's stock had previously been treated, since both affect EMB sensitivity in lice (Saksida et al. 2013). The first model included only these two effects and served as a null model that assumed lice did not evolve EMB resistance over time. The second model added a fixed effect for time (i.e., the number of days since January 1, 2010), while the third model included an interaction between time and sex. The fourth and fifth models were identical to the second and third, but with a quadratic effect for time, to account for possible first-order nonlinearity. We were unable to add an effect for farm due to small sample sizes. We performed model selection using the Akaike Information Criterion penalized for small sample sizes (AICc; Hurvich and Tsai 1989), treating AICc differences of less than two as being indistinguishable in terms of statistical support and selecting the least complex model when that was the case (Burnham and Anderson 2002). The ΔAICc values for the EC_{50} models were 48.1, 6.1, 4.9, 0, 1.75, respectively.

Field efficacy

We used relative salmon-louse counts after EMB treatment (i.e., the post-treatment count divided by the pre-treatment count) as our measure of EMB field resistance between 2010 and 2021 (higher relative counts imply lower treatment efficacy). We defined "pre-treatment" as one month prior to treatment and "post-treatment" as three months after treatment (roughly when one would expect to find the lowest counts in louse populations previously unexposed to EMB), as in Saksida et al. (Saksida et al. 2013). We excluded EMB treatments for which an additional, non-

EMB treatment was performed within the following three months. In total, there were 73 EMB treatments for which we were able to calculate relative post-treatment counts.

Salmon-louse counts were performed by farm staff as described by Godwin et al. (Godwin et al. 2021a). In short, salmon-louse counts were usually performed at least one per month by capturing 20 stocked fish in each of three net pens using a box seine net, then placing the fish in an anesthetic bath of tricaine methanesulfonate (TMS, or MS-222) and assessing the fish for motile (i.e., pre-adult and adult) *L. salmonis* by eye.

The treatment dataset included the date and type of every treatment that has been performed on a BA farm (i.e., not just the 11 farms with bioassay data). In total, 88 EMB treatments were conducted between 2010 and 2021, of which we were able to calculate relative post-treatment counts for 73 because some months lacked counts or had a non-EMB treatment performed within the following three months. An additional 22 non-EMB treatments (e.g., freshwater and hydrogen baths) were performed, all since the beginning of 2019, but we excluded these data from our analysis.

To determine whether field efficacy of EMB treatments has decreased over time, we used GLM-based "hurdle models" – standard statistical descriptions used to accommodate an over-abundance of zeroes in data being analysed. A hurdle model uses two components – one model for whether a count is nonzero and another for the value of the nonzero count – to predict overall mean count. To this end, we fitted three binomial GLMs paired with three gamma GLMs to the relative-count data, each of the paired models being structurally identical in terms of predictors. All of these submodels included a binary fixed effect for previous treatment, as in the EC_{50} models. The null pair of submodels included no additional terms, the second pair of submodels

included a fixed effect for time (i.e., the number of days since January 1, 2010), and the third pair of submodels included a quadratic effect of time (again, to account for possible first-order deviations nonlinearity). We were unable to add an effect for farm due to small sample sizes. We performed model selection of the hurdle models, again using the Akaike Information Criterion penalized for small sample sizes. The ΔAICc values for the three hurdle models were 39.6, 18.3, and 0, respectively. We performed our analyses in R 3.6.0 (R Core Team 2021), using the lme4 package (Bates D 2015).

Acknowledgements

We are enormously saddened by the loss of our co-author Jeffrey Hutchings, who passed away just prior to the acceptance of this paper; we remember his contributions to science and the positive influence he had on the lives of so many. We are grateful for the support of the Broughton Aquaculture Transition Initiative leadership and technical teams. This research was funded by a Liber Ero Postdoctoral Fellowship (to S.C.G), NSERC Discovery Grants (RGPIN-2021-04372 to J.A.H. and RGPIN-2015-04249 to A.K.), the European Research Council (COMPLEX-FISH 770884 to A.K.), and the Academy of Finland (317495 to A.K.).

Author contributions

Conceptualization: S.C.G, A.W.B.; methodology: S.C.G, A.W.B., investigation: S.C.G; writing - original draft: S.C.G.; writing - review and edits: A.W.B., A.K., R.J., K.S., J.P., J.A.H.; funding acquisition: A.K., R.J., K.S., J.P., J.A.H.; supervision: A.K., J.A.H.

Data availability

All data were provided to the Mamalilikulla, 'Namgis, and Kwikwasut'inuxw Haxwa'mis First Nations by the salmon-farming companies MOWI Canada West and Cermaq as part of the Indigenous Monitoring and Inspection Plan (IMIP) Framework Agreements. The data and analysis code for this study are available in the Dryad digital repository found at <insert DOI here> .

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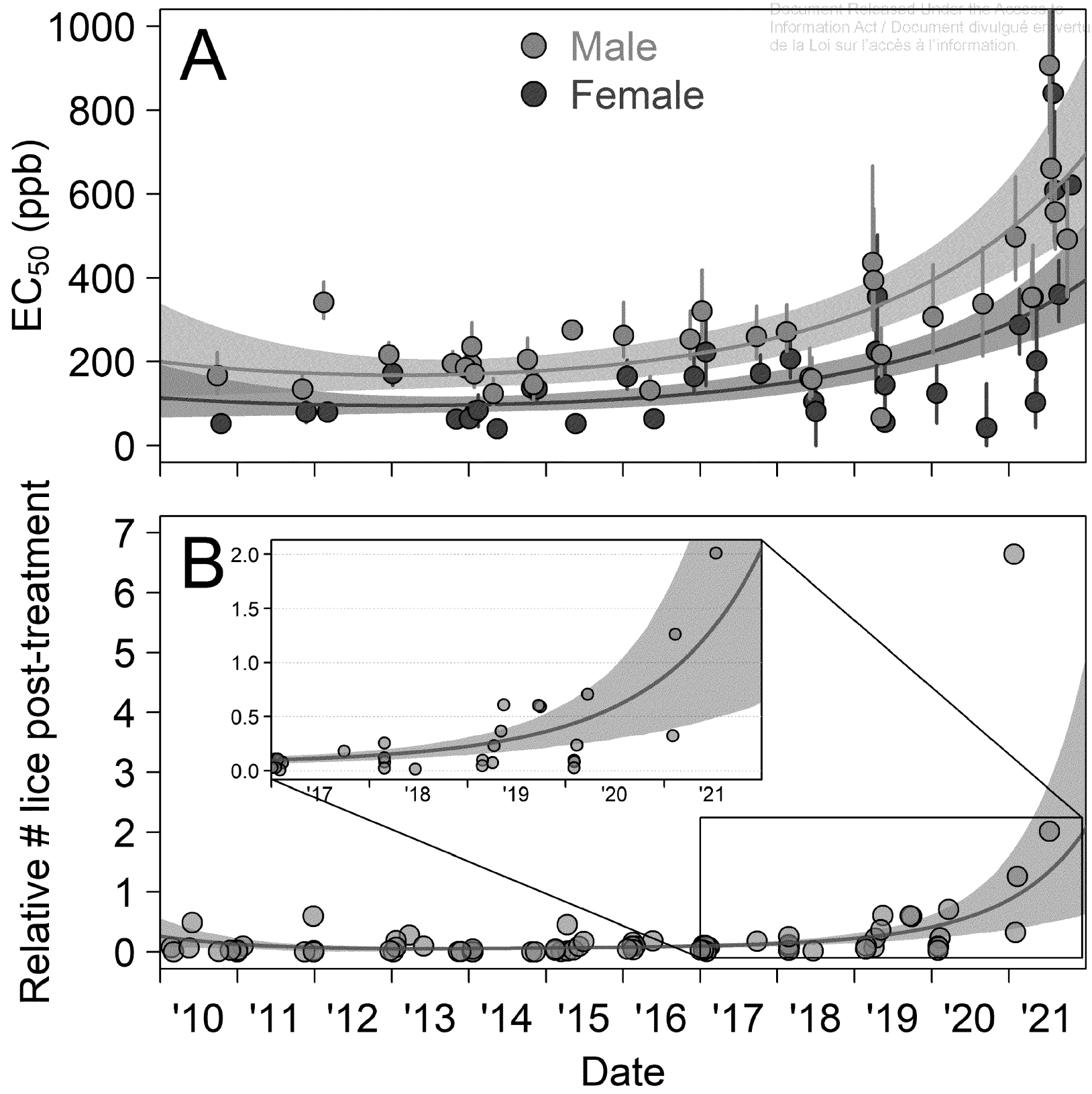


From: Sitter, Laura
Sent: Tuesday, March 22, 2022 5:23 PM
To: Shaw, Kerra; Oswell, Alexandria; Manchester, Howie; Price, Derek; Sandberg, Krista; Diamond, Maria
Cc: Runciman, Grace
Subject: RE: Sea lice compliance assessment graphics.pptx
Attachments: Sea lice compliance assessment graphics_bulletin.pptx

Follow Up Flag: Follow up
Flag Status: Flagged

Hi everyone,

I have updated the graphics with the elements from the bulletin (which really only added to 6.9- the list of exemptions from performing sea lice counts). Let me know what you think! It would be great to get feedback from others about the graphic ☺

Laura

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Monday, March 14, 2022 3:32 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>; Diamond, Maria <Maria.Diamond@dfo-mpo.gc.ca>
Cc: Runciman, Grace <Grace.Runciman@dfo-mpo.gc.ca>
Subject: Sea lice compliance assessment graphics.pptx

Hi all!
I took a stab at some graphics to help with assessing compliance for current sea lice COL (top 4 slides in here) that relate to:

1. The non-migration window
2. The pre-migration window
3. Assessing the first count of the out-migration window
4. The out-migration window

Grace also made simplified versions that you may like better (thank you!!). Perhaps these are useful? I will likely use the "assessing the first count of the out-migration window" to help in conversations with C&P.

Sea Lice COL Compliance Breakdown

Non-Migration Window Compliance Assessment

COL 6.4

Counting Event:
- Minimum 3 stocked pens per month

Submit Reports to DFO:
- By the 15th of the following month
- Using Appendix VI-A

Submit Reports to DFO:
- Within 7 days
- Using Appendix VI-B

Threshold Exceedance

Notify DFO:
- Within 7 days
- Using Appendix VI-B

Further Counting:
- Minimum 3 stocked pens
- Every two weeks until under threshold

COL 6.9

Excluded from Counting :
(a)(i): harvest within 10 days
(a)(ii): fish medicated or FHE
(a)(iii): environmental issue
(a)(iv): <30 calendar days have passed since transfer
(a)(v): fish have been in-feed medicated for sea lice within the previous 21 days
(a)(iv): DFO permission

Notify DFO:
- If any pens were missed during Counting Events
- If an entire Counting Event was missed within 24 hours

If management measures taken

COL 6.10

Notify DFO:
- 24 hours prior
- Notify what management measures will be
- Using Appendix VI-B

Further Counting:
- All stocked cages 7 days prior to measure
- All stocked cages following measure

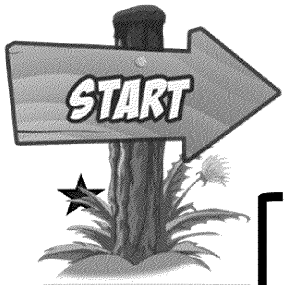
Submit Reports to DFO:
- Within 48 hours
- Using Appendix VI-B

Treatment Failure

Notify DFO:
- Within 48 hours

000049

Pre-Migration Window Compliance Assessment



All stocked pens must be counted during these 2 Counting Events

COL 6.5

1st Counting Event:
- Half of all stocked pens
- At least 3 pens
- First 2 weeks of Feb

2nd Counting Event:
- Half of all stocked pens
- At least 3 pens
- Last 2 weeks of Feb

Submit Reports to DFO:
- Within 48 hours
- Prior to March 1
- Using Appendix VI-B

Threshold Exceedance

Notify DFO:
- Within 48 hours
- Using Appendix VI-B
- Describe measures

Further Counting:
- All stocked cages
- Every two weeks until under threshold

Submit Reports to DFO:
- Within 48 hours
- Using Appendix VI-B

If management measures taken

COL 6.9

Excluded from Counting :
(a)(i): harvest within 10 days
(a)(ii): fish medicated or FHE
(a)(iii): environmental issue
(a)(iv): <30 calendar days have passed since transfer
(a)(v): fish have been in-feed medicated for sea lice within the previous 21 days
(a)(iv): DFO permission

Notify DFO:
- If any pens were missed during Counting Events
- If an entire Counting Event was missed within 24 hours

COL 6.10

Notify DFO:
- Using Appendix V-B
- What management measures will be
- 24 hours prior to management measures

Further Counting:
- All stocked cages 7 days prior to measure
- All stocked cages following measure

Submit Reports to DFO:
- Within 48 hours
- Using Appendix VI-B

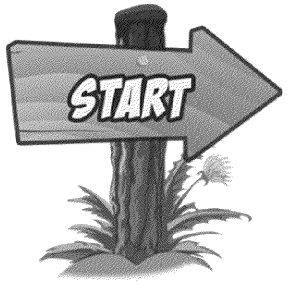
Treatment Failure

Notify DFO:
- Within 48 hours

COL 6.11

Excluded from Treatment:
- During the rest of the current production cycle without written approval from DFO

Entering the Out-Migration Window Compliance Assessment



From the Pre-Migration Window, should have data:
- From 2 Counting Events; one from the first half of Feb, one from second half
- From all stocked pens
- Before March 1

COL 6.7

Counting Event:
- At least 3 pens
- First week of March

Under Threshold →

Submit Reports to DFO:
- By April 15
- Using Appendix VI-A

→ **Compliant**

Over Threshold →

Notify DFO:
- Within 7 days of discovery
- Using Appendix VI-B

→ **Non-Compliant**

UNLESS

COL 6.11

Excluded from Counting :
(a)(i): harvest within 10 days
(a)(ii): fish medicated or FHE
(a)(iii): environmental issue
(a)(iv): <30 calendar days have passed since transfer
(a)(v): fish have been in-feed medicated for sea lice within the previous 21 days
(a)(iv): DFO permission

Notify DFO:
- If any pens were missed during Counting Events
- If an entire Counting Event was missed within 24 hours

If reported → **Compliant**

If not reported → **Non-Compliant**

May not be able to assess sea lice levels

Must resume counting when able

If Over at First Count:
- COL 6.6 will not be assessed
- Switch to Out-Migration rules -> must be under threshold within 42 days

Out-Migration Window Compliance Assessment

COL 6.7

Counting Event:
- Must occur within first week and once every 2 weeks thereafter
- Minimum 3 stocked pens

Submit Reports to DFO:
- By the 15th of the following month
- Using Appendix VI-A

Threshold Exceedance

Notify DFO:
- Within 48 hours
- Using Appendix VI-B
- Describe measures
- Reduce to below threshold within 42 days

Further Counting:
- Within 7 days
- All stocked cages

Submit Reports to DFO:
- Within 48 hours
- Using Appendix VI-B

COL 6.8

Must bring levels below threshold within 42 days of an exceedance

If Management Measures Taken

COL 6.10

Notify DFO:
- What management measures will be
- 24 hours prior to management measures

Further Counting:
- All stocked cages 7 days prior to measure
- All stocked cages following measure

Submit Reports to DFO:
- Within 48 hours
- Using Appendix VI-B

Treatment Failure

Notify DFO:
- Within 48 hours

COL 6.11

Excluded from Treatment:
- During the rest of the current production cycle without written approval from DFO

Notify DFO:
- Within 48 hours

COL 6.9

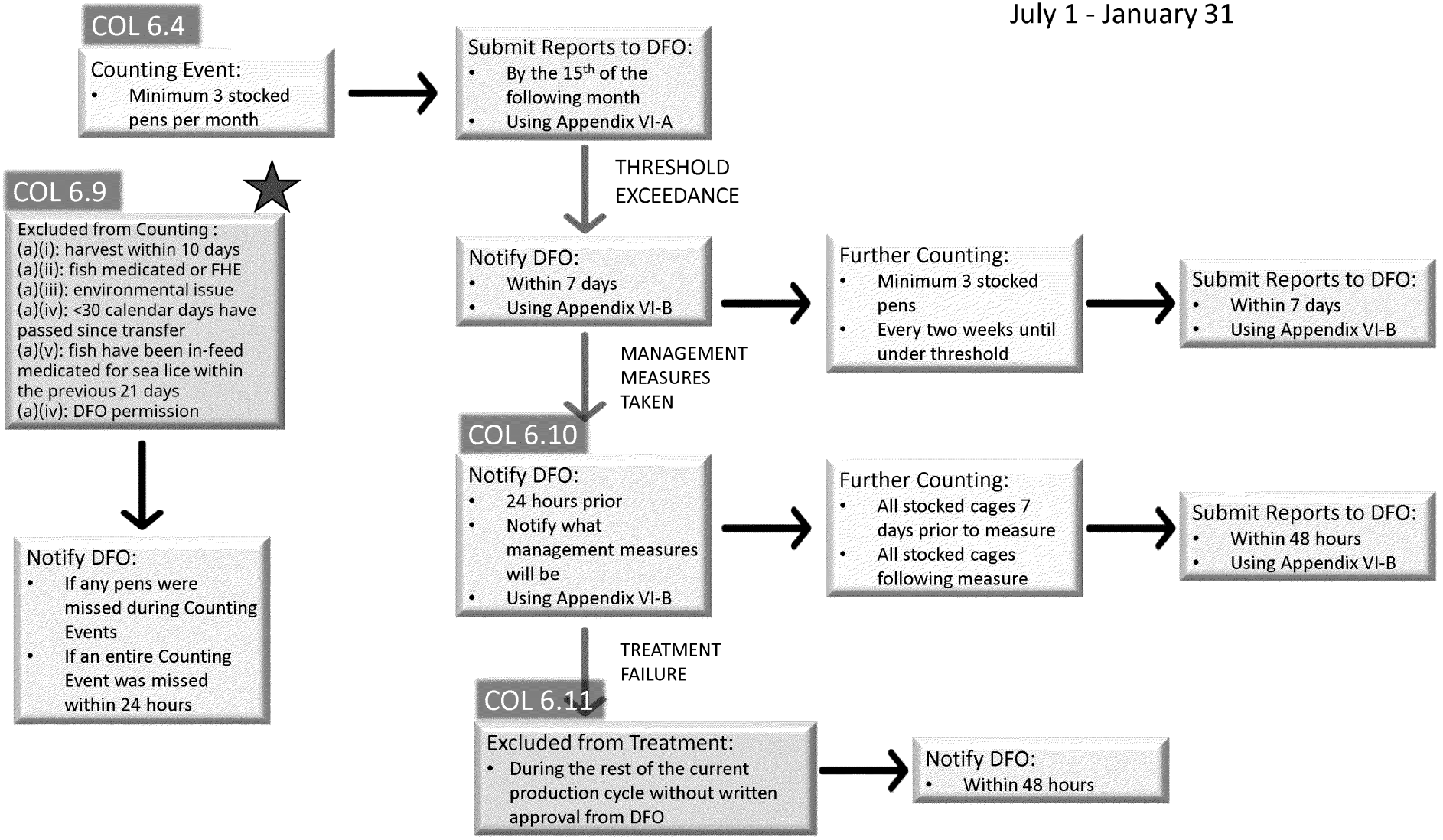
Excluded from Counting :
(a)(i): harvest within 10 days
(a)(ii): fish medicated or FHE
(a)(iii): environmental issue
(a)(iv): <30 calendar days have passed since transfer
(a)(v): fish have been in-feed medicated for sea lice within the previous 21 days
(a)(iv): DFO permission

Notify DFO:
- If any pens were missed during Counting Events
- If an entire Counting Event was missed within 24 hours

Alternate Style slides

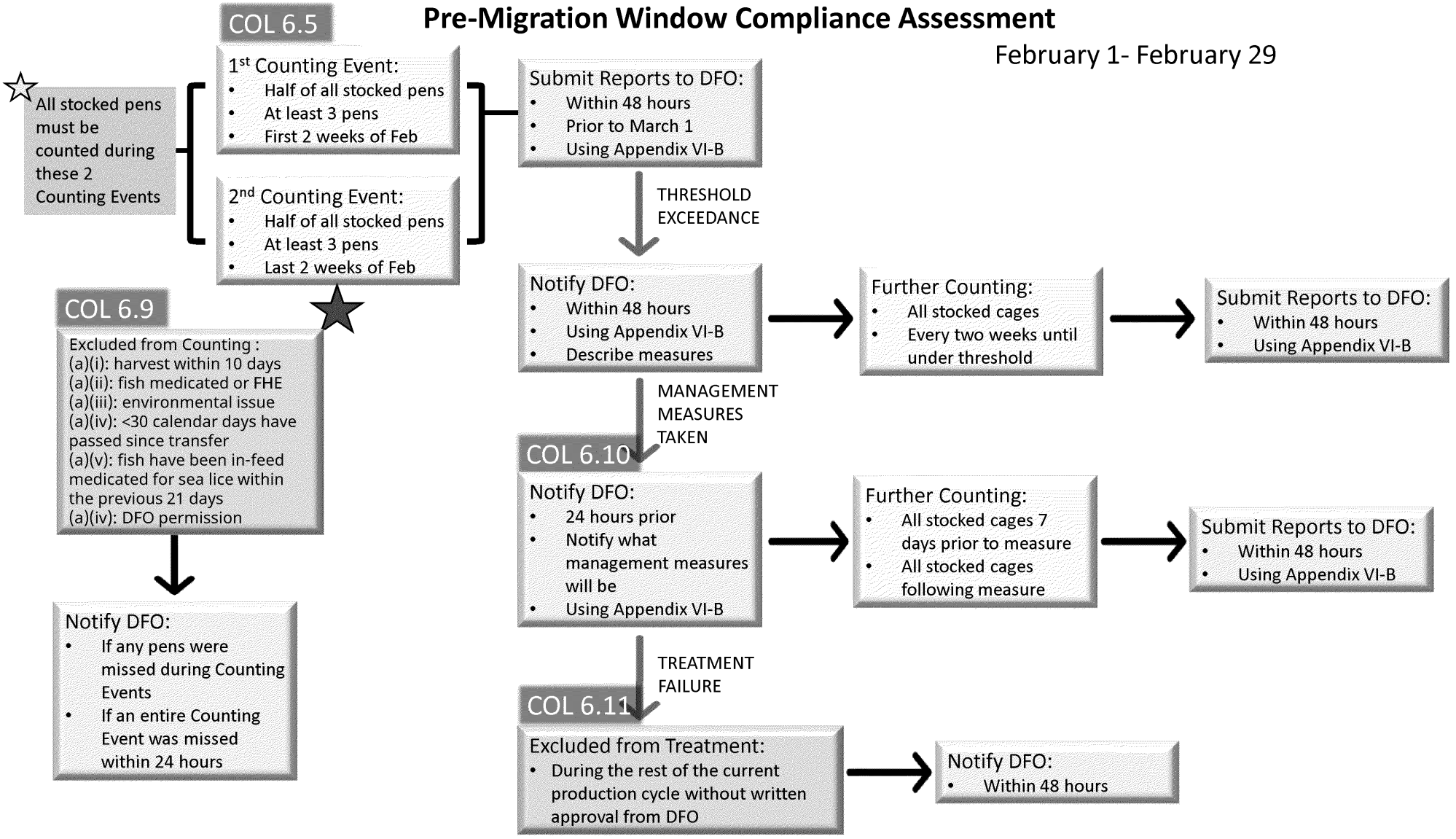
Non-Migration Window Compliance Assessment

July 1 - January 31



Pre-Migration Window Compliance Assessment

February 1- February 29



Out-Migration Window Compliance Assessment

March 1 – June 30

COL 6.7

Counting Event:
- Minimum 3 stocked pens
- Must occur within first week and once every 2 weeks thereafter

→ Submit Reports to DFO:
- By the 15th of the following month
- Using Appendix VI-A

COL 6.6

Threshold:
Must ensure below threshold at time of first counting event

COL 6.8

Threshold:
Must bring levels below threshold within 42 days of an exceedance

↓ THRESHOLD EXCEEDANCE

Notify DFO:
- Within 48 hours
- Using Appendix VI-B
- Describe measures
- Reduce to below threshold within 42 days

→ Further Counting:
- Within 7 days
- All stocked cages

→ Submit Reports to DFO:
- Within 48 hours
- Using Appendix VI-B

COL 6.9

Excluded from Counting :
(a)(i): harvest within 10 days
(a)(ii): fish medicated or FHE
(a)(iii): environmental issue
(a)(iv): <30 calendar days have passed since transfer
(a)(v): fish have been in-feed medicated for sea lice within the previous 21 days
(a)(iv): DFO permission

↓

Notify DFO:
- If any pens were missed during Counting Events
- If an entire Counting Event was missed within 24 hours

↓ MANAGEMENT MEASURES TAKEN

COL 6.10

Notify DFO:
- 24 hours prior
- Notify what management measures will be
- Using Appendix VI-B

→ Further Counting:
- All stocked cages
- 7 days prior
- All stocked cages following measure

→ Submit Reports to DFO:
- Within 48 hours
- Using Appendix VI-B

↓ TREATMENT FAILURE

COL 6.11

Excluded from Treatment:
- During the rest of the current pro cycle without written apprductionoval from DFO

→ Notify DFO:
- Within 48 hours

From: Price, Derek
Sent: Wednesday, March 23, 2022 5:51 PM
To: Shaw, Kerra; Sitter, Laura; Oswell, Alexandria; Manchester, Howie; Stenhouse, Shawn; Barry, Melanie; Xhignesse, Brian; Pretorius, Dylan; Diamond, Maria; Sandberg, Krista
Subject: monthly sea lice report
Attachments: monthly_report_feb2022.pdf

Hi,

Please find attached the first report of this 2022 outmigration season.
I'd appreciate your feedback and suggestions.

Regards,

Derek Price, MV, PhD

Epidemiologist, Aquaculture Fish Health
Aquaculture Management Division / Fisheries and Oceans Canada
Derek.Price@dfo-mpo.gc.ca
Tel: 250-703-0929 Cell: 250-850-9362

Motile *Lepeoptheirus salmonis* trends in farmed salmonids in British Columbia in February, 2022

March, 2022

Aquaculture Fish Health, Aquaculture Management Division

Fisheries and Oceans Canada

1 Introduction

As part of their Conditions of Licence, farms must report sea lice counts from at least three pens every two weeks during the outmigration period. These reports are collected by DFO and grouped by count event. The results are made publicly available and reported as average motile lice per fish. The following report summarises key sea lice statistics for the reports that comprise the 2022 juvenile salmon outmigration window and compares them to the previous year.

2 Results

In figure 1, we can see the location of the farms in a map of the coastline of BC. Out of 58 sites that reported sea lice counts in February of 2021 and 2022, 19 of them only reported in 2021 while 15 only submitted counts in 2022, and 21 farms reported sea lice counts both years. In total, 45 farms were in production in February, 2021 while only 41 reported activities in February, 2022.

With the exception of the Sunshine Coast and Esperanza Inlet finfish reporting areas, reported sea lice abundances seem to be the same or higher than February last year (Figure 2). Higher abundances at this point in the season suggests an increased challenge with sea lice this year and some farms may not be able to comply with the requirement of having less than 3 lice per fish by March 1st.

Trends suggest sea lice abundances were generally stable throughout the 2021 migration window, and for the most part, sea lice burdens remained below the action threshold (Figure 3). Abundance recorded in February 2022 seems to be higher than the previous year, but there is some evidence of a decline towards the end of the month.

Figure 4 represents the cumulative proportion of count events for each reporting area. As recorded sea lice abundance increases, we sum the number of count events that have an abundance equal or below to that value and divide that by the total number of count events. Areas with better performance should rapidly reach the top left corner, and areas with no counts above three lice per fish will reach 100% before intersecting with the threshold (dashed line). This graphs makes easy to compare the performance of farms in an area in two different years as the line for the better performing year

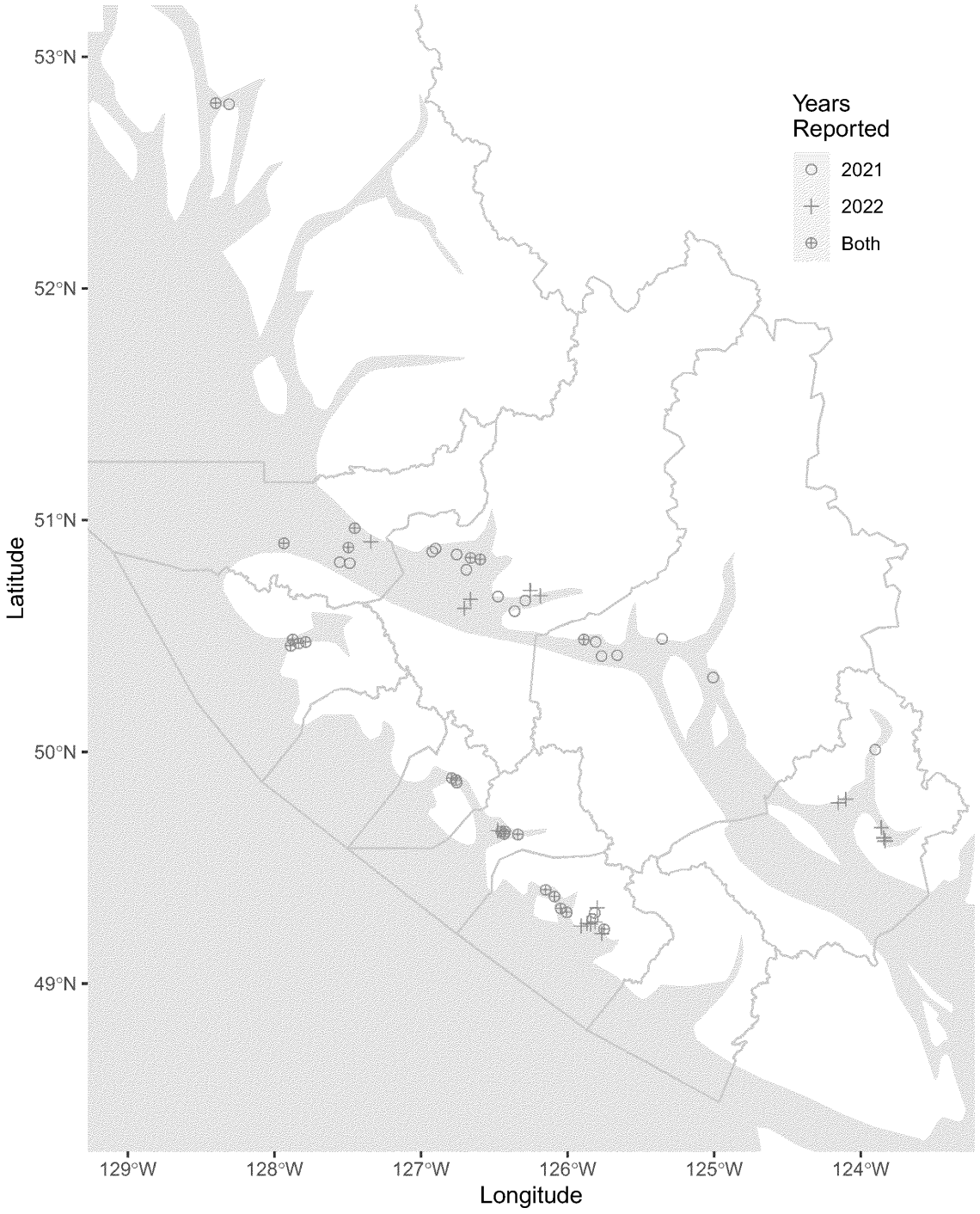


Figure 1: Location of farms reporting count events in 2021 and 2022 and Fish Reporting Areas by year reported.

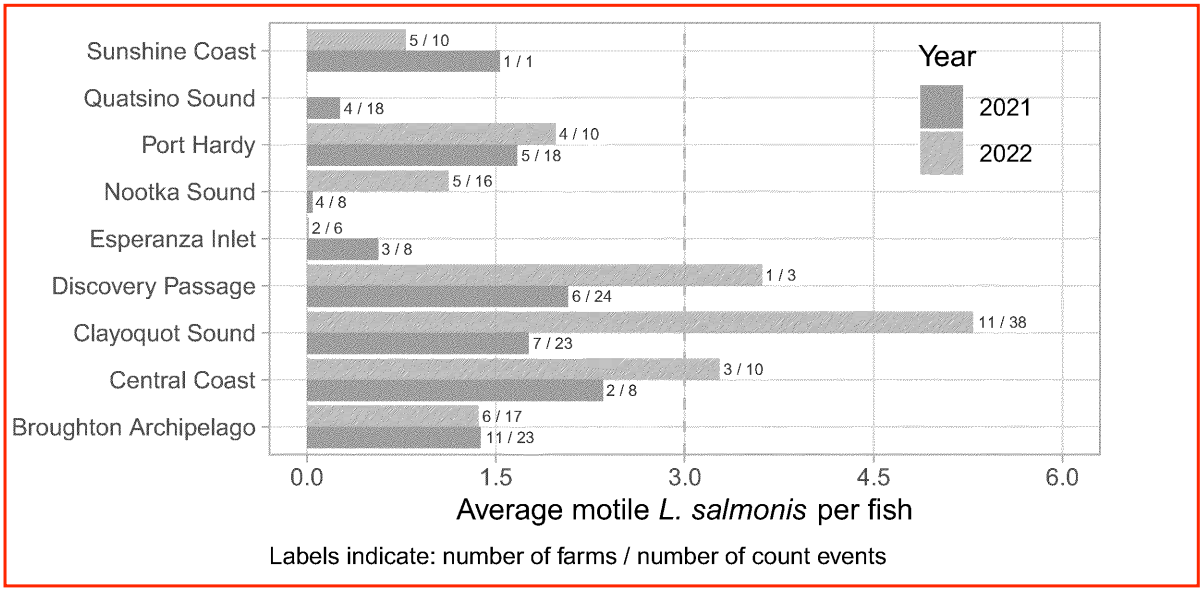


Figure 2: Average motile lice per fish for 2021 and 2022 by Fish Health Zone. Numbers beside bars represent number of farms and number of count events reported.

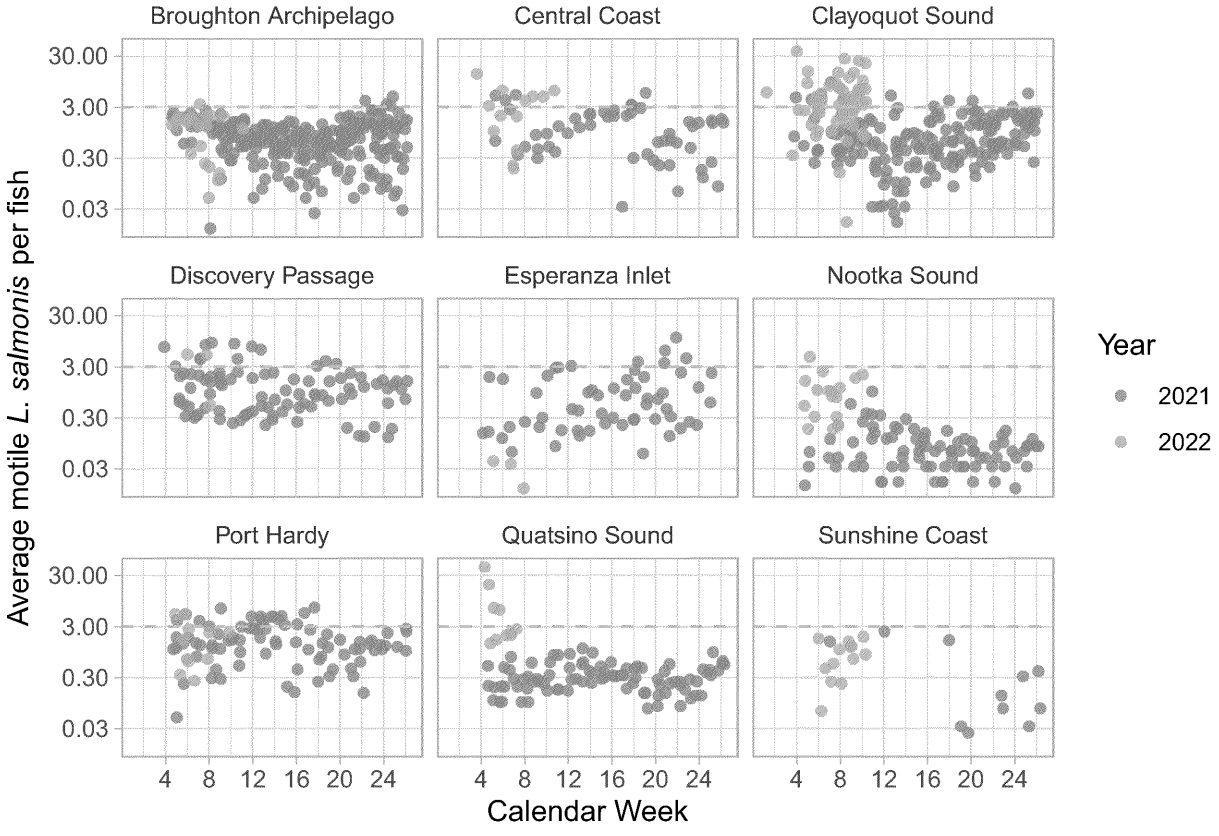


Figure 3: Average motile lice per fish on count events reported in 2021 and so far in 2022 by Fish Health Zone

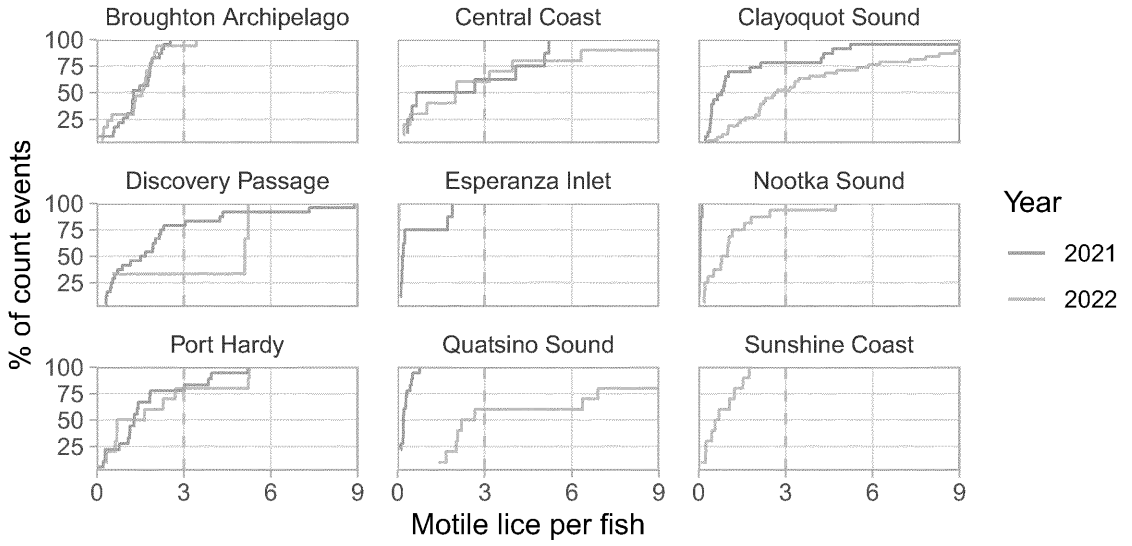


Figure 4: Cumulative distribuiton of average motile lice per fish for 2021 and 2022 by Fish Health Zone.

should sit above the other line, and ideally reach 100% before three lice per fish. As previously mentioned, with the exception of Esperanza Inlet and the Sunshine Coast, all areas seem to be having similar or higher sea lice abundances in 2022. Furthermore, the Clayoquot and Quatsino Sounds as well as the Central Coast have between 50 and 75% of their count events with a recorded abundance above threshold. The worst performing area in 2022 was the Discovery Passage; however, only one farm is active in the area.

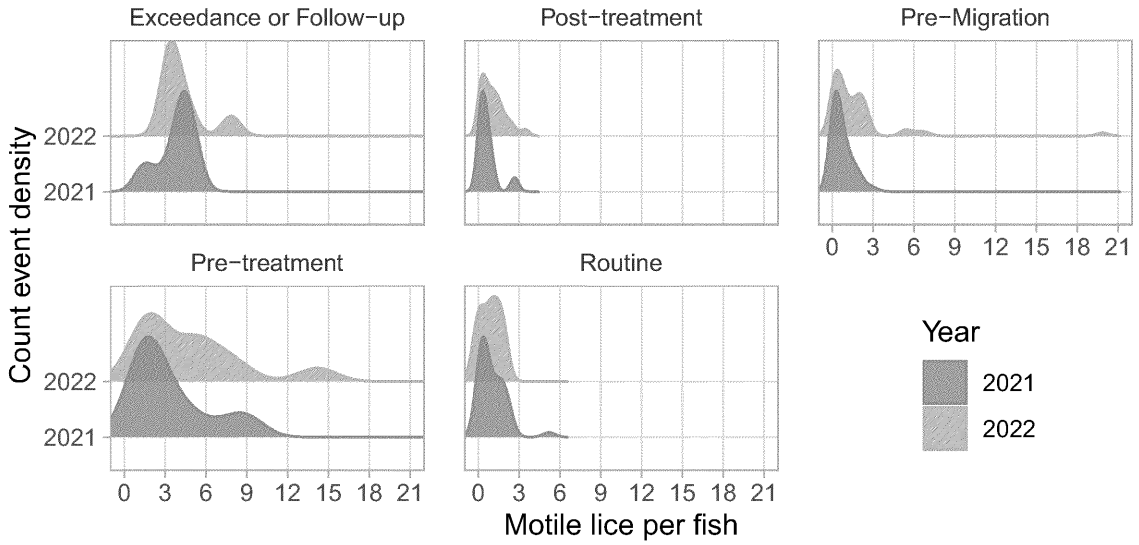


Figure 5: Density of average lice per fish for 2021 and 2022 by fish health zone and occurrence category.

This month, 120 count events were reported by 41 farms in 2022 compared to 131 events from 43 farms in 2021. When we look at the distribution of abundances by occurrence category (Figure 5), we see a slight shift to the right

Table 1: Number of count events by occurrence category and year

Occurrence category	2021	2022
Exceedance or Follow-up	11	8
Post-treatment	11	24
Pre-Migration	54	52
Pre-treatment	17	33
Routine	40	6

of pre-treatment counts. However, the majority of treatments are still occurring before the threshold is exceeded. A similar trend is observed in pre-migration counts. Another indication of the challenges imposed by 2022 is the relative contribution of count events to the different occurrence categories. Despite a similar number of count events have occurred in 2021 and 2022, a larger proportion of them are related to treatment in 2022 (Table 1).

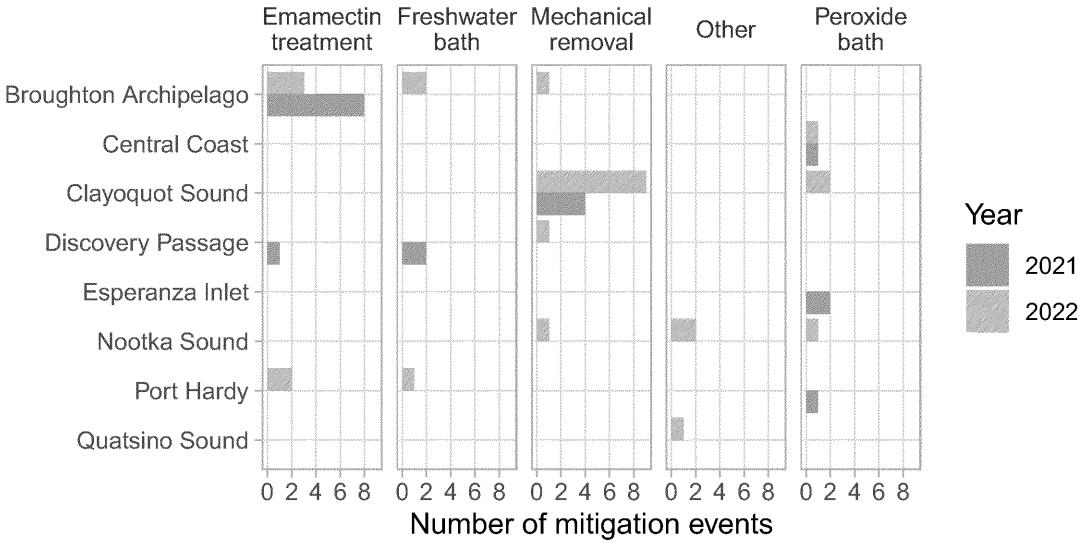


Figure 6: Number of interventions for 2021 and 2022 by fish health zone and mitigation category.

Forty six mitigation events were recorded this month. This large number of mitigation events is not unusual in the months preceding the outmigration window, however there are two notable changes between 2021 and 2022. In 2022 we can observe a large decrease in the use of Emamectin in the Broughton Archipelago and a replacement with freshwater baths and mechanical removal. At the same time, we can observe a large increase in the total number of interventions in the Clayoquot Sound, mainly comprised by peroxide baths and mechanical removal (Figure 6).

3 Conclusions

Sea lice count events conducted during February, 2022 suggest environmental conditions are optimal for the development of *L. salmonis* and it's making difficult to control sea lice infestation. Despite challenging conditions, farms have

been able to adapt to this challenging situation by modifying their control strategies manifested in a shift in the use of chemotherapeutants towards the use of bath and mechanical delousing alternatives.

No information has been removed or severed from this page

From: Sandberg, Krista
Sent: Thursday, March 24, 2022 12:13 PM
To: Sitter, Laura
Subject: RE: Review sea lice COL section for reissuance

Hey Laura,

I tried to take a look at these but I think it would be easier for us to discuss in person – do you think we could take a few minutes during the compliance meeting to chat about the changes?

Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Cellular | Cellulaire 250-895-1723

Government of Canada / Gouvernement du Canada

Canada

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Wednesday, March 23, 2022 4:58 PM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>; Diamond, Maria <Maria.Diamond@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Barry, Melanie <Melanie.Barry@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Stenhouse, Shawn <Shawn.Stenhouse@dfo-mpo.gc.ca>
Subject: Review sea lice COL section for reissuance

Hey team!

There are a few comments and changes in the sea lice section of the new COL that I would love for you all to look at, please. You can find the document here: Y:\Active Marine FF Information\2022 Finfish COL\2022 COL (look for the most recently changed document). Feel free to look at any of the other COLs as well! The clock is ticking to send these up so looking for a review within the next week if possible.

Thank you! Let me know if you want to meet specifically about this.

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Diamond, Maria
Sent: Thursday, March 24, 2022 1:10 PM
To: Sitter, Laura; Sandberg, Krista; Oswell, Alexandria; Price, Derek; Barry, Melanie; Manchester, Howie; Stenhouse, Shawn
Subject: RE: Review sea lice COL section for reissuance

I've going through quickly and added a comment or two.

M.

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Wednesday, March 23, 2022 4:58 PM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>; Diamond, Maria <Maria.Diamond@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Barry, Melanie <Melanie.Barry@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Stenhouse, Shawn <Shawn.Stenhouse@dfo-mpo.gc.ca>
Subject: Review sea lice COL section for reissuance

Hey team!

There are a few comments and changes in the sea lice section of the new COL that I would love for you all to look at, please. You can find the document here: Y:\Active Marine FF Information\2022 Finfish COL\2022 COL (look for the most recently changed document). Feel free to look at any of the other COLs as well! The clock is ticking to send these up so looking for a review within the next week if possible.

Thank you! Let me know if you want to meet specifically about this.

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Sitter, Laura
Sent: Thursday, March 24, 2022 2:08 PM
To: Sandberg, Krista
Cc: Manchester, Howie
Subject: RE: August to December 2021 Sea Lice Abundance report ready for your review

Hi Krista,

I've gone through the report and made a few comments/asked some questions. I'll see if I can find some time to meet with you to review ☺

Laura

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: Thursday, March 17, 2022 2:50 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>
Subject: August to December 2021 Sea Lice Abundance report ready for your review

Hi Laura,

The August – December Sea Lice Abundance report is now complete and ready for your review. Note that I combined all the months into one tab since they were all done together, so it's easier to review than month by month:

Z:\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2021\2021 Sea Lice WORKING.xlsx

Nothing too exciting in terms of compliance, lots of exceedances, lots of treatments. The only thing to note is that I added in a few mitigation events for harvest that were not officially reported to us. It's unclear to me if that is required in the non-migration period, but I think it's still worth noting. For example if they go over threshold in September and then harvest out by December.

Krista.

Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
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krista.sandberg@dfo-mpo.gc.ca
Cellular | Cellulaire 250-895-1723

From: Sitter, Laura
Sent: Thursday, March 24, 2022 2:47 PM
To: Geduld, Jennifer (HC/SC); Oswell, Alexandria; Price, Derek
Cc: Tatone, Elise (HC/SC); Struthers, Alistair
Subject: RE: EDR requests - 2022-31259 and 2022-31260

Hi Jennifer,

Thank you so much for the coordination and outreach. Look forward to chatting again!

Laura

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Geduld, Jennifer (HC/SC) <jennifer.geduld@hc-sc.gc.ca>
Sent: Thursday, March 24, 2022 11:14 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Cc: Tatone, Elise (HC/SC) <elise.tatone@hc-sc.gc.ca>; Struthers, Alistair <Alistair.Struthers@dfo-mpo.gc.ca>
Subject: FW: EDR requests - 2022-31259 and 2022-31260

Good afternoon,

I wanted to let you know that we informed [redacted] last week that she will be receiving a refusal letter this week for the two EDR requests for IMVIXA. I followed up today with the refusal letter below.

Thank you again for meeting with us and for your openness to collaborate and support us with our questions about these EDR requests.

Jennifer

From: Geduld, Jennifer (HC/SC) <jennifer.geduld@hc-sc.gc.ca>
Sent: 2022-03-24 10:49 AM
To: [redacted]
Cc: Emergency Drug Release / Distribution de médicament d'urgence (HC/SC) <edr-dmu@hc-sc.gc.ca>
Subject: EDR requests - 2022-31259 and 2022-31260

s.19(1)
s.20(1)(b)

Good morning [redacted]

Health Canada has completed the review of your two Emergency Drug Release (EDR) requests received February 17, 2022 (2022-31259 and 2022-31260). You have requested access to 2x10 kg of the unapproved drug, IMVIXA (lufenuron 10% premix, Elanco Canada) to treat approximately [redacted] farmed salmon owned by [redacted] in British Columbia before transfer to the marine site, [redacted] to prevent against sea lice

infestation.
It is understood that the anticipated treatment dates for the fish would be the end of March 2022.

Health Canada's Emergency Drug Release Program is supported by sections C.08.010 and C.08.011 of the *Food and Drug Regulations*. The program considers requests for access to drugs for veterinary use that are not available for sale in Canada for the purposes of diagnosing or treating a medical emergency in a patient (or group of animals) under a veterinarian's care. The Emergency Drug Release program considers requests when conventional therapies have either failed, are not suitable or not available in Canada.

In March 2020, Elanco Canada communicated with aquaculture companies that IMVIXA was removed from the EDR program due to outstanding, unresolved concerns by Health Canada. The status of this product at Health Canada remains unchanged. Should you require additional details about these concerns, it is recommended that you contact Elanco Canada directly.

The EDR program considers requests for authorization for IMVIXA on a case-by-case basis. Authorization of the product since March 2020 has only been granted once under extenuating circumstances, as alternative treatments were not possible to carry out due to unexpected physical distancing limitations associated with COVID-19 restrictions in early 2020. There has been sufficient notice since that time, for planning and managing activities within COVID-19 restrictions, when they are in place.

We have carefully considered your two requests for EDR release of IMVIXA and appreciate your responses to our questions. Given Health Canada's outstanding concerns with the use of this product, its use as a preventive rather than as a treatment and the availability of alternative treatments for sea lice, the two requests for IMVIXA will not be authorized by Health Canada.

If you have you have questions or concern regarding this letter, please contact Jennifer Geduld, Director, Clinical Evaluation Division, Jennifer.Geduld@hc-sc.gc.ca, 613-316-2624.

Regards,
Jennifer

Jennifer Geduld
Director/Directrice
Clinical Evaluation Division/Division de l'évaluation clinique
Veterinary Drugs Directorate/Direction des medicaments vétérinaires
Health Canada/Santé Canada
613-316-2624
Jennifer.Geduld@hc-sc.gc.ca

From: Sitter, Laura
Sent: Thursday, March 24, 2022 3:00 PM
To: Shaw, Kerra
Subject: RE: Sea lice COL

Thanks! Added everything to the working document and I've asked the team to review (in addition to our next 3 workshops).

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Thursday, March 24, 2022 10:36 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: RE: Sea lice COL
Importance: High

New changes below in red – I realized I had more questions and comments on this.

From: Shaw, Kerra
Sent: Wednesday, March 23, 2022 4:17 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: Sea lice COL

Treatment failure – changed to "Treatment Efficacy" means the percentage change from pre- to post-treatment sea lice abundances. This is measured by comparing the most proximal pre-treatment All Pen Counting Event to any All Pen Counting Event within 42 days post-treatment for in-feed treatments or seven days for all other treatment methods.

New update: Treatment Efficacy: means the percentage change from pre- to post-treatment sea lice abundance. This is measured by comparing the most proximal pre-treatment All Pen Counting Event data to any All Pen Counting Event between 21 and 42 days post-treatment for in-feed treatments or within seven days for all other treatment methods. THIS IS TO RESOLVE REMOVING 6.9(a)(v).

The Licence Holder:

a. Is not required to conduct a Handling Event for the purpose of counting or treating sea lice in an individual Containment Structure if:
   (i) Same
   (ii) Same (question: the new v spoke about medication… if we delete v as we discussed, and cover it in efficacy COL, should this be changed and medication just be deleted? Should it just say: fish are being managed for a Fish Health Event which precludes handling; or)
   (iii) the site is experiencing a measurable environmental issue that would reasonably lead to elevated fish stress and mortality; or (THE GRAMMAR didn't really work before, and I don't know what "additional" was supposed to mean – I think we should ensure that the environmental issue is tangible, which is therefore easier to request the supporting data, hence "measureable")
   (iv) Same but add (v) and (vi)
   (v) Delete – should be covered in efficacy monitoring COL
   (vi) As per bulletin
b. Must note if any Containment Structure(s) were missed in a required Counting Event could not occur for the reasons set out in 6.9(a) in the required reporting to the Department; and
c. Must notify the Department if an entire Counting Event could not occur for the reasons set out in 6.9(a) within 24 hours Upon Discovery; and

d. With that notification, provide the Department with all supporting information associated with the reasons set out in 6.9(a) including a harvest or transfer plan, Fish Health Event data, or Environmental Data as appropriate.
e. Once the reason set out in 6.9(a) has been resolved, sea lice counting and management must be resumed as per licence conditions. (I forgot I wanted to add this – I think it's important to state)

WHICH COL DO WE NEED TO EXCLUDE BASED ON COL 6.9 NOW? CHECK TO SEE IF THERE ARE MORE

6.6 The Licence Holder must ensure that sea lice numbers are below threshold 6.2 at the time of the first Counting Event of the Out-migration Window, unless the Department confirms they are unable to count or treat fish due to conditions outlined in Section 6.6.

From: Diamond, Maria
Sent: Thursday, March 24, 2022 6:14 PM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie
Subject: Compliance Summary for March 25 meeting
Attachments: Compliance Summary to March 24, 2022.docx

Good afternoon team!

I've put together the Compliance Summary for tomorrow's meeting for notifications received to-date [redacted]

Have a great weekend!

Maria

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

s.19(1)

Compliance Summary March 19-24, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
Dec 2	Mar 23	Rant	110 day follow-up
Mar 19	Mar 21	Atrevida	24hr ME - Other [redacted] uplift issue (diffuser ½ clogging) – [redacted] kg avg, [redacted] pcs, [redacted] kg biomass.
Mar 21	Mar 22	Dixon Bay	5 day ME - Handling [redacted] kg biomass, [redacted] kg avg, [redacted] pcs
Mar 22	Mar 23	Bedwell	5 day ME - Handling – SFI on site. [redacted] avg, [redacted] pcs, [redacted] kg biomass
Mar 22	Mar 23	Sargeaunt Pass	24hr ME – Treatment [redacted] kg biomass, [redacted] kg avg, [redacted] pcs.

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
Mar 20	Mar 21	Bedwell	MR treatment
Mar 20	Mar 21	Plover Point	MR treatment
Mar 21	Mar 24	Charlies Place	A. Salmonicida (sablefish)
Mar 22	Mar 22	Cypress Harbour	MR treatment Pens [redacted]
Mar 24	Mar 24	Bull Harbour	MR treatment

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
Mar 23	Mar 21	Bawden	Hydrolicer
Mar 25	Mar 21	Rant Point	Hydrolicer
Mar 26	Mar 24	Atrevida	Hydrolicer
Mar 27	Mar 24	Alexander	FW bath treatment
Mar 28	Mar 24	Mussel Rock	Hydrolicer

s.20(1)(b)

Sea Lice Events

Incident Date	Date Report	Facility	Details
Mar 18	Mar 20	Cougar Bay	Pre-tx 7.01 avg
Mar 19	Mar 20	Dixon Bay	Pre-tx 8.69 avg
Mar 20	Mar 21	Dixon Bay	Post-tx 0.75 avg
Mar 20	Mar 20	Sargeaunt Pass	Pre-tx 1.49 avg
Mar 19	Mar 21	Rant Point	Follow-up 3.12 avg
Mar 20	Mar 22	Alexander	Follow-up 4.79 avg
Mar 21	Mar 23	Bedwell	Pre-tx 7.36 avg
Mar 23	Mar 23	Bedwell	Post-tx 1.59 avg
Mar 23	Mar 24	Fortune	Exceed 3.65 avg
Mar 23	Mar 24	Millar Channel	Exceed 3.50 avg
Mar 23	Mar 24	Mussel Rock	Exceed 8.08 avg

From: McCorquodale, Brenda
Sent: Friday, March 25, 2022 10:34 AM
To: Shaw, Kerra
Cc: Price, Derek; Sitter, Laura; Oswell, Alexandria; Manchester, Howie; Barry, Melanie
Subject: RE: Thoughts on Godwin's paper

Thanks Kerra and Derek.
It would be good to put this on the list of items to discuss in our sea lice discussions with Science related to their CSAS work. Can you pls forward to Jay if you have not already.
Brenda

Brenda McCorquodale (she/ her/ elle)

Acting Regional Director, Fisheries Management (March 21 – 25, 2022)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Thursday, March 24, 2022 3:49 PM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Cc: Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Barry, Melanie <Melanie.Barry@dfo-mpo.gc.ca>
Subject: FW: Thoughts on Godwin's paper

Brenda - Derek reviewed the new sea lice paper and emamectin benzoate (EMB) resistance and had the following observations, in case you were interested. Understanding that you (and I) will not understand everything he wrote ;) Derek, I made minor edits for clarity.

I'd also add, and he can correct me if I'm wrong… that they concluded that "EMB sensitivity has dramatically decreased since 2010, concurrent with marked decrease in the field efficacy of EMB treatments", however their data does not see a decrease since 2010, rather a decrease since 2019. In addition, Derek told me the decrease they are noting in efficacy may not be exactly right – they used to treat with EMB when lice loads were higher, and after treatment, there is a dramatic drop. Now they are treating farms with lower lice loads, so the decrease is not as dramatic (e.g. maybe would have been 12 lice/fish before going down to 2 lice/fish, whereas now it may be 3.5 lice/fish going down to 2 lice/fish or something like that). So the "decrease in field efficacy" may, at least in part, be an inaccurate representation and more based on a change in how treatments occur.

Anyway, please let us know if you have questions ☺

From: Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Sent: Thursday, March 24, 2022 1:34 PM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>

Subject: Thoughts on Godwin's paper

- The authors used First Nations-provided data on emamectin benzoate (EMB) bioassays and sea lice counts in the Broughton Archipelago to demonstrate EMB sensitivity has decreased over the years.
- Results are presented in terms of EMB sensitivity (EC50 values) and field efficacy (post-count / pre-count) of treatments. However, treatment failure is not defined.
- Statistical comparisons are presented as AIC differences between models, but significance (or confidence intervals) of model terms is not reported with the exception of previous treatment, which is erroneously presented as a multiplicative rather than an additive effect.
- The authors conclude EMB sensitivity and field efficacy have decreased over time.
- Authors claim "EMB resistance is widespread and well established in BC" however, they only analyzed data from the Broughton. In addition, this conclusion goes against their own abstract, where they state "the Pacific Ocean, where wild salmon are far more abundant, has not seen widespread evolution of EMB-resistant lice" and also contradicting their own 2018 and 2020 citation that "genetic evidence has revealed only localized ephemeral resistance here [the North Pacific]"
- Time effect over EMB sensitivity modelled as quadratic effect despite Fig 2 suggests discrete effects of 2019 and 2021. Also variance of EC50 seems to be very uneven probably violating the assumption of homoscedasticity.
- Methods are confusing and poorly explained. More specifically, the model for field efficacy is described as a "hurdle models – standard statistical descriptions used to accommodate an over-abundance of zeroes in data being analyzed." However, dividing post-counts by pre-counts should not yield 0 under any circumstance.

Derek Price, MV, PhD

Epidemiologist, Aquaculture Fish Health
Aquaculture Management Division / Fisheries and Oceans Canada
Derek.Price@dfo-mpo.gc.ca
Tel: 250-703-0929 Cell: 250-850-9362

From: Sitter, Laura
Sent: Friday, March 25, 2022 4:02 PM
To: Sandberg, Krista
Cc: Manchester, Howie
Subject: RE: August to December 2021 Sea Lice Abundance report ready for your review

Hi Krista,

These are approved by me. Thank you.

Laura

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: Thursday, March 17, 2022 2:50 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>
Subject: August to December 2021 Sea Lice Abundance report ready for your review

Hi Laura,

The August – December Sea Lice Abundance report is now complete and ready for your review. Note that I combined all the months into one tab since they were all done together, so it's easier to review than month by month:

Z:\1. PUBLIC REPORTING\9. Sea Lice\1. Farm Level - Monthly\2021\2021 Sea Lice WORKING.xlsx

Nothing too exciting in terms of compliance, lots of exceedances, lots of treatments. The only thing to note is that I added in a few mitigation events for harvest that were not officially reported to us. It's unclear to me if that is required in the non-migration period, but I think it's still worth noting. For example if they go over threshold in September and then harvest out by December.

Krista.

Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Fisheries and Oceans Canada | Pêches et Océans Canada
krista.sandberg@dfo-mpo.gc.ca
Cellular | Cellulaire 250-895-1723

From: Sitter, Laura
Sent: Monday, March 28, 2022 8:05 PM
To: McCorquodale, Brenda; Shaw, Kerra
Subject: Sea lice updates- March 25, 2022

Hi Brenda and Kerra,

Thanks for your patience in waiting for this report from our meeting on Friday (March 25). Please see the updates below:

- **Sea lice updates**
  - **Broughton-** 7 active, 0 over
  - **Central Coast-** 3 active, 2 over*(Alexander and Cougar, FW treatment planned at both); change from last week: *Kid Bay now under
  - **Clayoquot North-** 4 active, 3 over*(Bawden (hydrolicer), Ross (harvest), Millar (new)); change from last week: *Dixon now under
  - **Clayoquot South-** 7 active, 4 over * (Fortune (new), Mussel (new), Rant (new), and Saranac); change from last week: *Bedwell now under
  - **Esperanza –** 2 active, 0 over
  - **Nootka-** 5 active, 0 over
  - **Port Hardy-** 4 active, 0 over
  - **Quatsino-** 3 active, 1 over * (Mahatta East (new, harvest)
  - **Sunshine Coast –** 5 active, 0 over
  - **Summary: 40 sites, 10 over** (6 new overthreshold, 3 from last week under)
- **Field updates**
  - No field work in AFH conducted this week. Q2 audits start next week.
- **Other updates**
  - [redacted]
  - FYI- Earlier this month I reported that VHSv had been detected in herring at Bedwell (Cermaq farm in Clayoquot Sound). Tests on farmed salmon came back negative.

Please let me know if you have any other questions; I would be happy to provide more detail.

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

s.16(1)(c)
s.21(1)(a)
s.21(1)(b)

From: Sitter, Laura
Sent: Tuesday, March 29, 2022 12:56 PM
To: Shaw, Kerra; Manchester, Howie; Price, Derek; Oswell, Alexandria
Subject: SLMP for review
Attachments: Sea Lice Management Plan- March 29.docx

Importance: High

Hi again team,

Attached is the revised SLMP. Thanks for Alex for reviewing and making changes to line up with the HMP changes (distributed yesterday). Again, these need to be reviewed and finalized by Friday afternoon. Thanks for your time!

Laura

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
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Appendix XX
Sea Lice Management Plan (SLMP) Requirements

This document outlines the minimum requirements to manage the sea lice of farmed fish in British Columbia. The licence holder must generate their own company Sea Lice Management Plan (SLMP) that confirms that all the elements in this template will be implemented, and develop a suite of Standard Operating Procedures (SOPs) that describes the details of implementation. Each section in the SLMP must list the relevant SOPs to meet defined objectives. As per the Conditions of Licence (COL), this plan must be reviewed on an annual basis and submitted to Fisheries and Oceans Canada (DFO) Aquaculture Management Division (AMD) by October 15th, along with a complete copy of the company's SOPs.

While the company may include additional elements to their SLMP, all elements described in this appendix must be explicitly included.

1. Staff Training

On site monitoring and correct identification of sea lice is a crucial component of any SLMP.

The SLMP/SOPs must describe how the company will address these points:

- Staff responsible for counting sea lice must be trained in species and life stage identification, with annual reviews of methods and information.
- Staff responsible for reporting sea lice numbers to the company Fish Health Team and the Department must have appropriate training on the regulatory requirements and timelines as outlined in the COL.

2. Monitoring

Accurate and timely counts are crucial to the successful implementation of any SLMP. Important information to be collected includes the species of sea lice found and its life stage.

The SLMP/SOPs must describe how the company will address these points:

- Regular counts must be conducted by licence holders to meet the requirements as laid out in the COL (including relevant appendices). All species and lifestages of sea louse must be recorded and reported, including chalimus, motiles, and adult females of both *Lepeoptheirus salmonis* and *Caligus clemensi*.
- If regulated sea lice thresholds are reached or exceeded, this must be reported to DFO as outlined in the COL.
- Environmental conditions, including water quality data, must also be measured and recorded.
- Internal audits must be conducted on a regular basis by the company veterinarian or Fish Health Team to ensure that staff are monitoring sea lice accurately and consistently.

3. Record Keeping

Accurate, legible, and accessible records are important in validating and verifying sea lice data.

The SLMP/SOPs must describe how the company will address these points:

- Records must be kept in such a way that they are available on site for quick and easy access by site staff and DFO, including raw data (e.g. field notebooks).
- There must be a back-up system to ensure that data is secure.
- Records must be kept for the duration of the production cycle at the facility and meet the requirements as outlined in the COL.

4. Prevention

As with other aspects of animal husbandry and health practices, prevention is the most effective way to manage infection.

The SLMP/SOPs must describe how the company will address these points:

- The health of fish through appropriate biosecurity practices, proper nutrition, good husbandry practices, and veterinary oversight must be maintained.
- Methods of exclusion of sea lice from entering farms (e.g. physical barriers) must be included.

5. Area-based management

As current marine farms have water flow through, farmed fish health can be influenced by the surrounding environment and wild fish. When farms are located in close proximity, there may be hydrological connectivity between them. As a result, managing the health of a single farm in isolation may not be as beneficial as managing fish health across multiple connected farms.

The SLMP/SOPs must describe how the company will address these points:

- Areas have unique physical and biological characteristics. These natural characteristics, such as presence of wild fish, must be considered in the management farmed fish health.
- Licences may identify Area Management Zones (AMZ) which farms are assigned to. When this occurs, coordinated fish health management for all farms must occur (e.g. coordinated stocking or treatments).
- In AMZs where more than one company operates facilities, all companies must document their plan to collaboratively manage fish health in the zone.

6. Treatments

The data used to help guide veterinarians in the decision making process of when to treat and what treatment modality to use includes a variety of biological, physical, and medical considerations.

The SLMP/SOPs must describe how the company will address these points:

- The company must describe the multiple tools and techniques which will be applied, when appropriate, and under what circumstances.
- These tools must be specifically identified with all supporting materials provided, including:

    - A general description of the tool (i.e. how does it work),
    - When this tool is typically used (e.g. size of fish, environmental conditions),
    - Appropriate permits and validity periods (e.g. Pesticide Use Permit),
    - Lice recapture capabilities (including technical specifications), and
    - Whether the tool is owned or borrowed and any MOUs/sharing agreements in place.
- Chemotherapeutants must be used judiciously under the direction of a licenced veterinarian and must adhere to requirements dictated by label instructions and any relevant regulations.
- Sea lice bioassays must be performed on a regular basis and prior to treatment with an in-feed medication.
- The efficacy of each treatment must be measured and made available to DFO AMD as per COL or upon request.

From: Sandberg, Krista
Sent: Thursday, March 31, 2022 12:33 PM
To: Sitter, Laura
Subject: RE: Language for 6.10
Attachments: Document1.docx

My comments

Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Cellular | Cellulaire 250-895-1723

Government of Canada Gouvernement du Canada

Canada

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Thursday, March 31, 2022 9:10 AM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Subject: Language for 6.10

Hey Krista,

We met yesterday and reviewed all the COLs for SL. The last thing I have to do I work COL 6.10. If you have time/energy to look at this, I would appreciate it! I'll be working on it myself so no stress if you don't get to it ☺

Laura

6.1 At any time of the year, if Sea Lice Mitigation measures are undertaken, the Licence Holder must:

(a) submit a Sea Lice Mitigation notification to the Department within the seven Days following the initiation of mitigation, using Appendix [Fish Health and Sea Lice Mitigation Notification]; and

(b) complete~~enduct~~ an All Pen Counting Event within seven days prior to the Sea Lice Mitigation measure; and

(c) conduct Counting Events following the Sea Lice Mitigation measure as follows:

(i) for in-feed treatments, conduct Counting Events every two weeks following the completion of treatment~~Day~~; until~~and~~

(ii) for in-feed treatments, within 42 Days from the completion of treatment, conduct an All Pen Counting Event once sea lice abundance is under threshold and a Treatment Efficacy of at least 60% is met; or

(iii) for all other treatments, conduct an All Pen Counting Event within seven Days of Sea Lice Mitigation measure completion; and

(d) submit the results of (b) and (c) to the Department within three Days using Appendix [Sea Lice Event]; and

(e) assess and report Treatment Efficacy, including supporting documentation as required.

Commented [SK1]: Complete rather than conduct? So that the All Pen Counting Event is COMPLETED in the week prior to treatment, but not necessarily CONDUCTED in that week?

Commented [SK2]: I think we had taken out the part about when they had to complete the pre-treatment counts because it's an All Pen Count which needs to be done in 7 days, but now this doesn't say when the count needs to be completed.

Commented [SK3]: Do we want to say anything about the 21 days? Are we still requiring counts at 14 days post treatment?

Suggestion: i) for in-feed treatments, conduct Counting Events starting 21 days following completion of treatment, and every two weeks; until

Commented [SL4]: If they achieve 60% reduction and below threshold within 4 weeks for example, we don't need them to continue biweekly counts for an additional 2 weeks…need language to reflect this.

Commented [SL5]: What we want is: 3 pen counts every two weeks from the completion of the treatment. We also want an All Pen count to demonstrate they are truly underthreshold at the site level AND to demonstrate efficacy of treatment. Help!

Commented [SL6R5]: Do we simply reference the requirement to report reduced efficacy?

Commented [SL7R5]: Can we add a new bullet outlining the efficacy component of counting?

Commented [SK8]: Maybe we want to say this? Take it or leave it.

From: Diamond, Maria
Sent: Friday, April 1, 2022 11:32 AM
To: Sitter, Laura; Oswell, Alexandria; Manchester, Howie
Subject: Compliance Summary to date
Attachments: Compliance Summary to April 1, 2022.docx

Please find the compliance summary for today's meeting.

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary March 24 – Apr 1, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
Dec 2	Mar 23	Rant	110 day follow-up

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
Mar 21	Mar 24	Charlie's Place	A. Salmonicida tx
Mar 24	Mar 24	Bull Harbour	MR treatment

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
Apr 1	Mar 25	Millar	Hydrolicer

Sea Lice Events

Incident Date	Date Report	Facility	Details
Mar 23	Mar 24	Sargeaunt Pass	Post-mech 0.18 avg
Mar 24	Mar 25	Fortune	Follow-up 3.65 avg
Mar 24	Mar 26	Atrevida	Pre-treat 1.46 avg
Mar 25	Mar 25	Millar Channel	Follow-up 7.80 avg
Mar 26	Mar 28	Gore	Post-mech 0.56 avg
Mar 26	Mar 28	Rant Point	Pre-treat 7.94 avg
Mar 28	Mar 28	Rant Point	Post-mech 0.61 avg
Mar 28	Mar 29	Bawden	Pre-treat 8.18 avg
Mar 29	Mar 29	Bawden	Post-mech 1.42 avg
Mar 29	Mar 30	Cougar	Post-bath 0.41 avg
Mar 30	Mar 30	Bedwell	Exceed 4.60 avg
Mar 30	Mar 30	Plover	Exceed 4.67 avg
Mar 30	Mar 31	Alexander	Pre-treat 5.35 avg
Mar 30	Mar 31	Dixon	Exceed 3.30 avg

From: Sitter, Laura
Sent: Friday, April 1, 2022 3:14 PM
To: Oswell, Alexandria
Subject: FW: Confirmation of filter specifications on treatment vessels
Attachments: Filtration Systems Summary - Tromoy and Hydrolicer.pdf

---

From: [redacted]
Sent: Friday, March 4, 2022 8:34 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: RE: Confirmation of filter specifications on treatment vessels

Hi Laura,
Please see attached the filter specifications for the Tromoy and Hydrolicer. I've included a diagram for the Tromoy filtration as it can be a bit complicated to follow sometimes.
If there are any questions please let me know.

Best regards,

[redacted]
Mowi Canada West
Mobile: [redacted]
Email: [redacted]

MOWI®

s.19(1)

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: February 15, 2022 9:26 AM
To: [redacted]
Cc: Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>
Subject: Confirmation of filter specifications on treatment vessels

Good morning vets,

We are updating our records and would like to confirm the filter specifications on each company's mechanical sea lice treatment vessels, as per Condition of Licence 6.12: "By March 1, 2020, the Licence Holder must ensure that all mechanical treatment options have technology in place to capture sea lice, and sea lice that are removed through mechanical treatments are not returned to the marine environment."

Could you please send the details of filter size, flow rate of discharge, and other relevant specifications to myself or the AQFF Fish Health Inbox (copied here) and indicate whether there have been any changes since

first implementation in 2020?

Please don't hesitate to contact me with any questions.

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

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Aqua Tromøy

- 8 x 150 micron pressure filters
    - 4 per hold
- 4 x 150 micron bag filters
    - 2 per hold

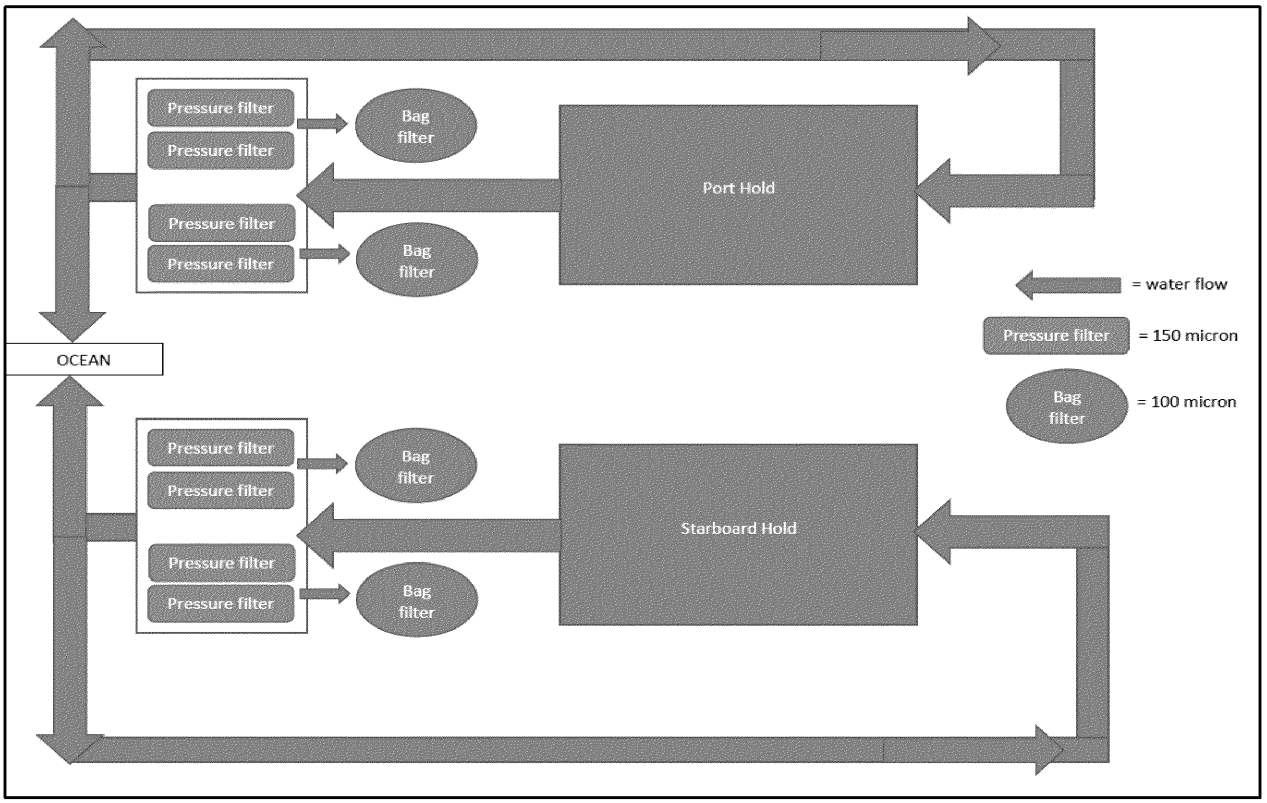

Figure 1. Basic schematic of Aqua Tromøy filtration systems

- During recirculation, approximately 3000 m3 (the entire contents of the holds) is filtered every 8 minutes.
    - The water flows via circulation pumps through the pressure filters. When the system detects that these filters are "full" they are then backwashed into the bag filters, and all lice and debris contained within are disposed of on-land.
- During discharge, the holds are emptied at a similar rate, and through the same filtration system as during recirculation.
- There are also lice capture socks around the hold stripping pipe and by-catch tables. The by-catch tables have 150 micron socks and the stripping pipe has a 750 micron sock, as water from the system can also exit through these locations. These filters act as a back-up.

Hydrolicer

- All water from the hydrolicer flows through a drum filter that is 90-100 micron
- After the drum filter, the water is also filtered through a 750 micron sock that acts as a secondary capture method for adult lice
    - Filtration smaller than 750 micron has proved problematic as it clogs easily with debris/scales and causes the drum filter to back-up and flood.
- The bycatch water is also filtered through a 750 micron sock

No information has been removed or severed from this page

From: Sitter, Laura
Sent: Friday, April 1, 2022 3:22 PM
To: Oswell, Alexandria
Subject: FW: How to Sample a Hydrolicer
Attachments: Where to sample hydrolicer.jpg

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Thursday, March 3, 2022 4:20 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: FW: How to Sample a Hydrolicer

From: [redacted]
Sent: Thursday, March 3, 2022 3:53 PM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Blasco, Nathan <Nathan.Blasco@dfo-mpo.gc.ca>; Metcalf, Vanessa <Vanessa.Metcalf@dfo-mpo.gc.ca>; Reid, Rebecca <Rebecca.Reid@dfo-mpo.gc.ca>; McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Subject: How to Sample a Hydrolicer

Dear Kerra Shaw (Senior DFO Aquaculture Biologist),

I am writing in follow-up to my question in our meeting today. I asked, is DFO sampling the effluent of the hydrolicers used by the salmon farming industry to confirm the industry is not in violation of their conditions of licence (6.12) which prohibit release of the sea lice removed via treatment. You said DFO doesn't know how to sample hydrolicer effluent in a manner that confirms the sample is from the treatment vs surrounding marine waters.

I have been sampling hydrolicers since September 2021. Here are three techniques that DFO can use to do this work:

1. Hydrolicer treatment water drops from pipes into the ocean. If DFO positions a plankton net under the pipe/filters and captures the water *before* it enters the ocean you know that you are exclusively sampling the treatment effluent. (see attached photo)

2. Any chalimus stage sea lice that appear in your sample can be assumed to be from the hydrolicer effluent, because hydrolicers are known to dislodge this stage of lice stage and this stage of lice has never been reported adrift in the marine environment because it is tethered to the fish. Chalimus stage lice are known as the "attached" vs "motile" stage. Once they cement themselves on the fish, they remain, even if the louse dies.

3. Always take a control sample either a short distance away from the hydrolicer during operation, or when possible, take samples under the effluent pipe before the hydrolicer begins operation for the day. Comparing results between your control sample and effluent sample will provide information on what is already in the water around the farms and what is going into the ocean specifically from the hydrolicer.

s.19(1)

4. You will also want to confirm that farm fish are actually passing through the treatment when you take the sample. And it is a good idea to sample several times during the treatment as the filters fill up with the scales that are stripped from the fish during the treatment (see attached image)

The Mowi hydrolicer *is releasing all stages of sea lice.* The effluent of this hydrolicer has been sampled repeatedly since September 2021. The most common stage found in this effluent is the attached-stage chalimus lice, however, live nauplii, copepodites (infective stage) and motiles, as well as scales, which are much larger than the lice, are present in the samples.

There is no value to having Conditions of Licence if DFO fails to enforce them.

I hope this helps and I will write again soon to hear of your progress sampling hydrolicers.

Thank you,

s.19(1)


Place net here or here

From: [redacted]
Sent: Friday, April 1, 2022 3:43 PM
To: Whelan, Dr. Daryl S; roland.cusack@novascotia.ca; jswood@gov.pe.ca; Jennifer.acheson@gnb.ca; [redacted] Sitter, Laura; [redacted] Anthony.Snyder@novascotia.ca; [redacted]
Subject: CONFIDENTIAL: Provincial & Producer Veterinarian Discussion: Sea Lice

Dear vets and fish health experts,

Thank you for your participation in the discussion on Wednesday. Here is a summary of the discussion- please treat as confidential.

Summary of our meeting March 30th 2022

Introductions to [redacted]
CAIA has contracted with [redacted] on a project which will coordinate, assess and develop an EDR framework to address the current and projected implications of sea lice to the Canadian aquaculture industry. They will be conducting interviews with provincial and aquaculture veterinarians as well as Canadian company officials and Norwegian/UK companies marketing aquaculture products. Canadian company officials would be asked to identify roadblocks to licensing of new aquaculture products in Canada and identify possible solutions. Identification of barriers such as market size to bringing product to the Canadian market and possible solutions to such issues. Final output will be a power point presentation outlining findings from the veterinary and industry interviews as well as proposing a practical EDR framework to manage sea lice in Canada for presentation to the Veterinary Drugs Directorate (VDD).

Update from Producer Vets on EDR Applications
Three companies had submitted EDR applications for IMVIXA (for multiple sites). All received letters from VDD on Thursday March 24th 2022 that the requests had been rejected. Reasons cited were:

- Environmental data still outstanding (from environmental monitoring of 2020 EDR in NB)
- Not an emergency (i.e. This is a preventative treatment therefore cannot be considered an emergency)
- Should have availed of other treatment options

For the East Coast producers, this will be their only application in 2022, as spring (April/May) transfer of smolts from hatcheries to ocean pens will be the last transfer for the year. On the West Coast, there are transfers taking place September thru December; another EDR application is possible.

One company noted that the follow-up questions received from VDD were very operational-specific and not within the usual scope of factors that VDD would consider in their assessment. For example, questioning regarding alternative farm sites for transfer or gaining access to well boats.

Comment that EDR's are not being approved for land-based animal use either. VDD is not taking a risk-benefit approach. The rejection of EDRs could force more off-label use of drugs (in agri-food sector more broadly).

Update from Elanco
The product remains without a full license in the market. As such, Elanco does not promote its use but does support technical discussions. Data for the first 12 months of environmental monitoring (under 2020 EDR) submitted to HECS this week. The next round of data (18 months) is with Elanco and being analysed and report is being prepared. Next round of data (24 months) is expected to be ready by May (Elanco will need some time for analysis and report). Preliminary results are directionally, positive.

s.19(1)

Next Steps
April 27th next meeting date
[redacted] will be conducting interviews
CAIA to draft deck for VDD as 'education' piece, attempt to support next round of EDR applications. Need to establish: 1) the importance of the sector; 2) the emergency conditions facing the industry and 3) the Integrated pest management practices that are being followed.

-----Original Appointment-----
From: [redacted]
Sent: February 24, 2022 11:21 AM
To: [redacted] Whelan, Dr. Daryl S; roland.cusack@novascotia.ca; jswood@gov.pe.ca; Jennifer.acheson@gnb.ca; [redacted]; Laura.Sitter@dfo-mpo.gc.ca; [redacted] Anthony.Snyder@novascotia.ca; [redacted]
Subject: Provincial & Producer Veterinarian Discussion: Sea Lice
When: March 30, 2022 12:00 PM-1:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: MS teams

Hi everyone,

Here's the agenda for today:

1. Introductions [redacted] and project underway
2. Update from company vets [redacted] etc.)
3. Update from Elanco & discussion
4. Tour-de-Table (other updates, intel to share)

Dear Veterinarians,

As agreed at our last meeting (February 23rd), I am scheduling a touchpoint at the end of March to bring together CAIA member Vets and provincial/DFO vets to continue the discussion sea lice (getting more 'tools in the toolbox'). With a larger group, it's tough to find a time that works for all but hope this works for the majority.

Kind regards,

[redacted]

Microsoft Teams meeting

s.19(1)

Join on your computer or mobile app
Click here to join the meeting

Learn More | Meeting options

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est retenue en vertu de l'article

21(1)(b)

of the Access to Information Act

de la Loi sur l'accès à l'information

From: Shaw, Kerra
Sent: Wednesday, April 6, 2022 9:44 PM
To: McCorquodale, Brenda
Cc: Sitter, Laura
Subject: Re: Sea lice updates- April 1, 2022

Yes - that remains the same. Sent letter to Cermaq re: the plankton farms and [redacted]

Sent from my iPhone

On Apr 6, 2022, at 5:16 PM, McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca> wrote:

Thanks!
And are we still consistent with 4 who have an environmental rationale for entering the outmigration over threshold, [redacted]
Have to brief the Minister's office on Friday – thx.
Brenda

Brenda McCorquodale (she/ her/ elle)
_____
Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Wednesday, April 6, 2022 9:25 AM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: RE: Sea lice updates- April 1, 2022

Sorry Brenda! Here you go:

1. **Sea lice updates, April 1, 2022.**

- **Broughton-** 7 active, 0 over
- **Central Coast-** 3 active, 1 over*(Alexander) FW tx planned for Alexander; Cougar under threshold March 29th
- **Clayoquot North-** 3 active, 2 over*(Dixon (new), Millar) Bawden under March 29th. Ross under, harvested out.
- **Clayoquot South-** 6 active, 4 over * (Bedwell, Mussel, Plover, and Fortune). Saranac under, harvested out.
- **Esperanza –** 2 active, 0 over
- **Nootka-** 5 active, 0 over
- **Port Hardy-** 4 active, 0 over
- **Quatsino-** 3 active, 1 over * (Mahatta E (harvest))

s.16(1)(c)

- **Sunshine Coast –** 5 active, 0 over
- **Summary: 38 sites, 8 over**

From: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Sent: Wednesday, April 6, 2022 7:42 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: RE: Sea lice updates- March 25, 2022

So we have a sea lice update from last week? I have a MinO briefing this morning and they would like a sea lice update.
B

Brenda McCorquodale (she/ her/ elle)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Tuesday, March 29, 2022 8:46 AM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: RE: Sea lice updates- March 25, 2022

Good question- the initial positive test was from herring that died in the pens. I spoke with the vets at Cermaq who indicated [redacted] I think it's unlikely that the herring were false positives given the species (herring are particularly susceptible), clinical signs, and time of year- CFIA does the confirmation testing and reporting. There is not enough information to suggest the outbreak is over, yet. As I get more information, I will let you know!

Hope that helps- sorry it's a bit long.

Laura

s.20(1)(b)
s.21(1)(a)
s.21(1)(b)

From: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Sent: Tuesday, March 29, 2022 7:45 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: RE: Sea lice updates- March 25, 2022

Thanks Laura – I am interested in the comment [redacted] Does that mean that the initial test was a false positive or that the outbreak is over?

Brenda

Brenda McCorquodale (she/ her/ elle)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Monday, March 28, 2022 5:05 PM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: Sea lice updates- March 25, 2022

Hi Brenda and Kerra,

Thanks for your patience in waiting for this report from our meeting on Friday (March 25). Please see the updates below:

- **Sea lice updates**
  - **Broughton-** 7 active, 0 over
  - **Central Coast-** 3 active, 2 over*(Alexander and Cougar, FW treatment planned at both); change from last week: *Kid Bay now under
  - **Clayoquot North-** 4 active, 3 over*(Bawden (hydrolicer), Ross (harvest), Millar (new)); change from last week: *Dixon now under
  - **Clayoquot South-** 7 active, 4 over * (Fortune (new), Mussel (new), Rant (new), and Saranac); change from last week: *Bedwell now under
  - **Esperanza –** 2 active, 0 over
  - **Nootka-** 5 active, 0 over
  - **Port Hardy-** 4 active, 0 over
  - **Quatsino-** 3 active, 1 over * (Mahatta East (new, harvest)
  - **Sunshine Coast –** 5 active, 0 over
  - **Summary: 40 sites, 10 over** (6 new overthreshold, 3 from last week under)
- **Field updates**
  - No field work in AFH conducted this week. Q2 audits start next week.
- **Other updates**
  - [redacted] s.16(1)(c) s.20(1)(b)
  - FYI- Earlier this month I reported that VHSv had been detected in herring at Bedwell (Cermaq farm in Clayoquot Sound). [redacted] s.21(1)(a) s.21(1)(b)

Please let me know if you have any other questions; I would be happy to provide more detail.

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)

Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

No information has been removed or severed from this page

From: Diamond, Maria
Sent: Thursday, April 7, 2022 6:31 PM
To: Oswell, Alexandria
Cc: Sitter, Laura; Manchester, Howie
Subject: Compliance Summary to April 7th
Attachments: Compliance Summary to April 7, 2022.docx

Hi Alex,

Here's the summary (up to date to this afternoon) with a couple of notes within that need some discussion.

Maria

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary April 1 - 7, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
Dec 1	Apr 1	Rant	120 day follow-up – numbers still high…example kg avg, pcs, kg biomass on day 115.
Apr 1	Apr 2	Mussel Rock	New 24hr ME Handling. kg biomass, kg avg, pcs.
Apr 4	Apr 5	Millar	New 5d ME Handling kg imass, kg ag, pcs.

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
Mar 28	Apr 1	Shelter Bay	MR treatment
Mar 14	Apr 1	Baxter (Jaundice)	Diagnostic test results received.
Apr 3	Apr 4	Tsa-ya	New MR treatment – pen

Sea Lice Mitigations

s.20(1)(b)

Incident Date	Date Report	Facility	Details
Apr 8	Apr 1	Midsummer	Hydrolicer
Apr 3	Apr 4	Plover	H202
Apr 6	Apr 4	Fortune	Hydrolicer
Apr 7	Apr 4	Dixon	Hydrolicer
Apr 8	Apr 7	Swanson	FW bath treatment

Sea Lice Events

Incident Date	Date Report	Facility	Details

	Apr 1	Mahatta E	Email from [redacted] advising 2 pens left, no more counts as only 2 pens left and due to be empty next week.
Apr 3	Apr 4	Mussel Rock	Pre-treat 6.57 avg
Apr 3	Apr 4	Millar	Pre-treat 7.09 avg
Apr 4	Apr 5	Millar	Post-mech 1.23
Apr 5	Apr 6	Mussel Rock	Post-mech 1.24 avg
Apr 3	Apr 5	Alexander	Post-bath .53 avg
Apr 5	Apr 6	Plover	Pre-treat 5.88 avg
Apr 6	Apr 6	Plover	Post-bath H202 0.08 avg
Apr 4	Apr 6	Site 13	Follow-up 1.18 avg
Apr 6	Apr 7	Vantage	Follow-up 1.18 avg
Apr 6	Apr 7	Salten	Follow-up 1.56 avg
Mar 27	Apr 7*	Marsh	2 week follow-up post-SLICE avg .63
	*apparently this was stuck in [redacted] outbox. Feb. 19 counts were post-FW bath and pre-SLICE and avg was .63 (yes, same checked as a co-incidence). A couple of questions – is a follow-up necessary at 2 weeks post-SLICE since #'s were under threshold and therefore is it late. If so, do they only need to provide the 42d post-SLICE counts which would occur April 12th? All pens were counted.		
Apr 4	Apr 7	Mahatta E	Email from [redacted] advising site fallow as of Apr 4th. Over-threshold resolved in 19 days.

s.19(1)

From: McCorquodale, Brenda
Sent: Friday, April 8, 2022 4:00 PM
To: Shaw, Kerra; Sitter, Laura
Subject: RE: SL update- April 8, 2022

Thanks!
Met with the MinO today – they are interested in keeping up to speed on any licence repeatedly over the threshold. They suggested we continue to include updates in our biweekly briefings and note any farms over 20 days over threshold.
I think Kerra mentioned you were going to keep providing that info, so that is awesome.

Brenda

Brenda McCorquodale (she/ her/ elle)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Friday, April 8, 2022 11:10 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Subject: RE: SL update- April 8, 2022

Thanks Laura!!

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, April 8, 2022 10:44 AM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: SL update- April 8, 2022

Hi Brenda and Kerra,

Here are your sea lice updates as of April 8, 2022. Green highlights show newly active sites and red indicates threshold exceedance. No sites are approaching the 42 day exceedance limit (we have a trigger set for 30 days to inform you if any farms are getting close).

1. Sea lice
- **Broughton-** 8 active, 0 over (note: new active site)
- **Central Coast-** 4 active, 0 over (note: new active site; Alexander under from last week)
- **Clayoquot North-** 3 active, 1 over (Dixon; Millar under from last week)
- **Clayoquot South-** 6 active, 2 over (Bedwell, Fortune; Mussel and Plover under from last week)
- **Esperanza –** 2 active, 0 over
- **Nootka-** 5 active, 0 over

- **Port Hardy-** 4 active, 0 over
- **Quatsino-** 2 active, 1 over (Mahatta West; Mahatta East under from last week)
- **Sunshine Coast –** 5 active, 0 over

Summary: 39 sites, 4 over

2. Field update

- This week the Fish Health crew **audited 4 sites**: 3 on the Central Coast and 1 in Quatsino. **3 sea lice audits were performed**: 2 sea lice audits on the Central Coast were underthreshold, and 1 was overthreshold in Quatsino (this exceedance has been reported). There are **no issues of non-compliance** noted from these audits. The field team will be in Port Hardy and the Broughton over the next two weeks. A field crew from the BATI agreement may join the team during their audits in the Broughton.

Let me know if you have any other questions!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Sandberg, Krista
Sent: Tuesday, April 12, 2022 3:12 PM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie; Price, Derek
Subject: RE: Sea Lice Mitigation Events - web text for your review

Thanks for your review. I have cleaned up the document, adopted most of your suggestions, and sent to Kerra for review. Not sure if she will get this done this week, but I will keep things moving as much as I can before I go away. Next step is to have Comms and [redacted] review and approve.

Krista.

Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Cellular | Cellulaire 250-895-1723

Government of Canada / Gouvernement du Canada

Canada

From: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Sent: Tuesday, April 12, 2022 9:04 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: RE: Sea Lice Mitigation Events - web text for your review

Hi Everyone,
I've reviewed the document and think it's looking really good! I agree with Laura's comment that having a greater contrast of grey on the graph might help interpretation.
Thanks,
Alex

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, April 8, 2022 12:38 PM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: RE: Sea Lice Mitigation Events - web text for your review

Thanks for this, Krista!

Howie and I have finished reviewing it. It would be great for Derek and Alex to give it a once-over sometimes next week, then we will send to Kerra ☺

Talk soon!

Laura

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: Thursday, April 7, 2022 4:23 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>;

Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: Sea Lice Mitigation Events - web text for your review

Hi Fish Health Team,

In anticipation of the upcoming posting of our new Sea Lice Mitigations public reports, I have drafted some preliminary web text that I would like you all to review. I am certainly not the expert on this, so please feel free to make changes as needed! I really just wanted you to have something to start with 😊 Please track changes on the document below, and once you have all provided comments, I will clean it up and we can pass it on to Kerra for approval.

Z:\1. PUBLIC REPORTING\9. Sea Lice\4. Sea Lice Mitigation Reports\Sea Lice Mitigation - web text.docx

Thanks!
Krista.

Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Fisheries and Oceans Canada | Pêches et Océans Canada
krista.sandberg@dfo-mpo.gc.ca
Cellular | Cellulaire 250-895-1723

From: Sitter, Laura
Sent: Thursday, April 14, 2022 7:18 PM
To: McCorquodale, Brenda; Shaw, Kerra
Subject: Sea lice updates- April 14, 2022

Hi Brenda and Kerra,

I hope you had a good week! Here are the sea lice and field updates as of today:

- **Sea lice updates**
  - **Broughton-** 8 active, 0 over
  - **Central Coast-** 4 active, 0 over
  - **Clayoquot North-** 3 active, 1 over (Millar Channel new, Dixon); Fortune now under
  - **Clayoquot South-** 6 active, 3 over (Bare Bluff (new), Mussell Rock (new), Bedwell); Fortune now under
  - **Esperanza –** 2 active, 0 over
  - **Nootka-** 5 active, 0 over
  - **Port Hardy-** 5 active, 0 over (Doyle now active)
  - **Quatsino-** 2 active, 1 over (Mahatta West)
  - **Sunshine Coast –** 5 active, 0 over
  - **Summary: 40 sites, 4 over**
- **Field updates**
  - The AFH field team visited 5 sites this week, 4 in Port Hardy (Shelter Bay, Shelter Pass, Duncan, Doyle) and 1 in the Broughton (Midsummer). Sea lice audits were performed at 4/5 sites and were all under threshold.
  - No compliance of other issues noted during audits.

Let me know if you have any questions, and have a great long weekend!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: [redacted]
Sent: Tuesday, April 19, 2022 2:45 PM
To: Manchester, Howie
Cc: Sitter, Laura; Stenhouse, Shawn
Subject: RE: Sea lice Counting Event - unreported

Hello Howie,

The pen numbers below appear to be wrong. The pens counted on January 30 were [redacted] and the pen counted on Feb 3 was [redacted] At the time the index pen was [redacted] That may be the reason it was not reported however we generally try and report overthreshold regardless of whether or not the index pen is included.

Kind Regards,

[redacted]

CERMAQ

Phone + [redacted]

Cermaq Canada Ltd.
203 - 919 Island Hwy
V9W 2C2 Campbell River, BC, Canada

Cermaq.ca Facebook Twitter

From: Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>
Sent: April 11, 2022 4:23 PM
To: [redacted]
Cc: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Stenhouse, Shawn <Shawn.Stenhouse@dfo-mpo.gc.ca>
Subject: Sea lice Counting Event - unreported

Hi [redacted]

I'm just getting caught up with some of the 2022Q1 site visits compliance data our team assessed while on site at Millar Channel on March 2,2022.

While reviewing on site sea lice records it was noted that there was a three pen Counting Event conducted between January 30th and February 3, the average motile L.salmonis for this event was calculated to be 3.13 (please see table below). No record of this over threshold event was reported to DFO. I do realize that a later Counting Event (Feb 6 -9) over threshold was reported. Please let me know if there is a reason that the Jan 30th – Feb 3 counting event was not reported.

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Date	Pen	Avg/fish	Count average	Comment
				In the January abundance

30-Jan-22	[redacted]	2.75	3.13	reports
30-Jan-22	[redacted]	3.30		In the January abundance reports
3-Feb-22	[redacted]	3.35		Obtained from the site during audit

Thanks
Howie

Howie Manchester BSc
Senior Aquatic Science Biologist
Fisheries and Oceans Canada / Peches et Oceans Canada
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations - Fish Health
#103 2435 Mansfield Drive
Courtenay, B.C
Cell: 250 331 1927
Fax: 250 703 0921

s.20(1)(b)

From: Sitter, Laura
Sent: Tuesday, April 19, 2022 3:43 PM
To: Shaw, Kerra; Price, Derek; Oswell, Alexandria; Manchester, Howie
Subject: RE: Delousing treatment inspection form

Our first inspection is this Thursday- we will be inspecting the SFI system. I'm contacting the companies weekly to work out schedules based on the shifting needs but should have a few more lined up for next week and beyond. ☺

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Tuesday, April 19, 2022 12:40 PM
To: Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>
Subject: RE: Delousing treatment inspection form

Great, thanks Derek! Can you folks please send me a schedule for some of these inspections? I'll let Brenda know…

From: Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Sent: Tuesday, April 19, 2022 11:24 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: Delousing treatment inspection form

Please find attached version 1.0 of our inspection form. We will be modifying this as we conduct the first couple of inspections and release an improved version early in May.
All feedback is welcome.

Cheers!

Derek Price, MV, PhD

Epidemiologist, Aquaculture Fish Health
Aquaculture Management Division / Fisheries and Oceans Canada
Derek.Price@dfo-mpo.gc.ca
Tel: 250-703-0929 Cell: 250-850-9362

From: Metcalf, Vanessa
Sent: Tuesday, April 19, 2022 5:11 PM
To: Sitter, Laura
Subject: Wild monitoring notes

- Wild fish Sea Lice monitoring April 19th
- We intend to add a COL for 2022 to require monitoring of sea lice
- AMD would like to create a WG to figure out a step wise approach to the requirements of AMD and where sampling can be standardized
- Will reduce the number of fish killed for monitoring, creating synergies were possible
- Industry Comments:
- Some FN are in control of the monitoring, so it may be difficult for licence holders to dictate how this is managed
- Maybe an area based approach is the best way to address this?
- Maybe FN capacity funding would be important?
- Will DFO collate the information into a report? (DFO doesn't know yet)
- Will this info be posted? (DFO doesn't know yet).
- Industry has invested heavily in their data and they are happy to share what they have found, but want to ensure the integrity remains.
- The intent on the use of the data is important to industry, if that is to be a condition
- Language (at the direction of the department) is vague and we could see scope creep here in the future.
- Concern with this expanding
- What are we voluntarily agreeing to with the COLs?
- Concern with including "everything under a Section 52 licence"
- Essentially publishing data before publishing
- "For Active Facilities growing Atlantic salmon, Licence Holders are required to monitor wild salmon for sea lice as per the direction of the Department. All data from sea lice monitoring on wild salmon conducted under a Section 52 DFO scientific permit must be submitted to the Department annually starting January 15, 2023, for the previous calendar year, or upon request of a Fishery Officer or Fishery Guardian."
- They feel uninformed on what the creep can be if "all data" under the section 52 licence.
- Partnership could
- Where does the line stop for is required?
- Can the changes occur the Section 52 licence, as they are annual and easier to change?
- What is the use of this data? How is it going to be used in Management, as is required for putting a burden on the licence holder.
- It is not their licences (section 52), so how can they mandate when the reports are due?

Vanessa Metcalf [she/her]
A/Manager, Aquaculture Resource Management (April 14-24, 2022)
Aquaculture Management Division | Division de la gestion de l'aquaculture
Fisheries and Oceans Canada | Peche et Oceans Canada
Government of Canada | Gouvernement du Canada
Telephone | 236-334-4953
From the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations.

From: Sitter, Laura
Sent: Tuesday, April 19, 2022 5:30 PM
To: Shaw, Kerra; Manchester, Howie; Price, Derek; Metcalf, Vanessa
Subject: Notes from today's meeting
Attachments: Meeting with BSCFA April 19.docx

Hi everyone,

Here are the notes from today's meeting.

Laura

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

Wild fish Sea Lice monitoring April 19th
BCSFA and DFO AMD: What we heard

- DFO intends to add a COL for 2022 to require monitoring of sea lice on wild fish. Previous conversations with each individual company did not indicate any significant concerns
    - The intent is for wild salmon monitoring to continue as it currently has been (i.e. requirements for ASC certification or First Nations' agreements)
- AMD would like to create a WG this fall to figure out a step-wise approach to the requirements of AMD and where sampling can be standardized
- Will reduce the number of fish killed for monitoring, creating synergies were possible

Industry Comments:

- Some FN are in control of the monitoring, so it may be difficult for licence holders to dictate how this is managed. Suggest engagement with First Nations to discuss monitoring requirements.
- Progression of monitoring should include FN Guardian and Stewardship programs, and account for building capacity with these groups
- Need to consider what this information will be used for and how it will be reported. Consider removing identifiable elements (e.g. company name). Maybe an area based approach is the best way to address this?
- Maybe FN capacity funding would be important?
- Industry has invested heavily in their data and they are happy to share what they have found, but want to ensure the integrity of the dataset remains.
- The intent on the use of the data is important to industry, if that is to be a condition
- Language ("at the direction of the department") is vague and we could see scope creep here in the future. Significant concerns about "scope creep" and concern that vagueness of condition commits industry to burdens that have not even been thought of yet.
- Concern with including "All data" under a Section 52 licence. Would prefer to keep this sea lice condition pertinent to sea lice (e.g. "All sea lice data…")
- Potential language: "For Active Facilities growing Atlantic salmon, Licence Holders are required to monitor wild salmon for sea lice as per the direction of the Department. All data from sea lice monitoring on wild salmon conducted under a Section 52 DFO scientific permit must be submitted to the Department annually starting January 15, 2023, for the previous calendar year, or upon request of a Fishery Officer or Fishery Guardian."
- This meeting should be considered an introduction to a COL and should not be considered consultation with industry. There are too many unanswered questions with not enough background. They feel uninformed on what the creep can be if "all data" under the section 52 licence.
- Partnership could
- Where does the line stop re: scope creep with language "At the Direction of the Department…"
- Can the changes occur the Section 52 licence instead of the AQFF licence, as they are annual and easier to change?
- What is the use of this data? How is it going to be used in Management, as is required for putting a burden on the licence holder.
- Companies will often hire third parties to conduct monitoring, or FN partners conduct the monitoring. Therefore the Section 52 licence is not issued to the company. There is a potential issue where the company is on the line for information collected under a licence they were not issued. There can be difficulties getting information from companies and FNs for a specific date.

Actions:

- DFO to provide rationale and justification for this new burden to industry
- DFO to provide potential language of COL to industry
- Potentially add this topic to the next FAIP agenda

No information has been removed or severed from this page

From: Sitter, Laura
Sent: Tuesday, April 19, 2022 6:21 PM
To: McCorquodale, Brenda; Shaw, Kerra
Subject: SL update- April 19

Hi Brenda and Kerra,

I know it's early in the week to be getting a SL update, but earlier you had asked to know if farms exceed the threshold for 20 days or more, and if a farm exceeds multiple times. I will include these updates in my regular reviews in the future. As a reminder, these are not instances of non-compliance:

- 4 farms have exceeded the threshold multiple times this Outmigration: Bedwell, Dixon, Fortune, and Millar (all Cermaq farms, all in Clayoquot Sound).
- Currently, only 1 farm has exceeded the threshold for 20 days: Bedwell (20 days overthreshold as of today, April 19)
- The outmigration, 3 other farms have exceeded the threshold for more than 20 days: Bawden (27 days), Ross (20), and Saranac (25). These exceedances are now over.

Hope this helps with any questions you may get. Let me know if you have any questions!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Aitken, Kelly
Sent: Wednesday, April 20, 2022 11:14 PM
To: Sitter, Laura
Attachments: Occur refferals template-[redacted]

Hi Laura,
I will need all of the emails and correspondence between DFO and [redacted] sea lice compliance issues detailed in the referral form, as well as any other supporting documents specific to this suspected violation.
I will request a cansay at a future date.
Thanks so much,
Kelly

Kelly Aitken (she/her)
Fishery Officer | Agent des Pêches
Fisheries and Oceans Canada | Pêches et Océans Canada
Pacific Region | Région du Pacifique
1520 Tamarac Street, Campbell River
Phone | Téléphone: (250) 286-5816
Fax: (250) 754-0391
To report a violation: 1-800-465-4336 or 604-607-4186
Email | Courriel: kelly.aitken@dfo-mpo.gc.ca
This email was sent from the traditional territory of the We Wai Kai and We Wai Kum Nations

Fisheries and Oceans Canada | Pêches et Océans Canada

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From: Diamond, Maria
Sent: Friday, April 22, 2022 11:14 AM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie
Subject: Compliance Summary to April 22 a.m.
Attachments: Compliance Summary to April 22, 2022.docx

Good morning – I've finally managed to get caught up. Here is the summary of notifications from about April 7 to this morning.

M.

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary April 7 - 22, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
Dec 1	Apr 1	Rant	140 day follow-up –
Apr 8	Apr 10	Gore	24hr - Other – uplift failure Diver cleanout pcs, kg avg, kg biomass
Apr 12	Apr 12	Dixon	5day – Handling kg ag, pcs, kg biomass
Apr 13	Apr 14	Bedwell	24hr – Handling pen – pcs, g avg, kg biomass
Apr 15	Apr 16	Atrevida	24hr - Other – Diver cleanout (happened in March too) kg avg, pcs, kg avg
Apr 20	Apr 21	Bare Bluff	24hr – Handling due to H202 tx, kg biomass, g avg, pcs
Dec 2/21	Apr 18	Rant	140d follow-up ME concluded as site is now empty.

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
Apr 8	Apr 11	Plover	MR treatment
Apr 9	Apr 11	Bare Bluff	MR treatment
Apr 12	Apr 13	Bull Harbour	MR treatment
Apr 14	Apr 15	Tsa-ya	MR treatment pens
Apr 16	Apr 18	Bedwell	Vibrio OTC treatment

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Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
Apr 8	Apr 1	Midsummer	Hydrolicer
Apr 12	Apr 11	Bedwell	H202
Apr 13	Apr 11	Bawden	Hydrolicer – Cancelled due to enviros
Apr 15	Apr 14	Ahlstrom	Hydrolicer
Apr 17	Apr 18	Mussel Rock	Hydrolicer
Apr 18	Apr 14	Shelter Pass	FW bath
Apr 18	Apr 16	Concepcion	Hydrolicer
Apr 19	Apr 14	Bare Bluff	H202
Apr 20	Apr 18	Culloden	Hydrolicer
Apr 21	Apr 18	Midsummer	SLICE – well below threshold

Sea Lice Events

Incident Date	Date Report	Facility	Details
Apr 9	Apr 11	Fortune	Pre-tx 6.71 avg
Apr 10	Apr 11	Fortune	Post-mech 0.72 avg
Apr 9	Apr 11	Mahatta West	Follow-up 8.30 avg Harvesting
Apr 10	Apr 12	Dixon	Pre-tx 5.01 avg
Apr 11	Apr 12	Dixon	Post-tx 1.07 avg
Apr 11	Apr 13	Swanson	Pre-tx 1.33 avg
Apr 13	Apr 14	Bare Bluff	Exceed 3.70 avg
Apr 13	Apr 14	Midsummer	Pre-tx 1.77 avg
Apr 13	Apr 14	Millar	Exceed 4.30 avg
Apr 13	Apr 14	Mussel	Exceed 3.48 avg
Apr 14	Apr 16	Ahlstrom	Pre-tx 2.38 avg
Apr 14	Apr 17	Midsummer	Post-FW & Pre-SLICE (some pens) 0.13 avg
Apr 15	Apr 15	Swanson	Post-FW 0.15 avg
Apr 15	Apr 17	Marsh Bay	Post-SLICE, Pre-tx (Pen only) 0.86 avg
Apr 16	Apr 18	Marsh	Post-mech Pen only 0.35 avg
Apr 17	Apr 18	Concepcion	Pre-tx 2.13 avg
Apr 17	Apr 18	Millar	Follow-up 4.40 avg
Apr 18	Apr 18	Culloden	Pre-tx 1.56 avg
Apr 19	Apr 19	Bedwell	Pre-tx 7.12

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Apr 20	Apr 20	Bedwell	Post-tx 0.60 avg
Apr 20	Apr 21	Bawden	Exceed 4.68 avg
Apr 19	Apr 21	Ahlstrom	Post-mech 1.12 avg (from 2.38 = 53% reduction) This would, by definition in current COL's be a tx failure).

No information has been removed or severed from this page

From: Sitter, Laura
Sent: Friday, April 22, 2022 2:51 PM
To: Aitken, Kelly
Cc: Oswell, Alexandria
Subject: RE:

Hi Kelly,

Thanks for this. I will collect the items I have. There were several other people involved from DFO who will also have documents. I'm [redacted] for the next 2 weeks so your point-of-contact during that time will be our second vet, Alex Oswell. I've copied her here and she will distribute and gather the information for you. Is there is file she should save this information to?

Laura

From: Aitken, Kelly <Kelly.Aitken@dfo-mpo.gc.ca>
Sent: Wednesday, April 20, 2022 8:14 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject:

Hi Laura,
I will need all of the emails and correspondence between DFO and [redacted] sea lice compliance issues detailed in the referral form, as well as any other supporting documents specific to this suspected violation.
I will request a cansay at a future date.
Thanks so much,
Kelly

Kelly Aitken (she/her)
Fishery Officer | Agent des Pêches
Fisheries and Oceans Canada | Pêches et Océans Canada
Pacific Region | Région du Pacifique
1520 Tamarac Street, Campbell River
Phone | Téléphone: (250) 286-5816
Fax: (250) 754-0391
To report a violation: 1-800-465-4336 or 604-607-4186
Email | Courriel: kelly.aitken@dfo-mpo.gc.ca
This email was sent from the traditional territory of the We Wai Kai and We Wai Kum Nations

s.16(1)(c)
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Fisheries and Oceans Canada | Pêches et Océans Canada

From: Sitter, Laura
Sent: Friday, April 22, 2022 3:15 PM
To: [redacted]
Cc: Blasco, Nathan; Price, Derek
Subject: RE: Vessel inspection- Thursday April 28

Hi [redacted]

Thanks so much for the response. Yes, we will need someone to tour us through the vessel and to be available to answer any questions we may have. We expect to arrive at the site between 8-9am but can adjust the schedule to suit. We expect to be on site/vessel for ~3 hours.

I will [redacted] and Nathan will be your point of contact re: logistics. He is copied on this email.

Thank you!

Laura

From: [redacted]
Sent: Friday, April 22, 2022 11:54 AM
To: [redacted]; Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Blasco, Nathan <Nathan.Blasco@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: Re: Vessel inspection- Thursday April 28

Apologies for the late response.

Yes, an audit is welcome at any time. Will you have your own vessel? Can you give an approximate time of arrival? Depending on what is occurring they may be in the middle of loading or other activities so it would be good to line it up.

Thanks
[redacted]

From: [redacted]
Sent: Friday, April 22, 2022 9:59:25 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Blasco, Nathan <Nathan.Blasco@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>; [redacted]
Subject: RE: Vessel inspection- Thursday April 28

Hi Laura,
I'm just waiting on follow-up from the treatment team as to weather Thursday will be suitable for an audit. I assume, given this is the first one, that a comprehensive tour may be required to understand all aspects of the operation? I just want to ensure that there are vessel staff available to assist with this. I've cc'd [redacted] here.
Thanks,
[redacted]
Best regards,

s.19(1)

[redacted]
Mowi Canada West

Mobile: [redacted]
Email: [redacted]

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: April 20, 2022 10:42 AM
To: [redacted]
Cc: Blasco, Nathan <Nathan.Blasco@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Subject: Vessel inspection- Thursday April 28

Hi [redacted]

Thanks for letting me know that the Aqua Tromoy will be up at Shelter Pass next week. We would like to schedule a vessel audit on Thursday, April 28. We anticipate that 4 DFO staff will attend the vessel and site to observe all ongoing operations related to sea lice treatment on the site at that time. I anticipate that we would be on site for approximately 4 hours, arriving shortly after 9am.

Could you please send and confirm with [redacted] I don't have his email address.

Thank you!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

s.19(1)

From: Sitter, Laura
Sent: Friday, April 22, 2022 5:31 PM
To: McCorquodale, Brenda; Shaw, Kerra
Cc: Oswell, Alexandria
Subject: Sea lice update: April 22, 2022

Hi Brenda and Kerra,

Happy Earth Day! Here is your SL and FH compliance update for this week. I am copying Alex on this email because I will [redacted] and she will be providing you with updates in my absence.

Sea lice updates:

Broughton- 8 active, 0 over
Central Coast- 4 active, 0 over
Clayoquot North- 3 active, 2 over (Bawden new, Millar continued)
Clayoquot South- 5 active, 2 over (Bare Bluff and Mussel continued); Bedwell now under and Rant Point under/empty.
Esperanza – 2 active, 0 over
Nootka- 5 active, 0 over
Port Hardy- 5 active, 0 over
Quatsino- 2 active, 1 over (Mahatta West is harvesting, currently at 16 days overthreshold)
Sunshine Coast – 5 active, 0 over

Summary: 39 sites, 5 over (see that Rant Point is harvested). 5 sites have now exceeded the sea lice threshold multiple times during this outmigration: Bedwell, Dixon, Fortune, Bawden, and Millar. No sites are currently at or above 20 days since exceeding.

Field update:

- Due to COVID exposures and staff illness, no routine Fish Health audits were conducted this week. The team will be out in the field next week (Broughton Archipelalgo).
- Yesterday, 4 AMD staff (2 AFH and 2 AEO) attended Grieg's Culloden site on the Sunshine Coast to inspect Cermaq's SFI Hydrolicer sea lice treatment vessel. Staff were on site and on vessel for 2.5 hours inspecting every aspect of the vessel operation. AFH and AEO will continued to conduct sea lice treatment infrastructure inspections for the next several weeks to confirm compliance with COL and develop a routine inspection plan moving forward.

Please let us know if you have any questions,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576 **s.19(1)**
Laura.Sitter@dfo-mpo.gc.ca

Provided in excel format

From: Stenhouse, Shawn
Sent: Friday, April 22, 2022 6:46 PM
To: Sitter, Laura; Oswell, Alexandria
Subject: SL summaries
Attachments: Outmigration Exceedance Summary 2022.xlsx; March 2022 Outmigration review.xlsx

Hello Laura and Alex,

Here is what I have for the exceedance and first week of outmigration summaries.

Let me know if you need more details or if something is missing. The files will be in the same location as the graphs.

Cheers,
Shawn

Shawn Stenhouse
Aquatic Science Biologist | Biologiste en sciences aquatiques
Fisheries and Oceans Canada | Pêches et Océans Canada
Aquaculture Fish Health | Santé des poissons d'aquaculture
Aquaculture Environmental Operations | Opérations environnementales de l'aquaculture

Cellphone | Téléphone Portable 250-465-8932

Government of Canada / Gouvernement du Canada

Canada

From: Sitter, Laura
Sent: Friday, April 22, 2022 7:53 PM
To: [redacted]
Cc: Oswell, Alexandria; Price, Derek; AQFF.FishHealth (DFO/MPO)
Subject: Reminder: COL 6.13 report due June 1

Follow Up Flag: Follow up
Flag Status: Completed

Dear industry aquaculture vets,

I wanted to remind you that as per COL 6.13, "By June 1, 2022, the Licence Holder must complete and submit a scientific analysis, to the satisfaction of the Department, regarding the viability of sea lice that are captured before, during, and after sea lice bath treatments." These include hydrogen peroxide and freshwater bath treatments, depending on which tools your company employs. Please ensure these are submitted on time to the AQFF.Fish Health inbox.

Additionally, I will [redacted] until May 6, 2022. For any questions or concerns that arise during this time, please contact Alex or Derek (copied on this email).

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

s.19(1)

From: Neumann, Carla
Sent: Saturday, April 23, 2022 12:34 PM
To: Sitter, Laura
Cc: Oswell, Alexandria
Subject: [redacted]
Attachments: Occur refferals template-[redacted]

Laura,

I have been in receipt of your Conservation and Protection Aquaculture Occurrence Referral for Investigation specifically for [redacted]

In order to proceed with this file I will need more information from your sector.

Although not an exhaustive list can you please forward the following:
-Notes written or electronic.
-Emails between the company and DFO on this matter.
-How and when you initially became aware of the Sea Lice exceedance.
-Any other items relevant to this matter.

As a reminder it is asked that you keep email chatter to a minimum on this topic and all conversations will be disclosable and therefore need to be forwarded to myself.

Please let me know if you have any questions.

Thanks,
Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

s.16(1)(c)

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page 17

From: Neumann, Carla
Sent: Saturday, April 23, 2022 12:36 PM
To: Sitter, Laura
Cc: Oswell, Alexandria
Subject: [redacted]
Attachments: Occur refferals template- [redacted]

Laura,

I have been in receipt of your Conservation and Protection Aquaculture Occurrence Referral for Investigation specifically for [redacted]

In order to proceed with this file I will need more information from your sector.

Although not an exhaustive list can you please forward the following:
-Notes written or electronic.
-Emails between the company and DFO on this matter.
-How and when you initially became aware of the Sea Lice exceedance.
-Any other items relevant to this matter.

As a reminder it is asked that you keep email chatter to a minimum on this topic and all conversations will be disclosable and therefore need to be forwarded to myself.

Please let me know if you have any questions.

Thanks,
Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

s.16(1)(c)

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page 17

From: Neumann, Carla
Sent: Saturday, April 23, 2022 12:37 PM
To: Sitter, Laura
Cc: Oswell, Alexandria
Subject: [redacted]
Attachments: Occur refferals template- [redacted]

Laura,

I have been in receipt of your Conservation and Protection Aquaculture Occurrence Referral for Investigation specifically for [redacted]

In order to proceed with this file I will need more information from your sector.

Although not an exhaustive list can you please forward the following:
-Notes written or electronic.
-Emails between the company and DFO on this matter.
-How and when you initially became aware of the Sea Lice exceedance.
-Any other items relevant to this matter.

As a reminder it is asked that you keep email chatter to a minimum on this topic and all conversations will be disclosable and therefore need to be forwarded to myself.

Please let me know if you have any questions.

Thanks,
Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

s.16(1)(c)

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page 19

Provided in excel format

From: Price, Derek
Sent: Wednesday, April 27, 2022 3:09 PM
To: Shaw, Kerra; Sitter, Laura; Oswell, Alexandria; Manchester, Howie
Cc: Blasco, Nathan; Fraser, Blair; Mercer, Nick
Subject: SFI inspection
Attachments: risk_tool_SFI_Culloden_20220421.xlsx

Dear colleagues,

Please find attached the risk tool form for our first inspection to delousing vessels. A short description of the process follows (thanks Laura).

Prior to treatment, the site staff prepare the fish and the pens to be treated. The fish are starved for 3 days prior to treatment. This helps reduce mortalities due to stress and handling. All equipment must be removed from pens to facilitate the seining of the pen. This includes removing feeder mechanisms, oxygen supplement devices, and adjusting the below-water cameras. On the day of treatment, an operations crew including divers arrive at the site. The divers and operations crew, along with site staff, are responsible for setting up and operating the seine net. This involves "corking" the net and slowly shrinking the "pocket" (the space where the fish are crowded). There is one (or two) staff members on the treatment vessel responsible for fish welfare. They monitor the stress and handling of the fish by looking at density, number of fish rolls, gasping, and other indicators of stress and compromised welfare. They tell the ops and site crew to adjust the pocket and tell the boat crew to adjust the pump rate.

Once the vessel is in place beside the pen to be treated and the seine is in place, a large pipe is lowered into the pocket. The fish and some water are pumped out of the pen at a fixed rate and enter the SFI mechanical delousing system. The fish and water are pumped up the ship and "welled" up onto a stainless steel table. The fish are pushed (by the welling water) into troughs to line them up before passing through the system. As they move forwards, they pass through a "pre-spray" area where gentle streams of ocean water rinse the fish dorsally and ventrally. This provides the first part of the delousing, but not the main part. After this, they pass over a grated "dewatering" table so that any water travelling with them is drained so only the fish pass through the system. Then the fish travel down through a ~6m vertical pipe where two sets of 360 degree high-pressure water jets spray and lice off the fish. The pressure of the water is adjusted by the animal welfare technicians who balance lice removal with damage to the fish. On the day we visited the SFI system, they were treating ~2kg fish during a time of scale growth so the pressure [redacted] The fish exit the pipe and slide over a stainless steel table towards the exit pipe. Here the animal welfare technician observes the fish and removes some as they exit the system to perform sea lice counts in a steel tote beside the table. They perform several counts during the beginning of the pumping process to "dial in" the right settings for lice removal. After they have adjusted the initial settings, they observe the fish without performing counts. The fish slide over a final set of dewatering bars where water, lice, and scales are discarded, and the fish slide down the pipe back into the pen behind the seine (so treated and untreated fish are not mixed). From the time a fish enters the system to the time a fish leaves the system, less than 60 seconds passes.

The water that was removed from the fish at the various dewatering bars travels to a large drum filter. The water must flow through the filter, which has a filter pore size of [redacted] microns ([redacted]. As the water flows through, the filter rotates to bring any filtrate (filtered debris) up and out of the water flow. Pressurized water is sprayed to clean the filters, and the debris falls into a channel away from the drum filter. The channel deposits the debris and spray water onto a belt filter with a pore size of [redacted] microns [redacted] Here the debris (mostly fish scales, mucus, and lice) are removed from the water into a large plastic bin. The water flows out of the boat, with the filtered water from the drum filter, via a large pipe in the stern of the vessel. This pipe is fitted with a filter sock (pore size [redacted] microns or [redacted] to catch any possible debris that has escaped the two primary filters. The debris in the bin is removed by a barge and disposed of in a landbased facility or in a site's ensilage system.

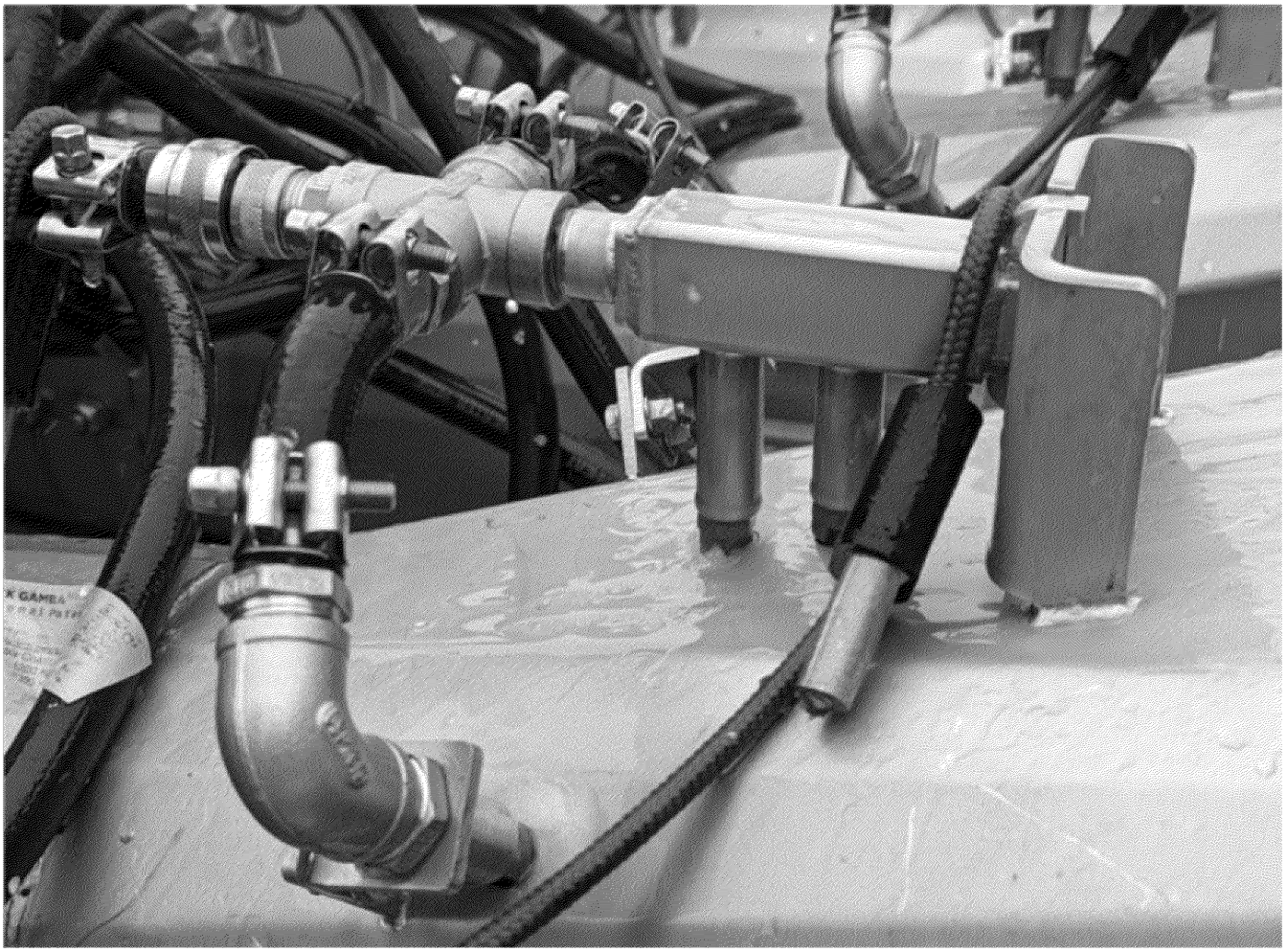
All three filters are visually monitored in-person by the boat and ops crew, as well as visually by cameras on the boat deck. Any deviations from normal are noted and corrected. Sometimes this requires stopping all operations then resuming once resolved. Ideally, the SFI can treat 2 pens at a site per day.

Some pictures so you can have a better idea of the process and the system.

s.20(1)(b)

General view

Pumping from "the pocket"



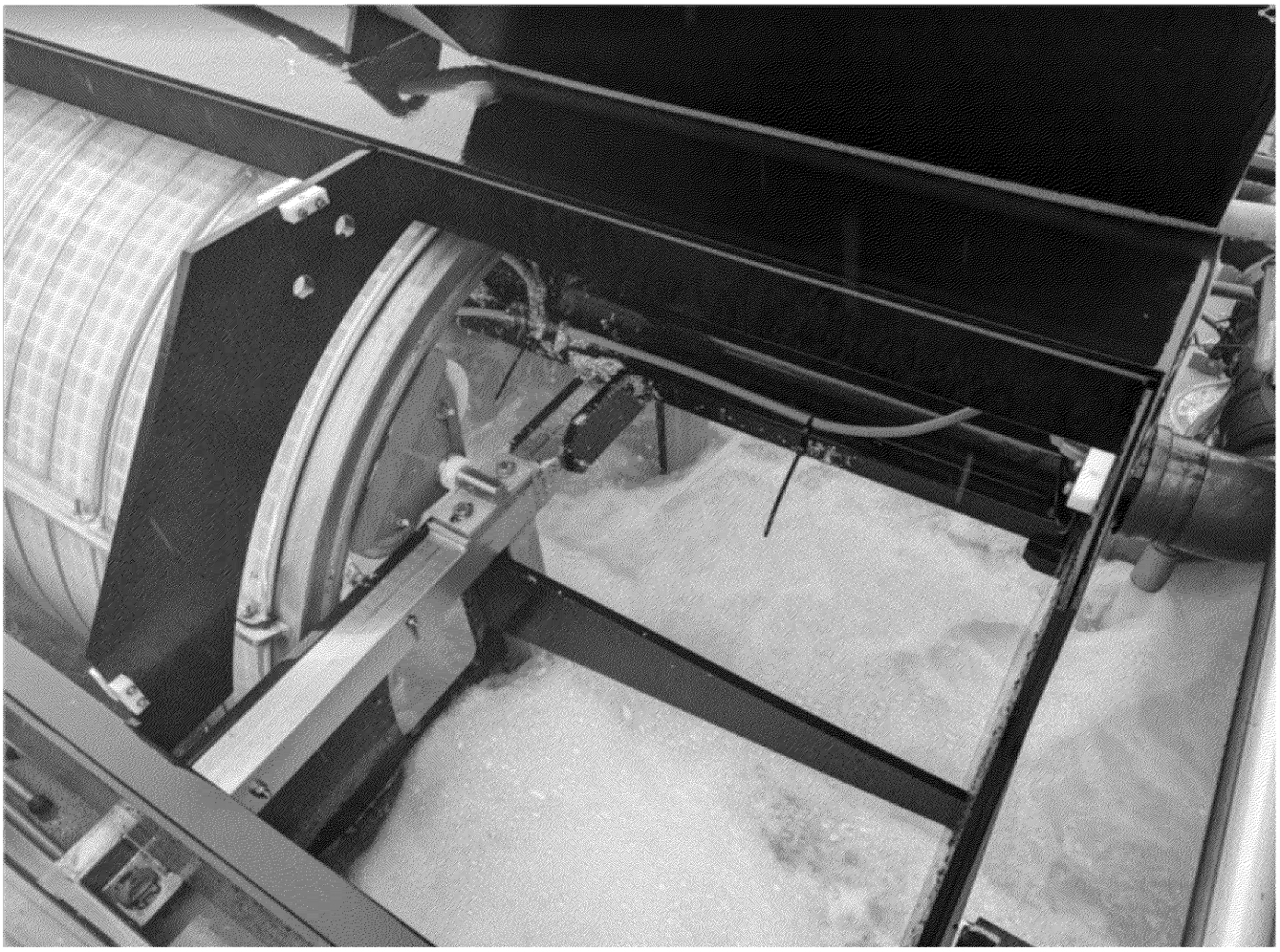
Pre-spray

High-pressure jet area

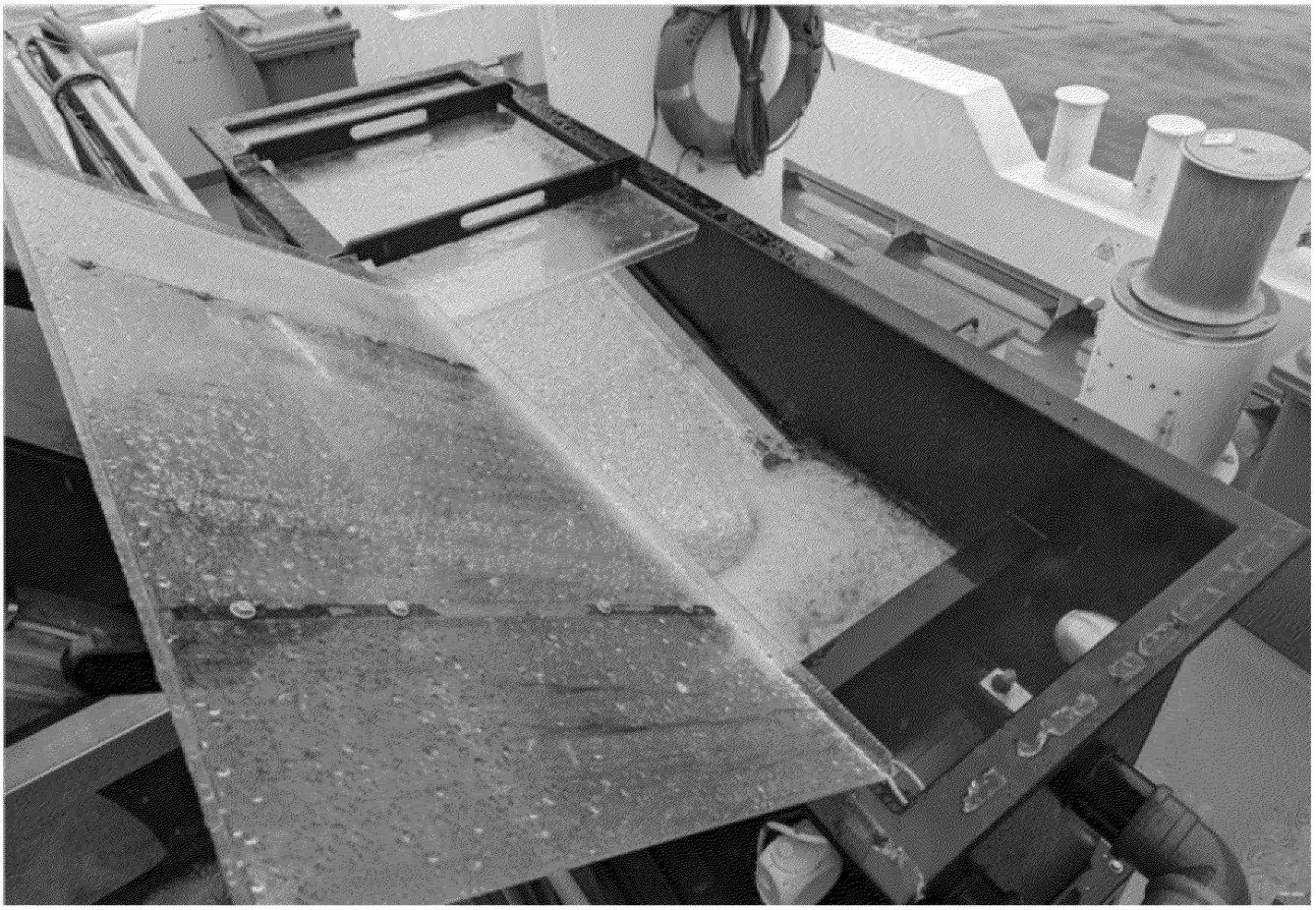
Sampling tote

s.19(1)

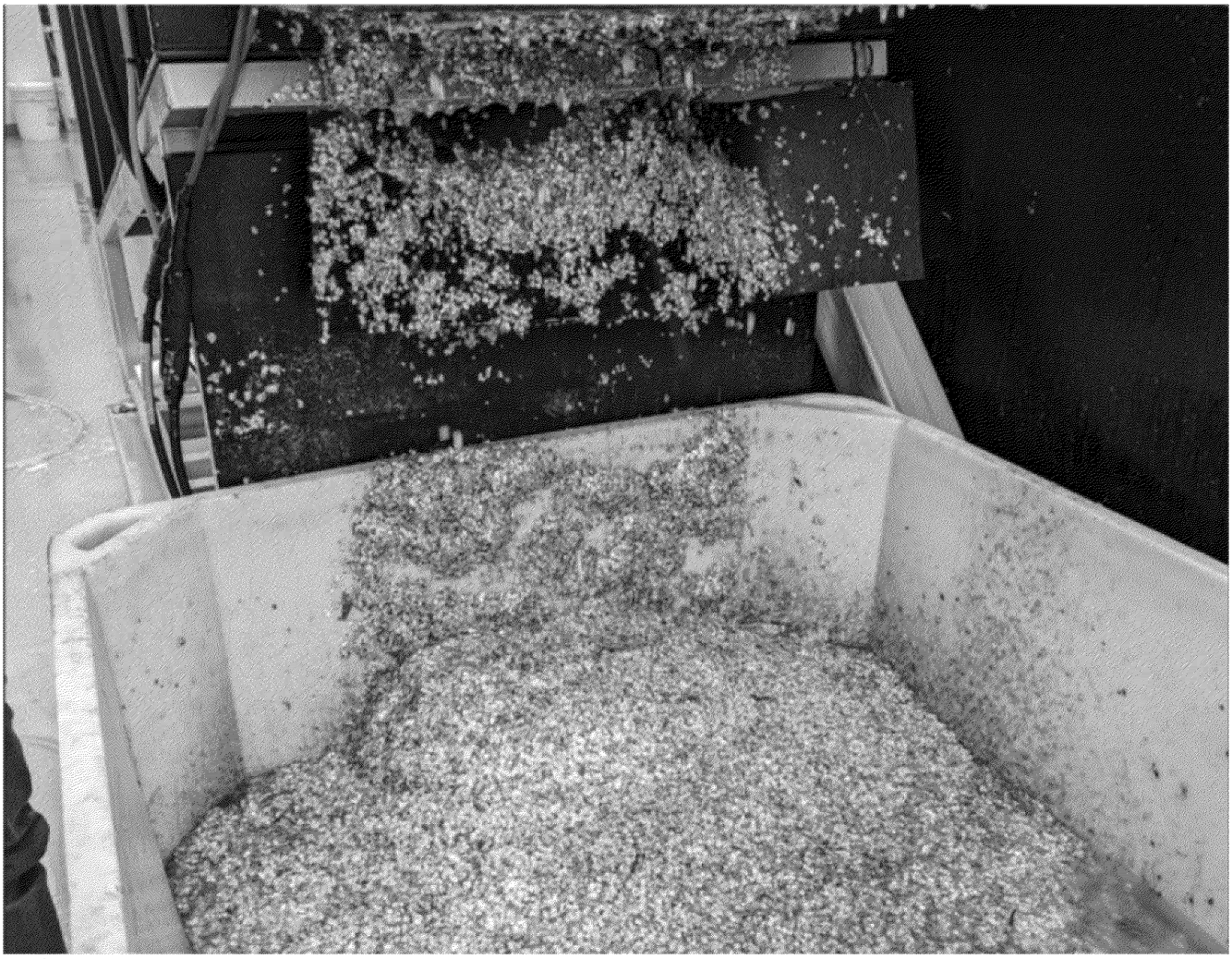
Incidental catch tank



Drum filter



Belt filter



Lice/scale tote

"The sock"

General view of the filtering area

Laura "vetsplaning"

Regards,

Derek Price, MV, PhD

Epidemiologist, Aquaculture Fish Health
Aquaculture Management Division / Fisheries and Oceans Canada
Derek.Price@dfo-mpo.gc.ca
Tel: 250-703-0929 Cell: 250-850-9362

s.19(1)

Government of Canada / Gouvernement du Canada

Canada

From: Diamond, Maria
Sent: Thursday, April 28, 2022 6:04 PM
To: Oswell, Alexandria; Manchester, Howie; Sitter, Laura
Subject: Compliance Summary to April 28
Attachments: Compliance Summary to April 28, 2022.docx

Here's the Compliance Summary to date for tomorrow's meeting. If anything comes in before our meeting I'll update it and resend.

Maria

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary April 22 - 28, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
Apr 22	Apr 22	Shelter Bay	MR treatment
Apr 24	Apr 25	Steamer	MR treatment
Apr 25	Apr 26	Plover Point	MR treatment

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
Apr 26	Apr 26	Millar Channel	Hydrolicer
Apr 29	Apr 27	Dixon Bay	Hydrolicer – Pens

Sea Lice Events

Incident Date	Date Report	Facility	Details
Apr 19	Apr 21	Ahlstrom	Post-mech 1.12 avg (from 2.38 = 53% reduction) This would, by definition in current COL's be a tx failure).
Apr 22	Apr 23	Culloden	Post-tx 0.70 avg (note only 55% reduction) hydrolicer
Apr 23	Apr 24	Mussel Rock	Pre-tx 3.73 avg hydrolicer
Apr 24	Apr 25	Mussel Rock	Post-tx 0.98 avg
Apr 23	Apr 25	Salten	Post-tx 0.87 avg SLICE did not achieve 60% reduction

s.20(1)(b)

Apr 23	Apr 25	Monday Rock	Exceed 4.93 avg Harvest to start in 2 weeks
Apr 24	Apr 25	Site 13	Post-tx 0.93 avg SLICE actually avg went up 0.10 in motile avg. 60% reduction not achieved.
Apr 25	Apr 26	Vantage	Post-tx 0.69 avg SLICE, only 42% reduction
Apr 25	Apr 26	Bawden	Follow-up 13.88 avg (Note: April 13th hydrolicer tx cancelled after some of the pens treated.
Apr 26	Apr 28	Monday Rock	Follow-up 9.91 avg, Harvest to start early May
Apr 27	Apr 28	Bare Bluff	Follow-up 2.01 avg. These counts along with the (pre/post) counts from the cancelled H202 Tx & cover all the pens. This demonstrates that site is below threshold. Tx will be rescheduled to occur when current OTC tx is completed.

From: [redacted]
Sent: Thursday, April 28, 2022 6:31 PM
To: AQFF.FishHealth (DFO/MPO)
Cc: [redacted] Sitter, Laura
Subject: RE: Sea Lice Mitigation Notification - Midsummer UPDATE

Hi Maria,
Just following up on below – is anything additional required or has everything been squared away?
Thanks,
[redacted]

Best regards,

[redacted]
Mowi Canada West

Mobile: [redacted]
Email: [redacted]

This email (and any attachments) contain Mowi confidential information and may contain competitive information.

MOWI

From: [redacted]
Sent: April 22, 2022 9:36 AM
To: AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>
Cc: [redacted] Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; [redacted]
Subject: RE: Sea Lice Mitigation Notification - Midsummer UPDATE

Also to follow-up, I received a warning for a late submission (24 hours) for the Midsummer post-treatment counts just a couple hours before this, so they must have been received? Just want to confirm that no communication is being mixed up here.

Best regards,

[redacted]
Mowi Canada West

Mobile: [redacted]
Email: [redacted]

This email (and any attachments) contain Mowi confidential information and may contain competitive information.

MOWI

From: [redacted] **s.19(1)**
Sent: April 21, 2022 1:58 PM
To: AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>

Cc: [redacted]
Subject: Re: Sea Lice Mitigation Notification - Midsummer UPDATE

Both pre and post counts were submitted. I've forwarded them again just now.
Thanks,
[redacted]

Get Outlook for iOS

From: AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>
Sent: Thursday, April 21, 2022 1:45:34 PM
To: [redacted]; AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>
Cc: [redacted]
Subject: RE: Sea Lice Mitigation Notification - Midsummer UPDATE

Good afternoon,

Wondering if this treatment was cancelled as there were no pre or post-treatment counts submitted for this April 8th scheduled treatment.

Please advise,

Maria

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

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s.19(1)

From: [redacted]
Sent: Monday, April 4, 2022 9:23 AM
To: AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>
Cc: [redacted]
Subject: Sea Lice Mitigation Notification - Midsummer UPDATE

Hello,
Please see attached the updated sea lice mitigation notification for Midsummer. The start of the treatment has

been delayed due to weather.
If there are any questions or concerns please contact me.

Best regards,

[redacted]
Mowi Canada West
Mobile: [redacted]
Email: [redacted]

s.19(1)

This email (and any attachments) contain Mowi confidential information and may contain competitive information.

No further information has been severed or removed from this page

From: Oswell, Alexandria
Sent: Wednesday, May 4, 2022 1:12 PM
To: Neumann, Carla; Sitter, Laura
Subject: [redacted]

Hi Carla,
What is the best way to provide this information? Is there a specific folder I should put documents into?
Thanks,
Alex

From: Neumann, Carla <Carla.Neumann@dfo-mpo.gc.ca>
Sent: Saturday, April 23, 2022 9:34 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: [redacted]

Laura,

I have been in receipt of your Conservation and Protection Aquaculture Occurrence Referral for Investigation specifically for [redacted]

In order to proceed with this file I will need more information from your sector.

Although not an exhaustive list can you please forward the following:
-Notes written or electronic.
-Emails between the company and DFO on this matter.
-How and when you initially became aware of the Sea Lice exceedance.
-Any other items relevant to this matter.

As a reminder it is asked that you keep email chatter to a minimum on this topic and all conversations will be disclosable and therefore need to be forwarded to myself.

Please let me know if you have any questions.

Thanks,
Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

s.16(1)(c)

From: Shaw, Kerra
Sent: Thursday, May 5, 2022 12:49 PM
To: Sitter, Laura; Manchester, Howie; Oswell, Alexandria; Price, Derek
Subject: Sea Lice Mitigation - web text CLEAN
Attachments: Sea Lice Mitigation - web text CLEAN.docx

Not sure who contributed to the sea lice mitigation text for public reporting, but thank you ☺ Here is what went through Comms and I and is headed to Brenda for approval.

Regional website:

Sea lice mitigation events graph

Sea lice occur naturally in the marine environment and their abundance is influenced by seasonal and annual variations in wild salmon, ocean salinity, temperature, and other environmental factors. Our conditions of licence for marine finfish aquaculture require monitoring and reporting of sea lice throughout the year. There are additional monitoring requirements for Atlantic salmon farms in the month of February, leading up to the juvenile wild salmon out-migration (March 1 to June 30) when wild salmon are more vulnerable to sea lice and may be found closer to farms. Atlantic salmon farms must be below a threshold of three motile salmon lice (*L. salmonis*) per fish at the first counting event of the out-migration window, and attempt to stay under this threshold through the rest of this time period. If they exceed the threshold, they must take action to reduce levels. Due to species differences and susceptibility to sea lice, Chinook salmon farms (currently the only species of Pacific salmon farmed in BC) do not usually require mitigation as sea lice levels typically remain low.

Motile refers to a developmental stage of the sea louse. They initially start as free floating eggs and larvae. If they find a host, they physically attach to the fish until they grow to the motile stage, where they can move independently on the fish surface. Therefore motile sea lice are those pre-adult to adult lice observable on fish.

Atlantic salmon farming companies use an integrated pest management approach to manage sea lice at marine fish farms. This means that numerous treatment methods are developed, including an in-feed medication, mechanical removal, and medicinal and non-medicinal bath treatments. This approach decreases the reliance on chemical usage, reduces the likelihood of resistance developing, and allows the use of the most appropriate tool for different situations. While mechanical and bath treatments are very effective, attached stages of sea lice are not always removed, and these lice can continue to grow to motile stages, requiring repeat treatments. Additionally, unlike in-feed treatments, bath and mechanical removal treatments do not provide residual protection from new infections and require a lot of handling, which may lead to increased stress and mortality.

In some cases, licence holders may choose to harvest fish in a timely manner to reduce sea lice numbers rather than use other mitigation measures. Conditions of licence require licence holders to submit notification of sea lice mitigation events to us and prevent captured sea lice from re-entering the marine environment for some types of treatments.

The figure below shows an annual break-down of sea lice mitigation events used at marine finfish aquaculture facilities in BC. These events are categorized according to the type of mitigation:

In-feed treatment

An anti-louse treatment of emamectin benzoate, or "SLICE©", is added to the feed and kills all attached and motile stages of lice on farmed Atlantic salmon. This type of treatment provides residual protection, which can last for several weeks. In-feed treatments can be used to treat active infections as well as to prevent future infections. Salmon farmers must monitor the effectiveness of in-feed treatments in order to protect against the development of resistance. Any reduced efficacy must be reported to us.

Mechanical removal

A mechanical removal treatment, the Hydrolicer©, uses a spray of water to remove motile stages of sea lice from farmed Atlantic salmon. The fish are caught using seine nets and pumped onto a treatment vessel where they are individually sprayed, lice are removed and collected, and the fish are returned to the net pen.

Medicinal bath

A medicinal bath treatment of hydrogen peroxide, or "Paramove 50©", can be used to remove motile stages of sea lice from farmed Atlantic salmon. These treatments are most commonly delivered by pumping the farmed fish into large well boats where the concentration of medication and water quality can be closely monitored. After a short treatment, the fish are returned to the marine net pens. Hydrogen peroxide dissipates quickly after being discharged back to the marine environment, but use of a well boat gives farmers the ability to discharge used bath water away from ecologically sensitive habitats. The *Aquaculture Activities Regulations* require all licence holders to submit notifications for planned pesticide deposits at least 72 hours prior to usage.

Non-medicinal bath

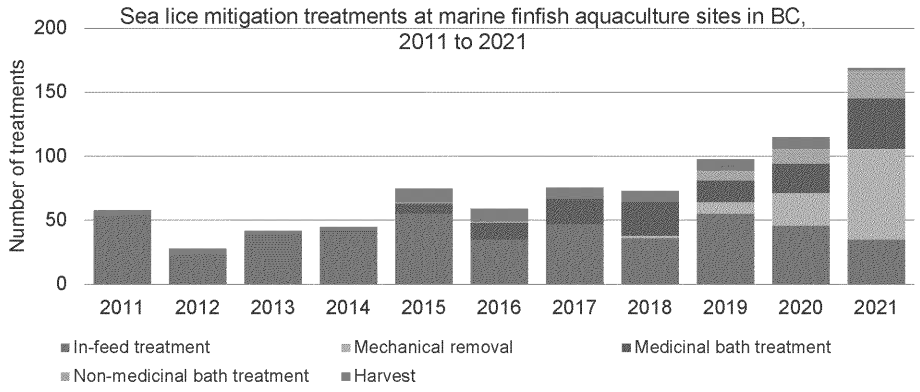
A non-medicinal bath treatment made up of fresh water, can be used to remove motile stages of sea lice from farmed Atlantic salmon. Sea lice live in salt water environments and drop off the salmon with prolonged exposure to fresh water. These treatments are most commonly delivered by pumping farmed fish into large well boats filled with fresh water, where the water quality and fish health can be closely monitored. After treatment, the fish are returned to the marine net pens.

Harvest

Harvesting is an approved approach to reducing the absolute number of sea lice at a facility. In some cases, where a farm is near harvest or other treatment options are not viable, licence holders may choose to harvest fish rather than employ other mitigative measures. During the juvenile salmon out-migration period (March through June), licence holders must harvest all fish, or bring the average sea lice abundance below the threshold within 42 days of exceedance.

Detailed information on specific sea lice mitigation events can be found in DFO's Sea lice mitigation events at British Columbia marine finfish aquaculture sites report.

Commented [SK1]: Add link once available



Open Data

Sea Lice Mitigation Events – Open Data

This report provides a summary of sea lice mitigation events reported by aquaculture companies to Fisheries and Oceans Canada (DFO). A sea lice mitigation event is any measure that is used to bring the sea lice abundance at a facility below the threshold of three motile salmon lice (*L. salmonis*) per fish. These mitigation measures include in-feed, mechanical removal, medicinal or non-medicinal bath treatments, or harvest. Salmon farmers must monitor the effectiveness of treatments and report reduced efficacy to the Department.

The terminology used in the report's column headings is defined in the terminology file below.

Related links:

Add sea lice mitigation graph link once available

Sea Lice Abundance http://open.canada.ca/data/en/dataset/3cafbe89-c98b-4b44-88f1-594e8d28838d

Sea Lice Graph http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/lice-ab-pou/index-eng.html

Sea Lice Infographic: Sea lice management at BC salmon farms (dfo-mpo.gc.ca)

Example:

Incident Date	Facility Reference Number	Licence Holder	Site Common Name	Latitude	Longitude	Finfish Aquaculture Reporting Zone	Mitigation
28-Mar-21	1862	Grieg Seafood BC	Hecate	49.86799	-126.75730	Esperanza Inlet	Medicinal Bath Treatment
29-Mar-21	1136	MOWI Canada West	Shaw Point	50.48527	-125.88981	Discovery Passage	Non-medicinal Bath Treatment
30-Mar-21	1291	Cermaq Canada	McIntyre Lake	49.30557	-125.81583	Clayoquot Sound	Mechanical Removal
7-Apr-21	1293	MOWI Canada West	Duncan Island	50.81950	-127.55568	Port Hardy	Medicinal Bath Treatment
7-Apr-21	7273	Grieg Seafood BC	Tsa-ya	50.61225	-126.33212	Broughton Archipelago	Medicinal Bath Treatment
12-Apr-21	831	MOWI Canada West	Shelter Pass	50.88414	-127.50040	Port Hardy	Non-medicinal Bath Treatment
13-Apr-21	1335	Cermaq Canada	Wehlis Bay	50.86410	-126.92374	Broughton Archipelago	Mechanical Removal
15-Apr-21	1839	Grieg Seafood BC	Wa-kwa	50.60106	-126.34741	Broughton Archipelago	Medicinal Bath Treatment
20-Apr-21	1336	Cermaq Canada	Simmonds Point	50.87791	-126.90153	Broughton Archipelago	Mechanical Removal
21-Apr-21	143	MOWI Canada West	Larsen Island	50.60175	-126.63284	Broughton Archipelago	In-feed Treatment
22-Apr-21	1825	Grieg Seafood BC	Noo-la	50.60799	-126.36301	Broughton Archipelago	Medicinal Bath Treatment
24-Apr-21	526	Cermaq Canada	Rant Point	49.25670	-125.84153	Clayoquot Sound	Mechanical Removal
29-Apr-21	1288	MOWI Canada West	Doyle Island	50.81456	-127.48698	Port Hardy	Medicinal Bath Treatment

From: Diamond, Maria
Sent: Friday, May 6, 2022 11:12 AM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie
Subject: Compliance summary to date
Attachments: Compliance Summary to May 6, 2022.docx

Please find the attached summary of notifications up until 8 a.m. this morning.

M.

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary April 29 – May 6, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
Apr 29	Apr 29	WaKwa	24hr ME - Handling – recent transfer [redacted]g avg, [redacted]kg biomass, [redacted] pcs. 2.6% proportion dead. FH also took samples for analysis.
May 1	May 2	Gore	5d ME - Handling – Harvest & Hydrolicing + some sea lion predation. [redacted] kg biomass, [redacted] pcs, [redacted]kg avg.
May 2	May 3	Atrevida	24hr ME – Other – uplift failure[redacted]kg biomass, [redacted]kg avg, [redacted] pcs. Uplift was replaced.

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
Apr 27	Apr 28	Esperanza	MR treatment
May 2	May 2	Noo-la	MR treatment

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
Apr 29	Apr 27	Dixon	Hydrolicer Pen [redacted] only
May 1	May 3	Bawden	Hydrolicer
May 2	Apr 29	Bull Harbour	FW bath treatment
May 3	May 2	Vantage	Hydrolicer
May 5	May 3	Fortune	Hydrolicer
May 5	May 3	Site 13	Hydrolicer
May 6	May 5	Salten	Hydrolicer

s.20(1)(b)

Sea Lice Events

Incident Date	Date Report	Facility	Details
Apr 28	Apr 29	Dixon	Follow-up 6.80 avg Pen only
Apr 28	Apr 29	Dixon	Pre-tx 20.30 avg. Pen only
Apr 29	Apr 30	Dixon	Post-mech 2.70 avg Pen (now pen 9) Note: Pens not tx'd due to withdrawal times – site to be empty by end of May.
Apr 28	Apr 30	Concepcion	Post-mech 0.44 avg
Apr 28	Apr 30	Millar	Pre-tx 9.08 avg
Apr 30	May 1	Millar	Post-tx 1.55 avg
May 1	May 2	Vantage	Pre-tx 2.01 avg
May 2	May 3	Site 13	Pre-tx 0.73 avg
May 2	May 4	Shelter Pass	Post-bath 0.29 avg (9 of 11 pens counted, remaining 2 pens not counted due to withdrawal times and harvest.
May 2	May 4	Bull Harbour	Pre-tx 1.81 avg.
.	May 5	Millar	Exceed 3.19 avg. (within 4 days of post-tx …this may warrant some discussion with the company as to how this occurred…usually about 3 weeks before #'s are at or close to threshold).
May 4	May 5	Plover	Exceed 3.40 avg FW bath planned
May 4	May 5	Salten	Pre-tx 1.21 avg

s.20(1)(b)

From: Sitter, Laura
Sent: Monday, May 9, 2022 7:43 PM
To: [redacted]
Cc: Oswell, Alexandria
Subject: RE: Sir Ed sea lice reduction post SLICE
Attachments: Sea lice treatment report- reduced efficacy.docx

Hi [redacted]

Thank you for this notification. As per the conditions of licence, Sir Ed is prohibited from using SLICE for this production cycle of fish without written permission by the Department. Could you please complete the attached form (or submit the details requested so I can complete the form) for our records?

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: [redacted]
Sent: Friday, April 8, 2022 11:34 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: Sir Ed sea lice reduction post SLICE

Hello Laura,

This is to inform you that following the treatment with SLICE at Sir Ed, sea lice levels did not reach the 60% reduction from pre-counts within the 42 days. The lowest counts were performed on day 42 with a 53% reduction. The numbers continue to decrease.

Kind Regards,

[redacted]

CERMAQ

Phone + [redacted]

Cermaq Canada Ltd.
203 - 919 Island Hwy
V9W 2C2 Campbell River, BC, Canada

Cermaq.ca Facebook Twitter

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Sea lice mitigation reduced efficacy report

As per SECTION 6.10(d)(i) of the Pacific Aquaculture Region (PAR) Marine Finfish conditions of licence, facilities are required to measure and report sea lice treatment efficacy from any treatment mitigation, and if that efficacy is determined to be less than 60%, that occurrence must be reported.

This form serves as a tool to summarize and evaluate each report.

Site name:	**Company:**	**Veterinarian:**
Dates of saltwater entry:		
All previous treatments:		**Efficacy rate:**
		Efficacy rate:
		Efficacy rate:
Bioassay performed?	**Date:**	**Results:**
	Date:	**Results:**
Flesh residue analysis performed?	**Date:**	**Results:**
	Date:	**Results:**
Other tests performed?	**Date:**	**Results:**
	Date:	**Results:**
Summary of treatment:		
Future treatment plans:		
DFO Veterinarian notes:		
Reviewed by:		
DFO Vet name:	**DFO Vet signature:**	**Date:**
Entered into AQUIIS?		**Date:**

Created: February 2022
Updated: May 2022

From: McCorquodale, Brenda
Sent: Monday, May 9, 2022 11:52 AM
To: Oswell, Alexandria; Shaw, Kerra
Cc: Sitter, Laura
Subject: RE: SL Update: May 9, 2022

Thanks Alex

- A couple of questions. No other exceeding 20 days over at present?
- If we think it will be close as to whether Mahatta West will be harvested out in time have we planned any visits to confirm if the harvest will be complete in time for them to stay in compliance?
- What it the criteria for 'multiple' exceedances – 3 times?

Thank you.
Brenda

Brenda McCorquodale (she/ her/ elle)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Sent: Monday, May 9, 2022 8:45 AM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Cc: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: SL Update: May 9, 2022

Good morning, here is the SL and FH compliance update for last week.

Sea lice updates:

Broughton- 9 active, 0 over
Central Coast- 4 active, 0 over
Clayoquot North- 3 active, 3 over (Dixon and Bawden continued, Millar new) Millar has gone under and back over since the last update
Clayoquot South- 5 active, 1 over (Plover new)
Esperanza – 2 active, 0 over
Nootka- 5 active, 0 over
Port Hardy- 5 active, 0 over
Quatsino- 2 active, 2 over (Mahatta West and Monday Rocks continued)
Sunshine Coast – 5 active, 0 over
Summary: 40 sites, 6 over. 6 sites have exceeded the sea lice threshold multiple times during this outmigration: Bedwell, Dixon, Fortune, Bawden, Millar and Plover.

Mahatta West is currently above 20 days (**30** days over as of May 6th), they plan to be fully harvested out by May 16th (will be 40 days exceeded by that day).

Field Update:

- One hatchery inspection occurred at Sea Spring as part of an ITC review.
- The sea lice treatment infrastructure inspection from last week was rescheduled. AFH and AEO plan to complete an inspection this week in the Tofino area.

Please let me know if you have any questions.

Thanks,
Alex

Dr. Alexandria Oswell [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
(236) 255-1054

From: Sitter, Laura
Sent: Tuesday, May 10, 2022 6:40 PM
To: [redacted]
Cc: Oswell, Alexandria
Subject: Reduced sea lice treatment efficacy
Attachments: Sea lice treatment report- reduced efficacy.docx

Hi vets,

As per our previous conversation, we are implementing a form to record the details surrounding sea lice treatment failures. Please complete these forms with the relevant details when reporting a sea lice treatment failure for all treatment modalities, or provide me with the supplemental documentation so that I can complete the form for our records.

Please let me know if you have any questions,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

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page 162

From: Sitter, Laura
Sent: Wednesday, May 11, 2022 6:03 PM
To: Shaw, Kerra
Subject: RE: AMD Science questions- draft list

Importance: High

In case this got buried ☺

From: Sitter, Laura
Sent: Wednesday, May 11, 2022 11:59 AM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: AMD Science questions- draft list

Science questions for AMD 2022

High priority

Group	Topic
FH/MFF	What are the impacts of sea lice (*Lepeoptheirus salmonis* and *Caligus clemensi*) from marine finfish farms on wild salmon populations (sea lice risk assessment)?
AEO/MFF	Sea lion (and others including seal, river otter, sea otter) exclusion methods from marine finfish farms
FH/MFF	What is the most effective way to measure the fish health impacts of marine finfish aquaculture on wild Pacific salmon (pathogens, sea lice)?
ITC/LB	What are the risks (genetic, ecological, fish health) associated with salmon enhancement activities in the Columbia River Basin and the Okanagan Basin?

Lower priority

Group	Topic
FH/MFF	What pathogens impact farmed sablefish (*Anopoploma fimbria*) and what are the potential impacts to wild sablefish and wild salmon?
AEO/MFF	Risk assessment for ecologic and genetic impacts of farmed sablefish
FH/LB	Risk of transmission of pathogens from flow through and recirculating landbased aquaculture facility effluent and effective mitigations
FH/AEO/SF	What diseases affect farmed shellfish in BC aquaculture and what are the impacts to wild shellfish populations?
FH/AEO/MFF	What are the risks associated with integrated multi-trophic aquaculture and how can they be mitigated for BC aquaculture?
FH/LB	Risk assessment for Whirling Disease (*Myxobolus cerebralis*) in BC and the potential impact of and to aquaculture (especially enhancement, recreational stocking)

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

Provided in excel format

From: Oswell, Alexandria
Sent: Thursday, May 12, 2022 2:22 PM
To: Manchester, Howie; Price, Derek; Sitter, Laura
Subject: Fwd: Salar/SFI Effluent/Ocean Surface Samples (Excel Log)
Attachments: image001.gif; Salar Effluent Sea Lice Sampling Data.xlsx

Sent from my iPhone

Begin forwarded message:

From: [redacted]
Date: May 12, 2022 at 10:59:26 AM PDT
To: "Oswell, Alexandria" <Alexandria.Oswell@dfo-mpo.gc.ca>
Cc: [redacted]
Subject: Salar/SFI Effluent/Ocean Surface Samples (Excel Log)

Hello all,

Alexandria requested some information about our effluent/ocean surface samples, so I'm sending her a copy of our logs.

Cheers,

[redacted]

Phone: [redacted]

Cermaq Canada Ltd.
203-919 Island Highway
V9W 2C2 Campbell River, BC, Canada

Cermaq.ca Facebook Twitter

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From: Diamond, Maria
Sent: Friday, May 13, 2022 10:30 AM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie
Subject: Friday the 13th Summary
Attachments: Compliance Summary to May 13, 2022.docx

Here's the summary for today's meeting.

M.

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary May 6 - 13, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
May 11	May 12	Atrevida	Other – Uplift failure, [redacted] kg biomass, [redacted] kg avg., [redacted] pcs. Uplift was repaired (this was 2nd time this has happened at this site this month.)

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
May 3	May 6	Bull Harbour	MR treatment with staggered start dates due to current FW bath treatment.
May 11	May 11	Wa-kwa	MR treatment pen [redacted]

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
May 9	May 6	Mussel Rock	Hydrolicer
May 10	May 6	Plover Pt	FW bath treatment
May 13	May 12	Bare Bluff	FW bath treatment
May 14	May 12	Bawden	Hydrolicer - SFI

Sea Lice Events

Incident Date	Date Report	Facility	Details
May 5	May 6	Bawden	Pre-treat 20.73 avg
May 6	May 6	Bawden	Post-treat 4.60 avg
May 7	May 8	Cougar	Exceed 3.25 avg
May 9	May 9	Bull Harbour	Post-bath FW 0.13 avg
May 8	May 10	Cougar	Follow-up 4.43 avg

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May 8	May 10	Fortune	Exceed + pre-treat 4.43 avg (Hydrolicer)
May 9	May 10	Fortune	Post-tx 0.82 avg
May 10	May 12	Bare Bluff	Exceed 3.80 avg (FW tx)
May 12	May 12	Bare Bluff	Pre-treat 1.81 avg (FW tx)
May 11	May 12	Plover Point	Pre-treat 3.45 avg (FW tx)

Provided in excel format

From: Price, Derek
Sent: Friday, May 13, 2022 2:28 PM
To: Shaw, Kerra; Sitter, Laura; Oswell, Alexandria; Manchester, Howie
Cc: Blasco, Nathan; Mercer, Nick
Subject: Aqua Tromoy Inspection
Attachments: risk_tool_AquaTromoy_Plover_20220511.xlsx

Dear Colleagues,

Please find attached the inspection form for the Aqua Tromoy visit conducted on Wednesday.

The visit occurred while the Vessel was in Plover. Fish Health and AEO witnessed the offloading of pens and the loading of pen . Prior to treatment, fish were fasted for two or three days to minimize the effects of stress. The pen was prepared for handling by the support vessels and farm personnel. This includes the removal of oxygen lines and feeding and mortality retrieval equipment. After the boat got in position, a cork line deployed by the operations crew was pulled by farm and boat personnel and a pocket is made where the fish were pumped out from. Oxygen may be added to the crowded fish if water quality is deteriorated or fish behaviour appears altered. The boat lowered its pumping hoses and a negative pressure was created by pumping water out of a special chamber in the boat thus siphoning the fish into one of the two 1500 cubic meter holds.

When the wellboat is performing freshwater treatments, all incoming seawater is removed in the first dewatering system. The system is basically a grill with stainless steel bars with a separation of 13 mm between bars. At the time of the inspection, the majority of herring present in the pen were removed at this stage. The process had to be stopped when the operator estimated there were too many herring in the dewatering tank and had to be removed. The herring were offloaded into a sorting trough with a dewatering grill and a mesh filter. Mortalities were removed and live fish were returned to the ocean after ~~a number was estimated b~~y eye. After all herring were removed, the process resumed. It takes almost one hour to load a pen with ~100.000 400-gram fish. Once all the fish are in the hold, water quality is assessed by a technician and water is conditioned if needed. The boat can adjust oxygen levels as well as pH. It can also remove CO2 using its CO2 strippers. Fish are held for 4 or 7 hours (this was a 4-hour treatment). While on treatment, the water is recirculated continuously and lice are filtered out using micron mesh. There are four filters per hold. Once the fish are treated, the fish are pumped out of the hold and a second dewatering to retain the fresh water occurs. This time, the grill is comprised of several stainless steel rollers and the separation can be adjusted. They generally adjust the width to generate a 50/50 split. In this case, they were mixing fish from the two pens they treated to generate new pens. One with large fish and one with smaller fish. Runts were being removed at this stage along with any remaining incidental catch using another sorting trough. All the process is monitored from the bridge. Water quality is assessed in the boat's laboratory.

Once the quality of the water is deemed unacceptable (generally because ammonia is accumulated) the water is filtered, UV-treated, and pumped out. Reverse osmosis desalinators in the boat can create fresh water from sea water at a rate of 260 cubic meters per hour. It takes approximately 16 hours to fill the holds with fresh water. Once the farm is treated, the boat can disinfect itself by creating ozone and adding it to the recirculating water.

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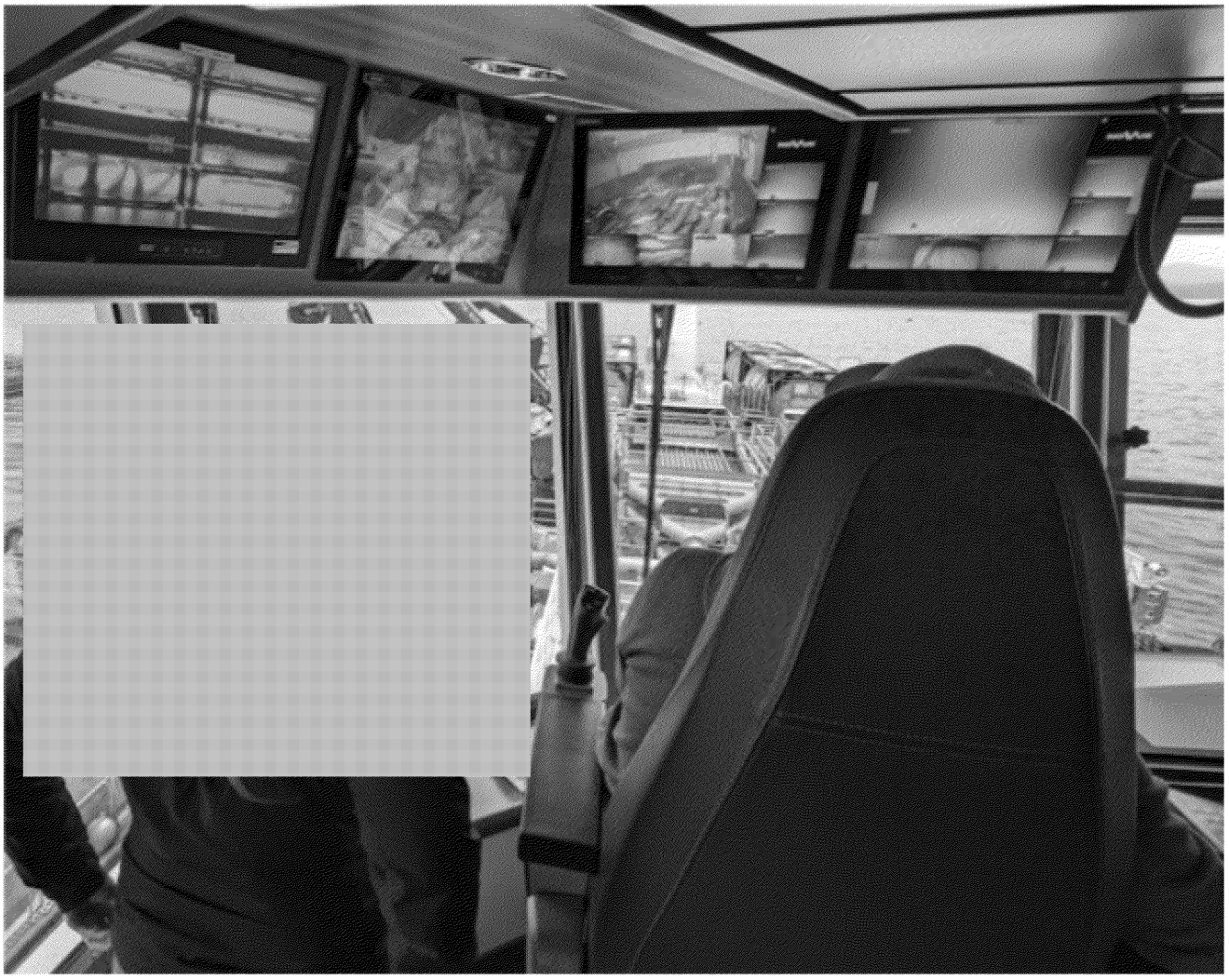
General view of the vessel offloading fish to the pen

Fish being pumped from the pocked

Control station



DFO personnel witnessing the loading of fish into the boat

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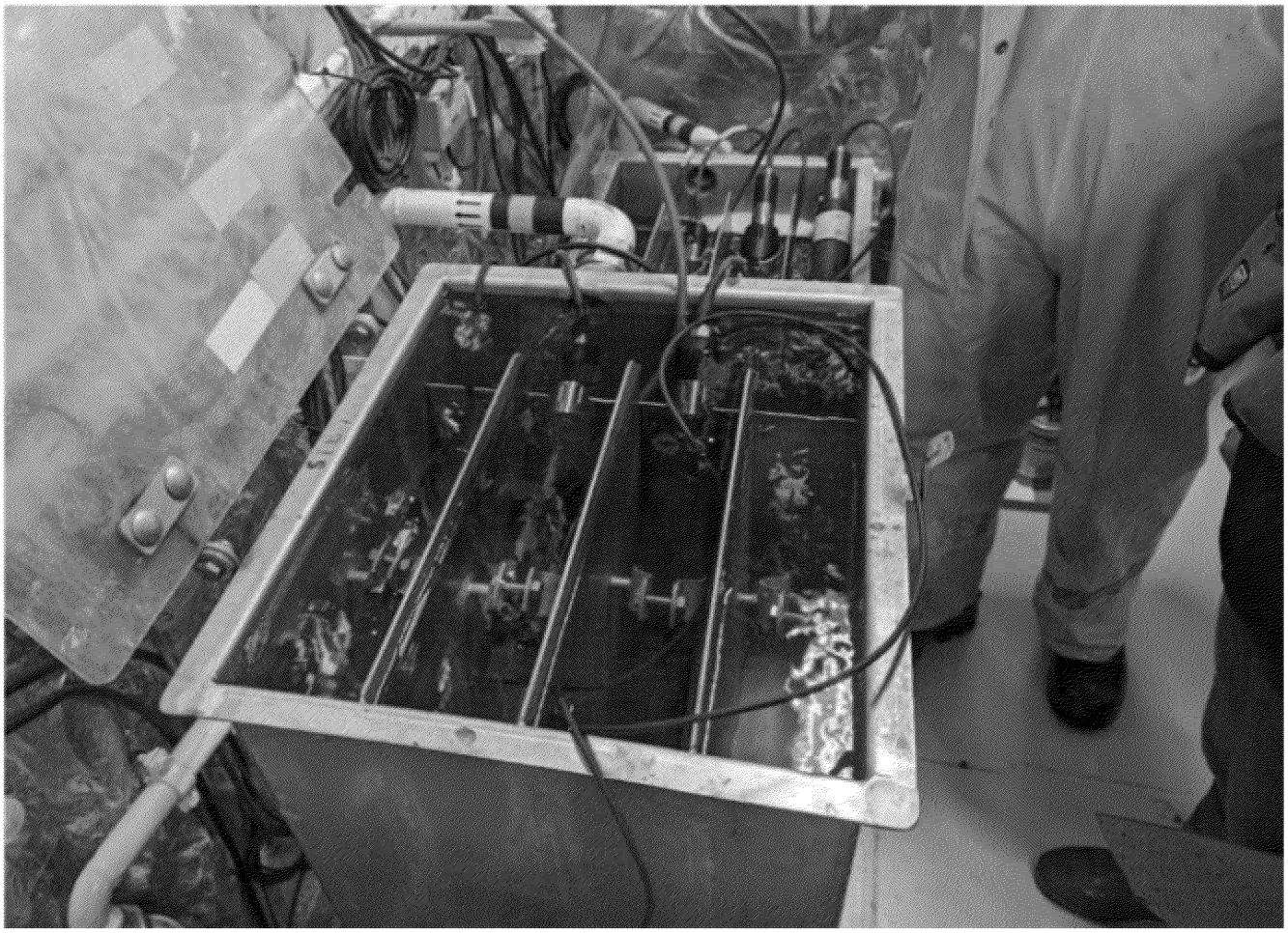
of the Access to Information Act

de la Loi sur l'accès à l'information

Herring being offloaded to sorting trough

Water quality lab



Water quality probes

CO2 strippers

Sea lice filters

Example of disposable mesh sock that go into the filters

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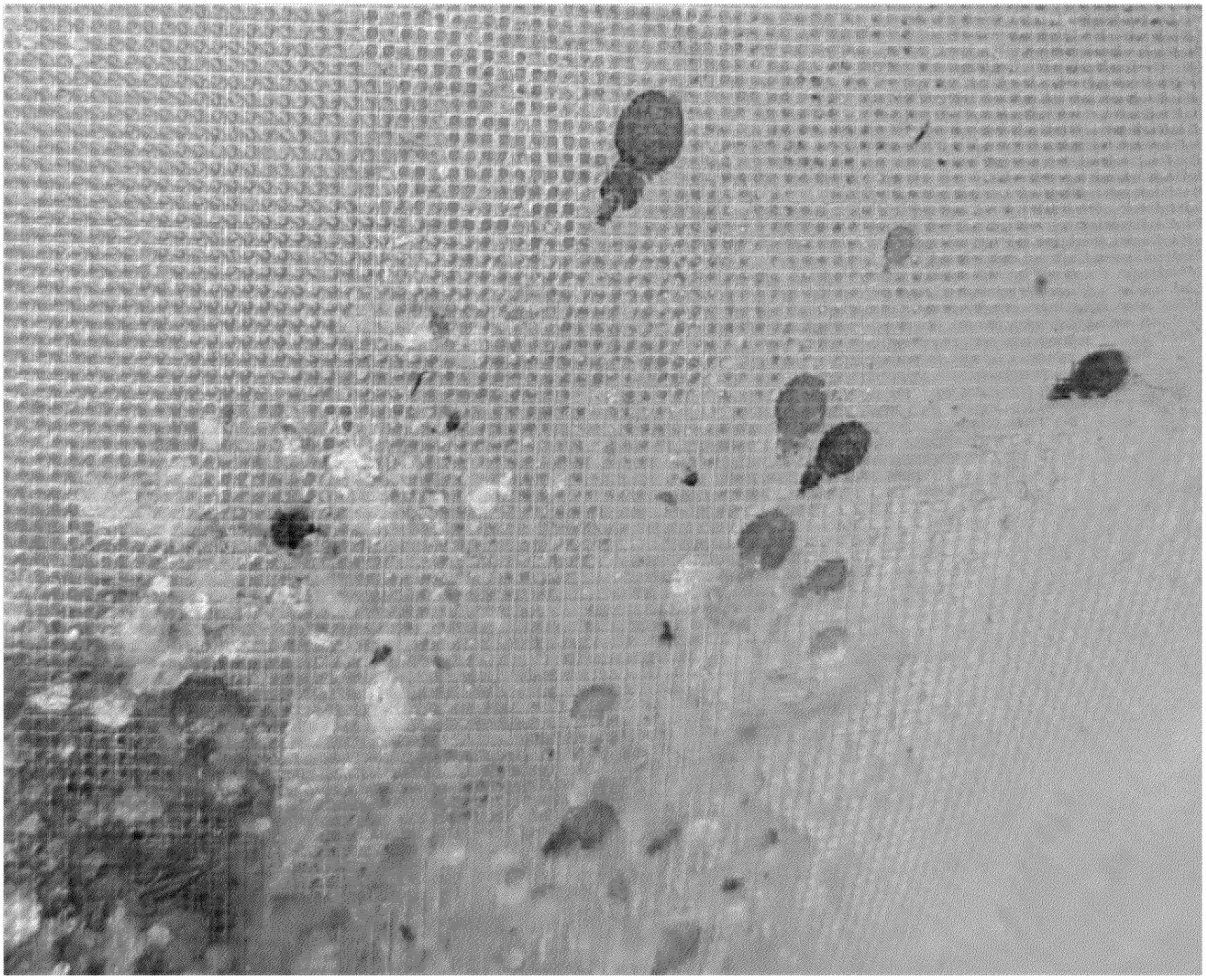

Example of used sock

Recirculation pump room

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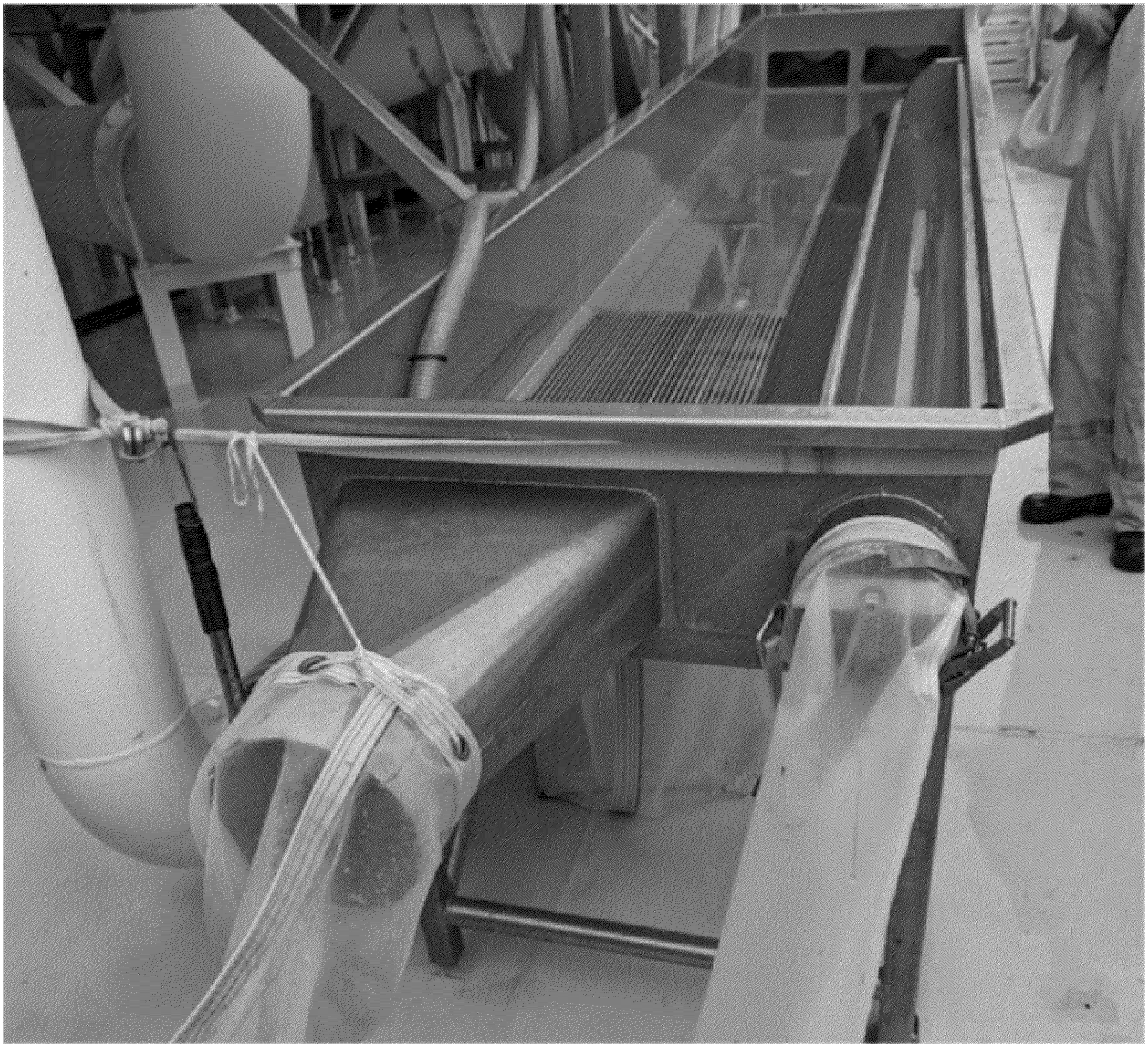

Runt sorting trough

General view of final dewatering and sorting area

Derek Price, MV, PhD

Epidemiologist, Aquaculture Fish Health
Aquaculture Management Division / Fisheries and Oceans Canada
Derek.Price@dfo-mpo.gc.ca
Tel: 250-703-0929 Cell: 250-850-9362

Government of Canada / Gouvernement du Canada

Canada

From: Sitter, Laura
Sent: Friday, May 13, 2022 5:58 PM
To: Shaw, Kerra
Cc: Price, Derek
Subject: Sea lice treatment vessels

There are eight sea lice treatment vessels in operation in BC. Six of these have full filtration capacity and the filter specifications on all six of these have been evaluated by AMD in-office. To date, three vessels (3/8) have been audited by DFO staff with two more inspections next week (5/8). The remaining three are waiting to be scheduled.

Our initial assessments of the mechanical and bath treatment vessels is that sea lice removal is very effective, and the filtration systems currently in place capture the vast majority, if not all, of the dislodged sea lice. Of the three vessels AMD has audited so far, all the water that is brought onto the vessels containing lice and fish is treated before being discharged back to the ocean.

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Shaw, Kerra
Sent: Friday, May 13, 2022 6:34 PM
To: Buhr, Val
Cc: Sitter, Laura; Price, Derek
Subject: MINO briefing

Val – can you please add these to the MINO briefing:

- DFO staff are currently conducting on-site inspections to assess sea lice filtration and capture technology on the eight existing well boats and barges that mitigate sea lice in BC. Three of eight operational vessels have been inspected, two more inspections are scheduled next week, and the final three will occur as soon as possible.
- These inspections show that sea lice removal is very effective, and the filtration systems currently in place capture the vast majority, if not all, of the dislodged sea lice.

From: McCorquodale, Brenda
Sent: Monday, May 16, 2022 10:27 AM
To: Sitter, Laura; Shaw, Kerra
Subject: RE: SL update: May 13, 2022

You guys are so awesome – thank you!
Brenda

Brenda McCorquodale (she/ her/ elle)
_____
Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, May 13, 2022 3:48 PM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Subject: SL update: May 13, 2022

Hi Brenda and Kerra,

Here is the sea lice and field update for this week:

- **Sea lice updates**
  - **Broughton-** 9 active, 0 over
  - **Central Coast-** 4 active, 1 over (Cougar new)
  - **Clayoquot North-** 3 active, 3 over (Bawden, Millar, and Dixon)
  - **Clayoquot South-** 5 active, 2 over (Plover, Mussel new)
  - **Esperanza –** 2 active, 0 over
  - **Nootka-** 5 active, 0 over
  - **Port Hardy-** 5 active, 0 over
  - **Quatsino-** 2 active, 2 over (Mahatta West and Monday Rocks)
  - **Sunshine Coast –** 5 active, 0 over
  - **Summary: 40 sites, 8 over**
  - **42d threshold:** Mahatta West **37** days over (as of May 13th) - plan to be empty by May 16th. Next closest sites are: Bawden (23 days) and Monday Rocks (20 days)
  - 8 sites have exceeded the sea lice threshold multiple times during this outmigration: Bedwell, Dixon, Fortune, Bawden, Millar, Plover, Mussel, and Cougar
- Field updates
  - AFH visited **9 MFF sites** in Clayoquot Sound this week. 9 fish health audits were performed (2 targeted), 4 sea lice audits. Data is still being reviewed however no obvious compliance issues have been noted so far.
  - AFH also conducted **2 FW salmon hatchery audits** this week for ITC purposes: Big Tree Creek and

Freshwater Farms. No obvious compliance or health issues were noted.

- AFH also conducted **2 sea lice treatment vessel inspections** this week. These were on MOWI's Aqua Tromoy (freshwater bath) and Cermaq's Salar (mechanical). No obvious issues were noted. There are 2 more inspections scheduled for next week.

Please let me know if you have any further questions!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

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21(1)(b), 21(1)(a)

of the Access to Information Act

de la Loi sur l'accès à l'information

From: Oswell, Alexandria
Sent: Wednesday, May 18, 2022 7:32 PM
To: Manchester, Howie; Shaw, Kerra; Sitter, Laura; Price, Derek
Cc: 'Nathan.Blasco@dfo-mpo.gc.ca'; Mercer, Nick
Subject: Salar - Vessel Inspection - May 12 2022
Attachments: risk_tool_Salar_Mussel Rock_20220512.xlsx

Provided in excel format

Hello everyone,

Please find attached the inspection form for the Salar visit conducted on Thursday, May 12th.

The visit occurred while the Salar was at Mussel Rock. DFO Biologist and Veterinarian witnessed the treatment of pen [redacted] into an empty pen [redacted] . Prior to treatment, fish were fasted for two or three days to minimize the effects of stress. The pen was prepared for handling by the support vessels and farm personnel. This includes the removal of air lines and feeding and mortality retrieval equipment. After the Salar is in position, a cork line deployed by the operations crew was pulled by farm and boat personnel and a pocket is made where the fish were pumped out from. Oxygen may be added to the crowded fish if water quality deteriorates or fish behavior appears altered. The Salar has four intakes which are lowered into the crowded pocket, fish entering each intake go through two hydrolicer (water jets) and then over a dewatering table. Fish are then returned to a receiving pen through a aluminum trough which is supplied with 'clean' water (water that is pumped in and has not gone through the delousing process). The fish going into the receiving pen appeared in good health with no apparent damage.

All effluent water that has gone through the four intakes and hydrolicer is removed in the first dewatering bars. The stainless steel bars are 10 mm apart and allow water, sea lice and very small by-catch to go through, while larger by-catch along with all salmon go into the receiving pen. While the system for by-catch was inspected, no by-catch were observed, no staff were attending the by-catch bin and it was set to flow directly out to the ocean. Beneath the first set of dewatering bars is a second set that allows effluent water to continue into a large tank while allowing by-catch to travel into a separate tank with 'clean' water, so no or very little lice would be expected to go out with by-catch. Effluent water then moves from the large tank to a set of side by side drum filters (effluent water is split and only goes through one drum filter). The mesh size of the drum filter screen is [redacted] micron. All captured debris, including sea lice, goes into a trough within the drum filter and then is deposited onto a belt filter [redacted] microns). This filters out the water and deposits the solid waste (primarily scales and some sea lice) into a large (1 M3 insulated tote). Cleaned effluent water then exits the barge post drum filter and belt filter. All solid waste including scales and sea lice are then transferred by farm staff to the mort totes.

Each fish spends about 15 seconds going through the hydrolicer system, but fish can spend up to 2 or 3 hours in the seine waiting to go into one of the four intakes. Within the seine it is expected that some sea lice will be dislodged into the environment. Pen [redacted] had a population of [redacted] fish with an average weight of [redacted] kg and an average motile L.salmonis count of 3.3 lice/fish. It was anticipated that this number of fish would be done in three seines and would take up between 6 and 9 hours to complete.

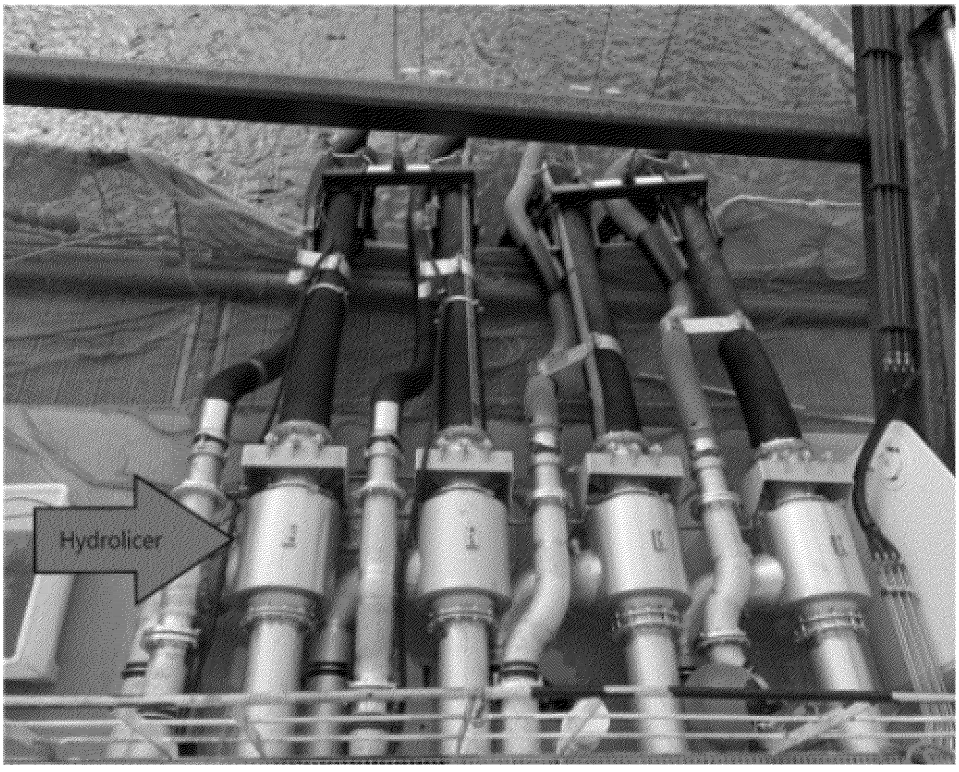
The speed the fish run through the system can be adjusted, this is set by balancing fish welfare and sea lice removal efficacy. Fish welfare is constantly monitored both by the Salar operator, who observes the fish in the seine for behavior and mortality, and the dedicated fish welfare technician who is monitoring gill health, gill bleed, scale loss and red belly. The fish welfare technician also monitors sea lice removal efficacy. All welfare and lice count information is relayed to the Salar operator, so adjustments can be made.

Thanks

s.20(1)(b)

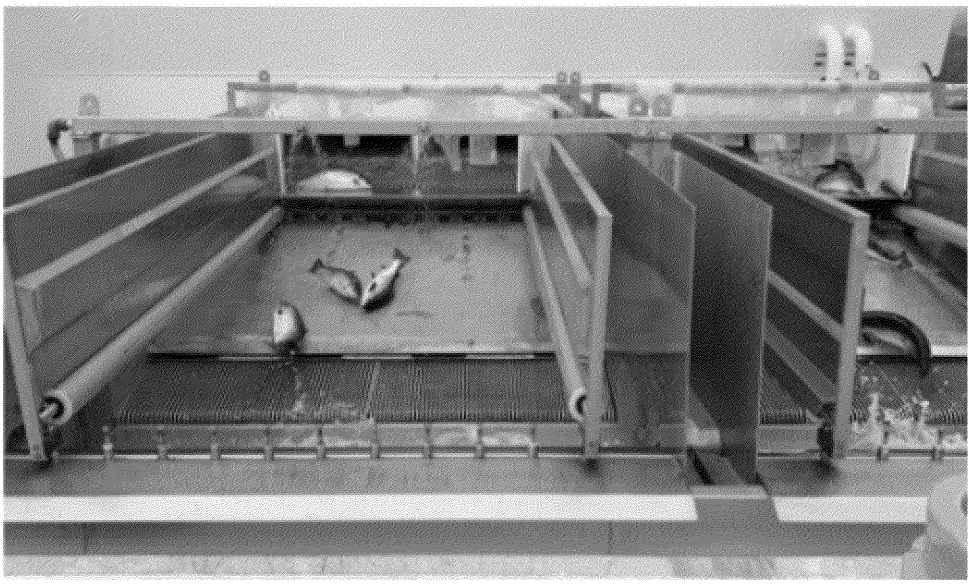
Howie

Fish being pumped from the pocket



Fish being pumped into the four main lines; arrow shows hydrolicer

DFO personnel in the control room



Dewatering

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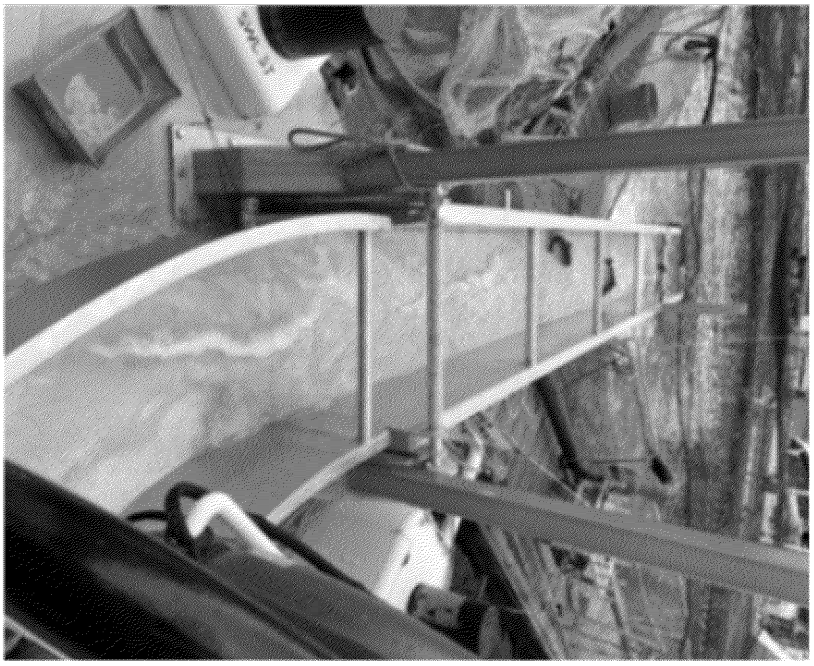

Fish entering receiving pen after treatment

Two drum filters and belt filter

From: Diamond, Maria
Sent: Thursday, May 19, 2022 4:31 PM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie
Subject: Compliance Summary for May 20th Meeting
Attachments: Compliance Summary to May 19, 2022.docx

Good afternoon,

Here is the summary for tomorrow's meeting. This covers notifications up until noon today. [redacted] hence sending these out now. Have a great long weekend everyone!

Maria

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
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Fax: 250 703 0921

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Compliance Summary May 13 - 19, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
May 13	May 14	Williamson	Other – Diver cleanout of harvest sized fish. [redacted] kg biomass, [redacted] kg avg, [redacted] pcs.

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
May 13	May 12	Bare Bluff	FW bath treatment
May 14	May 12	Bawden	Hydrolicer – SFI
May 17	May 16	Williamson	H202 on 10 pens (remaining pens harvesting)
May 18	May 16	Atrevida	Hydrolicer - Skamik

Sea Lice Events

Incident Date	Date Report	Facility	Details
May 4	May 17	Vantage	Post-mech 0.11 avg (late email warning sent) counts sent after asking if this tx had been cancelled as Salten & Site 13 were due to mech issues.
May 14	May 14	Plover	Post-tx 0.73 avg
May 14	May 15	Mussel Rock	Exceed + Pre-tx 3.93 avg

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May 14	May 16	Mussel Rock	Post-mech 0.80 avg
May 15	May 16	Williamson	Pre-treat (10/13 pens counted) 2.25 avg
May 13	May 18	Atrevida	Pre-tx (Pen [redacted] 2.35 avg (late submission with explanation, see compliance tracking notes as to why considering no late warning required) MD
May 18	May 19	Bare Bluff	Post-bath 0.23 avg

s.20(1)(b)

From: Sitter, Laura
Sent: Tuesday, May 24, 2022 12:19 PM
To: Shaw, Kerra; McCorquodale, Brenda
Cc: Oswell, Alexandria; Paylor, Adrienne
Subject: Sea lice update: May 20, 2022

Hi Brenda and Kerra,

Here are the sea lice and field updates as of May 20, 2022. There are no new exceedances from the last update:

- **Sea lice updates**
  - **Broughton-** 10 active, 0 over (one new site online)
  - **Central Coast-** 4 active, 1 over (Cougar continued)
  - **Clayoquot North-** 3 active, 3 over (Bawden, Millar, and Dixon all continued)
  - **Clayoquot South-** 5 active, 0 over (Plover and Mussel now under)
  - **Esperanza –** 2 active, 0 over
  - **Nootka-** 5 active, 0 over
  - **Port Hardy-** 5 active, 0 over
  - **Quatsino-** 2 active, 1 over (Monday Rocks) Mahatta West harvested out
  - **Sunshine Coast –** 5 active, 0 over
  - **Summary: 40 sites, 5 over**
  - **42d threshold:** Bawden (30 days), Monday Rocks (27 days), Dixon (23 days).
  - 8 sites have exceeded the sea lice threshold multiple times during this outmigration: Bedwell, Dixon, Fortune, Bawden, Millar, Plover, Mussel, and Cougar

- Field updates
  - AFH did not conduct any field visits this week.
  - AFH conducted **2 sea lice treatment vessel inspections** this week. These were on Grieg's Ronja Islander (hydrogen peroxide bath) and Skamik Coastal Server (new mechanical vessel) in Nootka Sound. No obvious issues were noted.

Dr. Laura Sitter [she/her]
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Laura.Sitter@dfo-mpo.gc.ca

From: Sitter, Laura
Sent: Tuesday, May 24, 2022 12:42 PM
To: Manchester, Howie; Price, Derek; Shaw, Kerra; Paylor, Adrienne
Subject: FW: Grieg - Video Links for Krone Filter and Recapture

FYI ☺

From: [redacted]
Sent: Thursday, May 19, 2022 1:41 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>
Cc: [redacted]
Subject: Grieg - Video Links for Krone Filter and Recapture

Hello,

These are helpful videos to describe the sea lice filtration systems on the Ronja 😊

Krone Filter: https://www.youtube.com/watch?v=laf5GGn1hZY

Grieg recapture: https://vimeo.com/429685716

Kristin

[redacted]
Campbell River, BC

Grieg Seafood

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#106 – 1180 Ironwood Street, Campbell River, BC V9W 5P7
Phone +1 250 286.0838 Ext. [redacted]
Mobile [redacted]
[redacted]
www.griegseafoodbc.com

s.19(1)

From: Sandberg, Krista
Sent: Tuesday, May 24, 2022 1:48 PM
To: Sitter, Laura
Cc: Manchester, Howie; Oswell, Alexandria
Subject: January to March 2022 sea lice abundance report ready for your review.

Hi Laura,

The January to March 2022 sea lice abundance report is now complete and ready for your review: Z:\1. PUBLIC REPORTING\1. Sea Lice\1. Abundance\1. Farm Level - Monthly\2022\2022 Sea Lice WORKING.xlsx

Take note of the yellow highlighted comments – those are the things that I think need your attention. Lots of potential efficacy issues, some of which are already addressed.

Once approved, I think this one should be approved by managers since it could be highly scrutinized.

Krista.

Krista Sandberg
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Coordonnateur principal des rapports publics et de données
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krista.sandberg@dfo-mpo.gc.ca
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From: Oswell, Alexandria
Sent: Tuesday, May 24, 2022 5:01 PM
To: Diamond, Maria; Sandberg, Krista
Cc: Stenhouse, Shawn; Sitter, Laura
Subject: RE: Monday Rocks - sea lice counts missing?

That would be great, thanks Maria! Depending on what they submit I can touch base with their vet.
Alex

From: Diamond, Maria <Maria.Diamond@dfo-mpo.gc.ca>
Sent: Tuesday, May 24, 2022 1:56 PM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Stenhouse, Shawn <Shawn.Stenhouse@dfo-mpo.gc.ca>
Subject: RE: Monday Rocks - sea lice counts missing?

I've double checked for any extra notes in the tracking spreadsheet but only see they intended to start harvest early May. I can send an email and ask if had done any follow-up counts since the April 26th count.

M.

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: Friday, May 20, 2022 9:25 AM
To: Diamond, Maria <Maria.Diamond@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Stenhouse, Shawn <Shawn.Stenhouse@dfo-mpo.gc.ca>
Subject: Monday Rocks - sea lice counts missing?

Hey Maria – something for you to follow up on next week.

This came up during the compliance meeting. It looks like we haven't received any follow up counts for Monday Rocks. The last report was from end of April and they were at 9.1 but then nothing. We think they might be harvesting but they should be able to at least submit some follow up counts.

Do you have any more insight and/or can you follow up if required?

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From: Jones, Simon
Sent: Thursday, May 26, 2022 12:54 PM
To: Shaw, Kerra; Paylor, Adrienne; Price, Derek; Sitter, Laura; [redacted]
Cc: [redacted]
Subject: RE: Thursday Presentation
Attachments: Perox treat IndustryV2.pdf

Hi all,

As requested, here is the ppt.

Simon

Simon R.M. Jones
Aquatic Animal Health Section
Pacific Biological Station
Fisheries and Oceans Canada
3190 Hammond Bay Road
Nanaimo, British Columbia
V9T 6N7, Canada
Tel: 250 327 3337
Fax: 250 756 7053
E-mail: simon.jones@dfo-mpo.gc.ca
https://profils-profiles.science.gc.ca/en/profile/simon-jones

https://scholar.google.ca/citations?user=JIvmjCwAAAAJ&hl=en

From: [redacted]
Sent: Tuesday, May 24, 2022 12:54 PM
To: Jones, Simon <Simon.Jones@dfo-mpo.gc.ca>
Cc: [redacted]
Subject: Thursday Presentation

Hi Simon,
Thank you for agreeing to brief the AMD folks on the ACRDP study results. I am now attending a conference in Vancouver and will try to make it, but to be sure everything goes off okay, I have asked my colleague [redacted] (copied) to host the meeting.

A few industry folks can't make it – are you able to send slides around?

Thanks

s.19(1)

[redacted]

BC SALMON FARMERS

BC Salmon Farmers Association
201-911 Island Highway, Campbell River, BC, V9W 2C2
bcsalmonfarmers.ca LinkedIn Instagram Facebook Twitter YouTube

No information has been removed or severed from this page

Pages 245 to / à 260

are withheld pursuant to section

sont retenues en vertu de l'article

18(c)

of the Access to Information Act

de la Loi sur l'accès à l'information

From: Sitter, Laura
Sent: Thursday, May 26, 2022 2:10 PM
To: [redacted]
Cc: Blasco, Nathan
Subject: RE: Sea lice treatment vessel inspections

Hi [redacted]

Thanks for the speedy reply! Yes, the audits only apply to sea lice treatments, and transporting smolts. It would be great if we could keep informed about the next time these vessels are being used for sea lice treatment. Thank you again!

Laura

From: [redacted]
Sent: Thursday, May 26, 2022 11:07 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; [redacted]
Cc: Blasco, Nathan <Nathan.Blasco@dfo-mpo.gc.ca>
Subject: RE: Sea lice treatment vessel inspections

Hi Laura,
There are no plans to use the Roy Kristian, hydrolicer, or Orca Chief in the next few weeks. We can update you when/if plans develop but at this time I don't expect the Roy Kristian or Orca Chief will be performing treatments any time soon – their main purpose is fish movement. Would the audits apply to just fish movement (usually smolts from hatchery to sea site) or only to treatments? The hydrolicer is currently undergoing maintenance and upgrades but we can update you to the next planned treatment.
Thanks,
[redacted]

Best regards,
[redacted]
Mowi Canada West
Mobile: [redacted]
Email: [redacted]

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: May 26, 2022 11:00 AM
To: [redacted]
Cc: Blasco, Nathan <Nathan.Blasco@dfo-mpo.gc.ca>
Subject: Sea lice treatment vessel inspections

Good morning [redacted]

Thank you for your collaboration so far on the treatment vessel inspections we've conducted over the last few weeks. Our staff appreciated all the help while inspecting the Aqua Tromoy in Clayoquot Sound.

I would like to try to schedule audits of the remaining MOWI vessels, specifically the hydrolicer, Roy Christian well boat, and the Orca Chief well boat. I know that some of these are used less frequently so we can discuss the best time and place to visit all vessels (while operating, ideally). As I think I've mentioned before, we are inspecting the vessels to understand and verify how fish, water, and lice move through the vessel. Additionally, our colleagues in Aquaculture Environmental Operations (AEO) have been accompanying us to observe how incidental catch are being sorted and handled.

Please let us know what works best for scheduling over the next few weeks.

Thank you,

Dr. Laura Sitter [she/her]
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s.19(1)

From: Manchester, Howie
Sent: Thursday, May 26, 2022 3:43 PM
To: Sitter, Laura
Subject: Ronja Islander & Coastal Server risk tools

Hi Laura,

As we discussed I've completed the Risk tool checklist for both the Ronja Islander (peroxide) and the Coastal Server (Skamik). Please review and make any changes as needed. Let me know if you have any questions.

risk_tool_Ronja Islander - Peroxide_Williamson_20220519.xlsx

risk_tool_Coastal Server - Skamik_Atrevida_20220520.xlsx

I'll work on a short summary of the Skamik workings and you were going to do the same for the Ronja Islander, correct?

thanks
Howie

Howie Manchester BSc
Senior Aquatic Science Biologist
Fisheries and Oceans Canada / Peches et Oceans Canada
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations - Fish Health
#103 2435 Mansfield Drive
Courtenay, B.C
Cell: 250 331 1927
Fax: 250 703 0921

From: Manchester, Howie
Sent: Thursday, May 26, 2022 6:26 PM
To: Sitter, Laura
Subject: RE: Can you read this through and let me know what you think?

Looks good. See one change in red.

Is it worth putting in a link to the video that Kristen sent:

Krone Filter: https://www.youtube.com/watch?v=laf5GGn1hZY

Grieg recapture: https://vimeo.com/429685716

Howie

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: May 26, 2022 2:09 PM
To: Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>
Subject: Can you read this through and let me know what you think?

Dear Colleagues,

Please find attached the inspection form for Grieg Seafood's Ronja Islander visit, conducted on Thursday, May 19, 2022. The Ronja Islander is a well boat used for hydrogen peroxide treatments.

Prior to treatment, fish were fasted for three days to minimize the effects of stress. The pen was prepared for handling by the operational crew and farm personnel. This included the removal of oxygen lines and feeding and mortality retrieval equipment. After the boat got in position, a cork line deployed by the operations crew was pulled by farm and boat personnel and a "pocket" was made where the fish were corralled. Water quality sensors from the treatment boat and ops crew are used to monitor the oxygen levels in the "pocket". Oxygen may be added to the crowded fish if water quality is deteriorated or fish behaviour appears altered. It normally takes ~2 hours to pump the fish out of a pocket into the boat. To pump the fish out of the pen, two large-diameter pipes are lowered into the pocket and these are controlled by the captain of the vessel. Large pumps on board the vessel suck the fish and seawater up and into the two holds ("wells") on the ship. Each well capacity is 900 cubic metres. The loading density of the wells is 90kg/m^3 or approximately 15,000 fish per hold (at ~4.8kg), 30,000 fish per load. The vessel is equipped with CO2 strippers however these are not required for hydrogen peroxide treatments (only fish transfers).

This vessel is equipped with a sorting table, which is basically a grill with stainless steel bars with an adjustable separation between bars. This is only employed when the vessel is transporting fish between farm sites, and is not used during hydrogen peroxide treatments. As a result, any incidental catch that are pumped onto the vessel are treated with the hydrogen peroxide and returned back to the farm pen after treatment (there is no sorting or removal of incidental catch during peroxide treatments). Once all the fish have been loaded onto the vessel, they are given a 15 minute rest period in the wells. The water quality in the wells is monitored (oxygen, CO2, pH, salinity) and the welfare of the fish is observed through cameras in the wells. After the 15 minute rest period, hydrogen peroxide is injected into the well water. It takes approximately 7 minutes for the full dose of hydrogen peroxide to be injected into the wells. Once injection starts, a dedicated technician takes solution samples from each well every 5 minutes to determine the concentration of hydrogen peroxide in the wells. Once the desired concentration is reached, the technician informs the vessel captain to stop the hydrogen peroxide injection. The full treatment time is ~20 minutes. The full concentration (target dose is 1200ppm) is

held for ~3 minutes, and following that, new ocean water is pumped into the wells from below the ship to dilute the hydrogen peroxide. Once the hydrogen peroxide is removed, the fish are given an additional 15 minute rest period. After this rest period, the fish and water are pumped through the outflow pipes (different from the inflow pipes) and back into the pen. The movement of is assisted with baffle walls that push the fish toward the outflow pipe. In total, from the start of the first rest period to the time the fish are pumped off the vessel after treatment is ~1 hour.

The primary method of water filtration is through eight large pumps that can recirculate water through the holds at a rate of 1800m^3/hour/pump (four per well). The pumps direct water through eight large Krohn filters with a filter pore size [redacted] microns. Water is constantly being recirculated through these pumps and filters. There are a series of sensors that measure the pressure in the Krohn filters so that when the filters start to fill up with scales, mucus, and sea lice then the filters are flushed. The flushed water and debris is sent through a secondary set of sock filters with a filter pore size of [redacted] microns. When socks begin to fill up, they are removed from the filter holders and manually rinsed in a sink on the ship deck. The drainage from the sink passes through another sock filter and the removed debris is discarded into a tote, which is emptied into the site mort floats. If any of the filters malfunction (Krohn or sock), the system can still run through the other filters at a slightly reduced rate. Alarms from the sensors alert the captain of the vessel to any failures or problems. Once the water has flowed through the Krohn filters and sock filters, it is discharged through pipes that sit below the surface of the water.

In order to use hydrogen peroxide as a treatment, a prescription needs to be written by a licenced veterinarian. Additionally, the vessel needs to have a valid Pesticide Use Permit (PUP) which is issued by the Province of BC Ministry of the Environment (MOE). Permits are typically issued for 3 year periods and issuance of permits involves a consultation process. Permits outline exactly how the product is used, and vessels treatments must follow the directions on the product label (i.e. no extra-label use). Each vessel must have someone on board who holds a valid Pesticide Application Permit. There is a training course that each permit holder must take in order to hold a permit. Usually there are at least two people on board each vessel with this certification, and most Grieg site managers also hold this permit.

Dr. Laura Sitter [she/her]
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Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

s.20(1)(b)

From: Shaw, Kerra
Sent: Thursday, May 26, 2022 7:12 PM
To: Sandberg, Krista; Sitter, Laura; Manchester, Howie; Diamond, Maria; Paylor, Adrienne; Oswell, Alexandria; Manchester, Howie; Fenton, AJ; Greene, Amy
Subject: RE: New report on Open Data sea lice mitigation events

Congrats!

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: Thursday, May 26, 2022 3:02 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Diamond, Maria <Maria.Diamond@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Fenton, AJ <AJ.Fenton@dfo-mpo.gc.ca>; Greene, Amy <Amy.Greene@dfo-mpo.gc.ca>
Subject: FW: New report on Open Data sea lice mitigation events

FYI – the Sea Lice mitigation report is now available online.

Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Cellular | Cellulaire 250-895-1723

Government of Canada Gouvernement du Canada Canada

From: Schwartzel, Margarita <Margarita.Schwartzel@dfo-mpo.gc.ca>
Sent: Thursday, May 26, 2022 8:47 AM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>; Anderson, Laura <Laura.Anderson@dfo-mpo.gc.ca>
Subject: RE: New report on Open Data sea lice mitigation events

Hi Krista and Laura,

The sea lice mitigation report is now public on Open Data: https://open.canada.ca/data/en/dataset/fdba4d10-51aa-40df-884e-09e1c29049d8

Margarita Schwartzel
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From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: Wednesday, May 25, 2022 3:06 PM
To: Anderson, Laura <Laura.Anderson@dfo-mpo.gc.ca>; Schwartzel, Margarita <Margarita.Schwartzel@dfo-mpo.gc.ca>
Subject: RE: New report on Open Data sea lice mitigation events

Comments below. Thanks Ladies!

Krista Sandberg
Senior Data and Public Reporting Coordinator |
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Government of Canada Gouvernement du Canada

Canada

From: Anderson, Laura <Laura.Anderson@dfo-mpo.gc.ca>
Sent: Wednesday, May 25, 2022 2:47 PM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>; Schwartzel, Margarita <Margarita.Schwartzel@dfo-mpo.gc.ca>
Subject: RE: New report on Open Data sea lice mitigation events

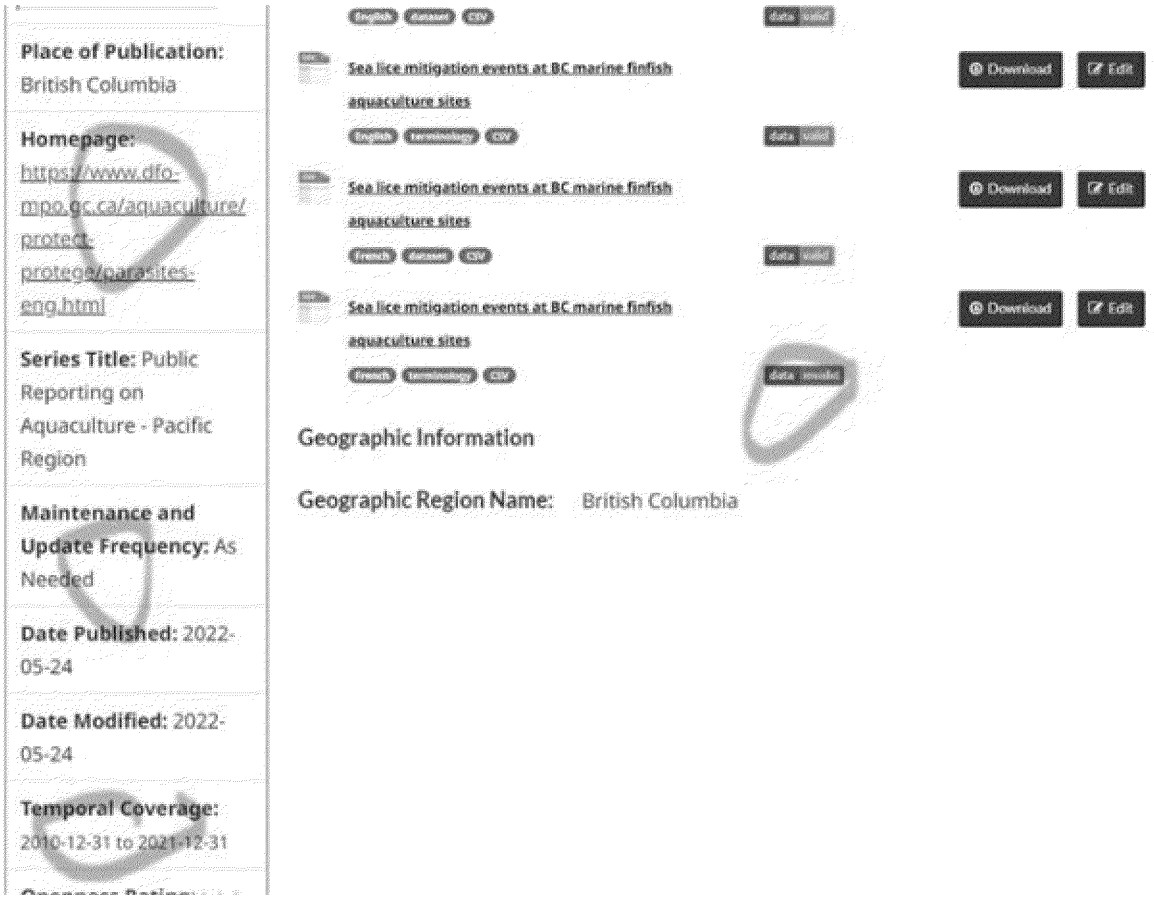
HI Krista,

This Open Data page is almost ready to go. It looks like they stood down the development server, so I've attached a .pdf of what it currently looks like for your review. There are just a few things to be addressed before we go live – if you could help with these questions, Margarita can action the changes.

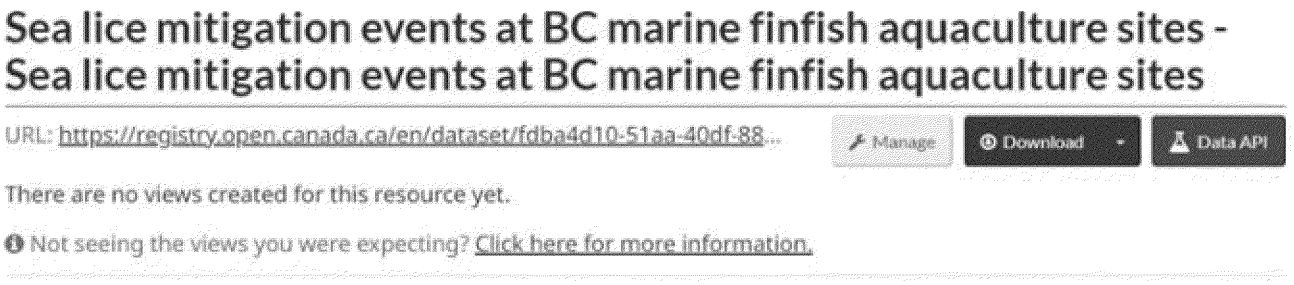
1. Did you want the Data email address as the main point of contact if there are questions about this dataset? DFO.PAC.AquacultureData-Donneesdaquaculture.PAC.MPO@dfo-mpo.gc.ca Yes please
2. Should this link back to the managing disease and parasites page? (I think so) Yes and can we also add these links to the bottom of the introductory text:

Sea Lice Abundance http://open.canada.ca/data/en/dataset/3cafbe89-c98b-4b44-88f1-594e8d28838d
Sea Lice Graph http://www.pac.dfo-mpo.gc.ca/aquaculture/reporting-rapports/lice-ab-pou/index-eng.html
Sea Lice Infographic: Sea lice management at BC salmon farms (dfo-mpo.gc.ca)

3. When should the Update frequency be set for? Monthly, quarterly, annually, as needed, other? Quarterly is our intent but As needed works as well
4. The first instance on this spreadsheet is Dec 31, 2010. Is that the beginning of the covered period, or did you start this report from Jan 1, 2010, and there was just that one instance that slipped under the annual wire? I struggled with this one. Most of our reports just start in 2011 but DFO took over aquaculture management on December 19, 2010. These events occurred at the end of December and were reported to the Department so I included them. However, we should probably remain consistent with other reports, so lets remove those 2 and start January 1, 2011.



5. The .csv file names have to be a little more distinct than they are. We can't just have 4 files called "sea lice mitigation events…" that exactly match the title of the main page. In other cases we had "Sea lice mitigation events at BC marine finfish aquaculture sites, from 2011 to ongoing" and "Sea lice mitigation events at BC marine finfish aquaculture sites, from 2011 to ongoing, terminology file". Otherwise, when you get to the actual .csv page, the title looks like an error. We have not been consistent with this one and many of our other reports look like this, but say "2011 onwards at the end". We did clean one up and add "English" and "Terminology" to the title for clarity. We should do that here and I will make an action item for us to revisit other reports to clarify as well. So:
    a. Data – Sea lice mitigation events, 2011 onwards - English
    b. Data - Sea lice mitigation events, 2011 onwards - French
    c. Terminology – Sea lice mitigation events – English
    d. Terminology – Sea lice mitigation events – French



6. Finally Margarita, there's an error in the French terminology file for some reason. Can you look at it further please?

Thanks!

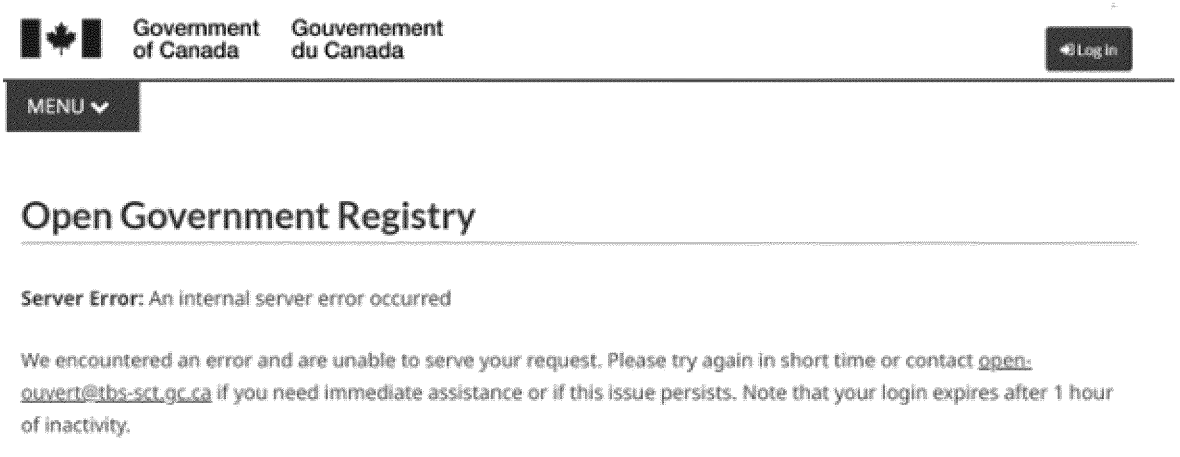
Laura Anderson
(She/her | elle/la)

Team-Lead, Digital Communications
Fisheries and Oceans Canada/Government of Canada
Laura.Anderson@dfo-mpo.gc.ca / Cell: 604-499-5808

Chef d'équipe, Communications numériques
Pêches et Océans Canada/Gouvernement du Canada
Laura.Anderson@dfo-mpo.gc.ca / Mobile : 604-499-5808

From: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Sent: Wednesday, May 25, 2022 7:23 AM
To: Schwartzel, Margarita <Margarita.Schwartzel@dfo-mpo.gc.ca>
Cc: Anderson, Laura <Laura.Anderson@dfo-mpo.gc.ca>
Subject: RE: New report on Open Data sea lice mitigation events

Thanks Margarita. I get this error when I click on the link. Not sure if it's a login error or a coincidental server error?



Krista Sandberg
Senior Data and Public Reporting Coordinator |
Coordonnateur principal des rapports publics et de données
Aquaculture Management Division | Gestion de l'aquaculture
Cellular | Cellulaire 250-895-1723

Government of Canada Gouvernement du Canada Canada

From: Schwartzel, Margarita <Margarita.Schwartzel@dfo-mpo.gc.ca>
Sent: Tuesday, May 24, 2022 4:28 PM
To: Sandberg, Krista <Krista.Sandberg@dfo-mpo.gc.ca>
Cc: Anderson, Laura <Laura.Anderson@dfo-mpo.gc.ca>
Subject: New report on Open Data sea lice mitigation events

Hi Krista and Laura,

The new report is ready for your review before it is published to the Open Date Registry:
https://registry.open.canada.ca/en/dataset/fdba4d10-51aa-40df-884e-09e1c29049d8

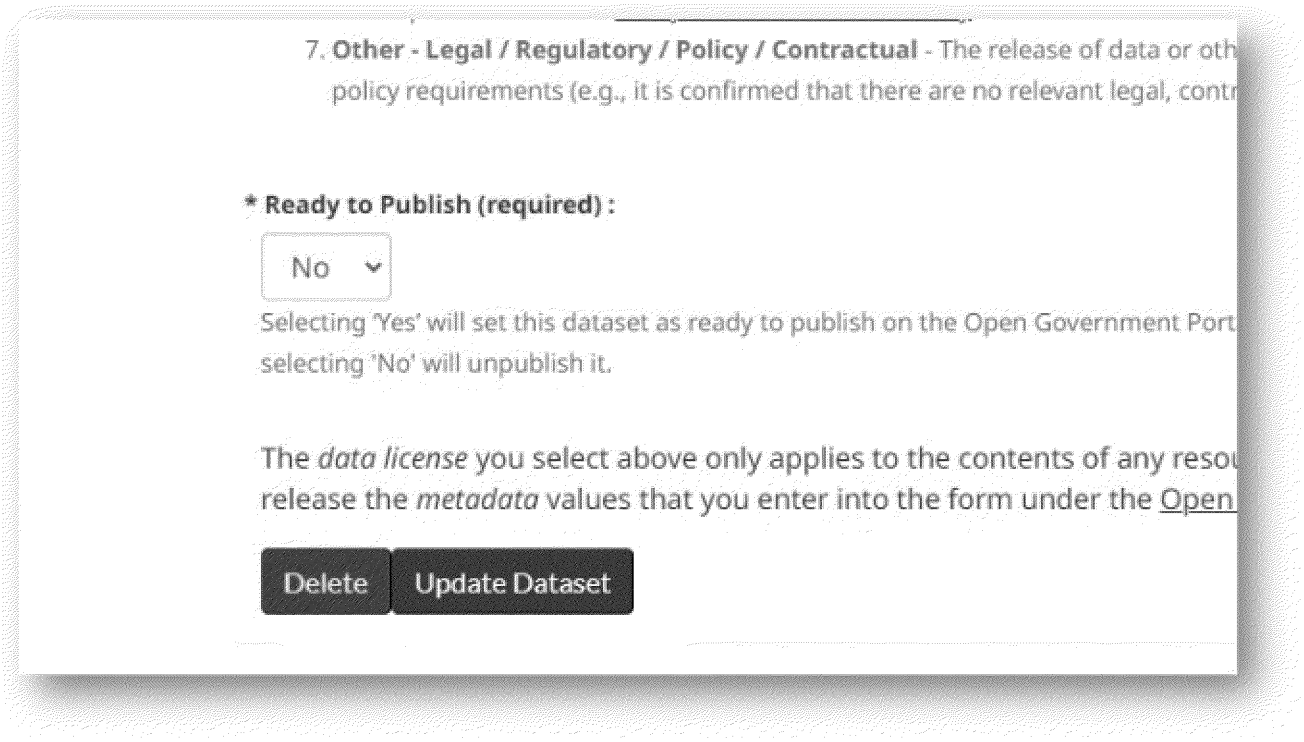
The report consists of:

- 1 English data csv file

- 1 English terminology csv file
- 1 French data csv file
- 1 French terminology csv file

Krista, do you need our password to get into this view?

Let me know if you need any explanation before I click on the "yes" button at the bottom of the metadata page:



Margarita Schwartzel
Digital Communications Advisor
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cellulaire: 236-330-5259

From: Diamond, Maria
Sent: Friday, May 27, 2022 10:23 AM
To: Oswell, Alexandria; Sitter, Laura; Manchester, Howie
Subject: Compliance Summary May 27
Attachments: Compliance Summary to May 26, 2022.docx

Good morning,

Please find attached the most recent compliance summary for this morning's meeting. While I'm thinking about it can we please discuss Handling vs Treatment in mortality event reports as well as the additional factors. I need to clarify a couple of things about what we expect and the process.

Thanks,

Maria

Maria Diamond, B.Sc. (she/her)
Fish Health Data Biologist / Biologiste des données sur la santé des poissons
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations/Opérations environnementales de l'aquaculture
Fisheries and Oceans Canada / Pêches et Océans Canada
#103 - 2435 Mansfield Drive
Courtenay, B.C
Office | Bureau: 250 465 2948
Fax: 250 703 0921

Compliance Summary May 19 - 27, 2022

Mortality Events – New 24hr events or updates

Incident Date	Date Report	Facility	Details
May 20	May 20	Millar	5d ME Handling – kg biomass, kg avg, pcs. Delouser on site
May 23	May 23	Williamson	24hr ME – Treatment O2 crashed on vessel during tx. kg biomass, kg avg, pcs
May 25	May 25	Bawden	24hr ME – Handling – continued drop out during delousing. kg biomass, kg avg, pcs.

Fish Health and Sea Lice Mitigations:

Fish Health Event

Incident Date	Date Report	Facility	Details
May 18	May 19	Doyle	MR treatment
May 25	May 26	Charlie's Place	Furunculosis
May 26	May 26	Duncan	MR treatment

Sea Lice Mitigations

Incident Date	Date Report	Facility	Details
May 21	May 20	Fortune	FW bath treatment
May 26	May 25	Bawden	Hydrolicer
May 26	May 25	Ahlstrom	Hydrolicer
May 31	May 26	Concepcion	H202 treatment

Sea Lice Events

Incident Date	Date Report	Facility	Details
May 19	May 20	Millar	Pre-tx 8.25avg
May 20	May 20	Millar	Post-mech 1.18 avg

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May 20	May 22	Bawden	Pre-tx 8.83 avg
May 21	May 22	Bawden	Post-mech 2.15 avg
May 20	May 22	Fortune	Pre-tx 1.91 avg
May 20	May 22	Midsummer	Post-feed (2wk) 0.57 avg
May 22	May 23	Bedwell	Post-bath 0.14 avg
May 22	May 24	Ahlstrom	Pre-tx 1.38 avg
May 22	May 24	Atrevida	Post-mech (Pen only) .80 avg
May 25	May 25	Mussel Rock	Exceed 3.67 avg (3 pen count)
May 26	May 26	Fortune	Post-bath 0.25 avg

s.20(1)(b)

From: Shaw, Kerra
Sent: Friday, May 27, 2022 12:42 PM
To: McCorquodale, Brenda
Cc: Sitter, Laura; Paylor, Adrienne
Subject: RE: Ministerial Briefing Aquaculture - Agenda - June 1 2022

We collectively determined only 4 were non-compliant. I guess that was more my point – you're correct.

From: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 9:39 AM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Cc: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Subject: RE: Ministerial Briefing Aquaculture - Agenda - June 1 2022

Yes – my expectation is that we are only doing this during the outmigration window.
Weren't there 8 farms over entering the outmigration window but 4 were dealing with issues that didn't allow them to handle or treat fish so they were exempt?
Brenda

Brenda McCorquodale (she/ her/ elle)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 9:36 AM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Cc: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Subject: Ministerial Briefing Aquaculture - Agenda - June 1 2022

Hi Brenda, here is the update on sea lice this week. Sending to Laura and Adrienne in case they need to do in the future.

However, please note that I added in here that the out-migration window ends on June 30. Perhaps we can stop these updates when the out-migration window is over?

The conclusion could be that there were 4 farms over at the start of the out-migration, as we have previously briefed. Otherwise, all farms stayed in compliance the rest of these time frame.

Thanks,
Kerra

From: Sitter, Laura
Sent: Friday, May 27, 2022 2:46 PM
To: Shaw, Kerra; Paylor, Adrienne
Cc: Young, Jennifer A; Girdler, Lauren
Subject: RE: westerly news

No, I haven't heard of this and don't have any additional information.I agree with Kerra that it is extremely unlikely to be a product of sea lice treatments from distant farms. If you would like information on recent sea lice treatments in Clayoquot Sound, I certainly can provide that. Hydrogen peroxide has not been used in Clayoquot Sound this week.

Laura

From: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 11:15 AM
To: Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>; Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>; Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: RE: westerly news

I haven't heard of it. Laura would be able to find out if Cermaq was treating for sea lice, however it would seem unlikely to me because there aren't Cermaq farms in Tofino Harbour.

From: Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 11:12 AM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: FW: westerly news
Importance: High

Have either of you heard about this or know anything?

From: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 10:46 AM
To: Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Cc: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Subject: FW: westerly news
Importance: High

Hi Adrienne,

Please see media request below – sent to both me and Cermaq. Please let me know if you'd like to call to discuss.

Thanks

s.19(1)

Lauren Girdler (she/her/elle)
C: 604-365-6675

From: [redacted]
Sent: May 27, 2022 10:18 AM
To: Media Canada <media@cermaq.com>; Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>

Subject: westerly news

HI [redacted] and Lauren

I am getting reports that a large amount of seafoam was drifting in the Tofino Harbour yesterday (May 26) and went up browning pass.

Some are linking it to the well boats Cermaq uses for pesticides.

Did Cermaq dumb any pesticides yesterday? Is the seafoam harmful to the marine environment?

Thank you for your help,

[redacted]

Tofino-Ucluelet Westerly News
The West Coast's News Source
#102-1801 Bay St., Ucluelet, B.C.
Ph: 250.726.7029
www.westerlynews.ca
www.facebook.com/WesterlyNews

Black Press Media

First Place: 2022 BCYCNA Newspaper Excellence Award (Category A)
Second Place: 2022 BCYCNA Spot News Photo
Second Place: 2020 & 2019 BCYCNA Newspaper Excellence Award (Category A)
Second Place: 2019 CCNA Best Business Writing (Circ. up to 9,999)

s.19(1)

From: Manchester, Howie
Sent: Friday, May 27, 2022 3:04 PM
To: Sitter, Laura
Cc: Oswell, Alexandria; Stenhouse, Shawn
Subject: Potential Sea Lice counting issues - need clarification
Attachments: 2022-042 SL Data.pdf

Hi Laura,

Here is an explanation for the SL issues the team say at Bedwell and Bawden.

Bedwell sea lice counting issue:

Audit 2022-043 , team was there on May 10th. Sea lice data from March 7th to April 13th, Pen has had 40 fish counted in this pen on the following dates (March 10, 19, 20th, 30th, April 12, 13th). Looks like the site is then reporting to DFO Per data as Pen and Pen data. For example on March 30th, Cermaq reported from Bedwell Pen counted 40 fish had 126 motile, but reported Pen (59 motile) and Pen (67 motile) = 126 motile(threshold exceedance). So therefore instead of counting three pens as required by licence they have been reporting only counts from 2 pens as three. Does confirm that this is going on?

Apparently the reasoning site staff gave was that due to an issue with the peroxide treatment they had to combine pen Regardless of this they should still be submitting results for 3 separate pens.

Bawden:

Some anomalies discovered in the on site sea lice report from fish talk for an audit conducted by DFO on May 11th. Looks like multiple pen sea lice sampling results that are identical yet only one of these is reported to DFO. What is the explanation for this anomaly? Are these sampling events real and not reported? Or is there some other explanation? Maybe can look at the system and see if she is seeing a problem.

Some examples:

Date	Pen	Number of Fish		Motiles
13/03/2022		20	0	106
13/03/2022		20	0	106
13/03/2022		20	0	106
16/03/2022		20	1	99
16/03/2022		20	1	99
16/03/2022		20	1	99
17/03/2022		20	1	132

Reported:

s.19(1)
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SL Date	Pen ID	SL Count	Avg. SL Count Pre Counts	Post Counts	DFO Count	Comments		
13-Mar-22		5.3	3.34285714		5.3			106
16-Mar-22		4.95	5.775			March Counts		99
17-Mar-22		6.6						132

Thanks
Howie

Howie Manchester BSc
Senior Aquatic Science Biologist
Fisheries and Oceans Canada / Peches et Oceans Canada
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations - Fish Health
#103 2435 Mansfield Drive
Courtenay, B.C
Cell: 250 331 1927
Fax: 250 703 0921

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Production analysis

Period: 01.Mar 2022 - 11.May 2022

Pages: 3. Author: Bawden Point Manager. Published: 11.May 2022

2022-042

General information		Lice counting										
Date	Unit	# of fish sampled	Caligus Elongatus, all stages, total # of lice	Lep Adult F + M + Preadult, total # of lice	Lep Pre Adult+Males, total # of lice	Lep. Adult female, total # of lice	Lep. all stages, total # of lice	Lep. female + movable, last sample	Lep. female + movable, total # of lice	Lep. female with egg strings, total # of lice	Lep. female without egg strings, total # of lice	Lep. Juveniles, total # of lice	Lep. Movable, total # of lice
02/03/2022	[redacted]	20	8	222	134	88	278	11.10	222	40	48	56	134
02/03/2022	[redacted]	20	5	394	262	132	480	19.70 ✓	394	54	78	86	262
02/03/2022	[redacted]	20	8	222	134	88	278	11.10 ✓	222	40	48	56	134
02/03/2022	[redacted]	20	8	222	134	88	278	11.10	222	40	48	56	134
02/03/2022	[redacted]	20	10	227	125	102	312	11.35 ✓	227	59	43	85	125
02/03/2022	[redacted]	20	5	394	262	132	480	19.70	394	54	78	86	262
02/03/2022	[redacted]	20	5	394	262	132	480	19.70	394	54	78	86	262
06/03/2022	[redacted]	20	6	351	222	129	417	17.55	351	48	81	66	222
07/03/2022	[redacted]	20	0	303	183	120	303	15.15	303	81	39	0	183
07/03/2022	[redacted]	20	0	54	10	44	54	2.70	54	21	23	0	10
07/03/2022	[redacted]	20	3	291	184	107	342	14.55	291	67	40	51	184
07/03/2022	[redacted]	20	0	303	183	120	303	15.15	303	81	39	0	183
07/03/2022	[redacted]	20	0	303	183	120	303	15.15	303	81	39	0	183
07/03/2022	[redacted]	20	3	291	184	107	342	14.55	291	67	40	51	184
08/03/2022	[redacted]	20	0	45	7	38	47	2.25	45	20	18	2	7
08/03/2022	[redacted]	20	0	45	7	38	47	2.25	45	20	18	2	7
09/03/2022	[redacted]	20	0	52	17	35	52	2.60	52	13	22	0	17
09/03/2022	[redacted]	20	0	466	201	265	466	23.30	466	87	178	0	201
09/03/2022	[redacted]	20	0	52	17	35	52	2.60	52	13	22	0	17
09/03/2022	[redacted]	20	0	466	201	265	466	23.30	466	87	178	0	201
09/03/2022	[redacted]	20	0	52	17	35	52	2.60	52	13	22	0	17
09/03/2022	[redacted]	20	0	466	201	265	466	23.30	466	87	178	0	201
10/03/2022	[redacted]	20	3	62	20	42	66	3.10	62	18	24	4	20
10/03/2022	[redacted]	40	3	646	289	357	665	29.20	646	128	229	19	289
10/03/2022	[redacted]	20	3	62	20	42	66	3.10	62	18	24	4	20
10/03/2022	[redacted]	20	0	584	269	315	599	29.20	584	110	205	15	269
11/03/2022	[redacted]	40	0	563	231	332	570	24.50	563	126	206	7	231
11/03/2022	[redacted]	40	0	563	231	332	570	24.50	563	126	206	7	231
11/03/2022	[redacted]	20	0	490	199	291	496	24.50	490	100	191	6	199
11/03/2022	[redacted]	20	0	490	199	291	496	24.50	490	100	191	6	199
12/03/2022	[redacted]	40	0	626	322	304	632	27.50	626	185	119	6	322
12/03/2022	[redacted]	20	0	76	34	42	82	3.80	76	28	14	6	34
12/03/2022	[redacted]	20	0	550	288	262	550	27.50	550	157	105	0	288
12/03/2022	[redacted]	20	0	550	288	262	550	27.50	550	157	105	0	288
12/03/2022	[redacted]	20	0	76	34	42	82	3.80	76	28	14	6	34
12/03/2022	[redacted]	20	0	76	34	42	82	3.80	76	28	14	6	34
13/03/2022	[redacted]	20	0	106	40	66	114	5.30	106	45	21	8	40
13/03/2022	[redacted]	20	0	106	40	66	114	5.30	106	45	21	8	40
13/03/2022	[redacted]	20	0	106	40	66	114	5.30	106	45	21	8	40
16/03/2022	[redacted]	20	1	99	42	57	102	4.95	99	32	25	3	42
16/03/2022	[redacted]	20	1	99	42	57	102	4.95	99	32	25	3	42
16/03/2022	[redacted]	20	1	99	42	57	102	4.95	99	32	25	3	42

General information		Lice counting											
Date	Unit	# of fish sampled	Caligus Elongatus, all stages, total # of lice	Lep Adult F + M + Preadult, total # of lice	Lep Pre Adult+Males, total # of lice	Lep. Adult female, total # of lice	Lep. all stages, total # of lice	Lep. female + movable, last sample	Lep. female + movable, total # of lice	Lep. female with egg strings, total # of lice	Lep. female without egg strings, total # of lice	Lep. Juveniles, total # of lice	Lep. Movable, total # of lice
16/03/2022		20	1	99	42	57	102	4.95	99	32	25	3	42
17/03/2022		20	1	132	54	78	136	6.60	132	52	26	4	54
22/03/2022		20	0	124	52	72	135	6.20	124	41	31	11	52
22/03/2022		20	0	124	52	72	135	6.20	124	41	31	11	52
22/03/2022		20	0	124	52	72	135	6.20	124	41	31	11	52
23/03/2022		20	0	37	3	34	37	1.85	37	23	11	0	3
23/03/2022		40	0	221	102	119	251	1.85	221	79	40	30	102
23/03/2022		20	0	37	3	34	37	1.85	37	23	11	0	3
23/03/2022		20	0	184	99	85	214	9.20	184	56	29	30	99
24/03/2022		20	4	142	50	92	149	7.10	142	55	37	7	50
24/03/2022		20	0	29	3	26	29	1.45	29	13	13	0	3
24/03/2022		20	0	29	3	26	29	1.45	29	13	13	0	3
24/03/2022		20	4	142	50	92	149	7.10	142	55	37	7	50
25/03/2022		20	5	218	106	112	226	10.90	218	59	53	8	106
25/03/2022		40	5	243	107	136	257	1.25	243	72	64	14	107
25/03/2022		20	5	218	106	112	226	10.90	218	59	53	8	106
25/03/2022		20	0	25	1	24	31	1.25	25	13	11	6	1
26/03/2022		20	0	35	6	29	36	1.75	35	20	9	1	6
26/03/2022		20	6	168	65	103	185	8.40	168	60	43	17	65
26/03/2022		20	0	35	6	29	36	1.75	35	20	9	1	6
26/03/2022		20	6	168	65	103	185	8.40	168	60	43	17	65
26/03/2022		20	6	168	65	103	185	8.40	168	60	43	17	65
26/03/2022		20	0	35	6	29	36	1.75	35	20	9	1	6
27/03/2022		20	0	23	8	15	23	1.15	23	8	7	0	8
27/03/2022		20	22	157	69	88	176	7.85	157	57	31	19	69
27/03/2022		20	0	23	8	15	23	1.15	23	8	7	0	8
27/03/2022		20	0	23	8	15	23	1.15	23	8	7	0	8
27/03/2022		20	22	157	69	88	176	7.85	157	57	31	19	69
28/03/2022		20	0	23	6	17	24	1.15	23	15	2	1	6
28/03/2022		20	2	152	60	92	183	7.60	152	68	24	31	60
28/03/2022		20	0	23	6	17	24	1.15	23	15	2	1	6
29/03/2022		20	0	27	5	22	28	1.35	27	9	13	1	5
05/04/2022		20	0	44	20	24	48	2.20	44	18	6	4	20
05/04/2022		20	2	48	14	34	56	2.40	48	21	13	8	14
05/04/2022		20	0	44	20	24	48	2.20	44	18	6	4	20
05/04/2022		40	2	92	34	58	104	2.40	92	39	19	12	34
06/04/2022		20	0	70	27	43	83	3.50	70	34	9	13	27
06/04/2022		20	0	70	27	43	83	3.50	70	34	9	13	27
06/04/2022		20	0	70	27	43	83	3.50	70	34	9	13	27
12/04/2022		20	2	111	67	44	111	5.55	111	26	18	0	67
12/04/2022		20	2	111	67	44	111	5.55	111	26	18	0	67
13/04/2022		20	1	21	11	10	25	1.05	21	7	3	4	11
13/04/2022		20	2	168	89	79	168	8.40	168	33	46	0	89
13/04/2022		20	2	168	89	79	168	8.40	168	33	46	0	89
13/04/2022		20	1	21	11	10	25	1.05	21	7	3	4	11
13/04/2022		20	2	168	89	79	168	8.40	168	33	46	0	89
14/04/2022		20	0	31	21	10	36	1.55	31	7	3	5	21
14/04/2022		20	0	31	21	10	36	1.55	31	7	3	5	21
14/04/2022		20	0	31	21	10	36	1.55	31	7	3	5	21
19/04/2022		20	0	57	36	21	82	2.85	57	9	12	25	36

General information		Lice counting											
Date	Unit	# of fish sampled	Caligus Elongatus, all stages, total # of lice	Lep Adult F + M + Preadult, total # of lice	Lep Pre Adult+Males, total # of lice	Lep. Adult female, total # of lice	Lep. all stages, total # of lice	Lep. female + movable, last sample	Lep. female + movable, total # of lice	Lep. female with egg strings, total # of lice	Lep. female without egg strings, total # of lice	Lep. Juveniles, total # of lice	Lep. Movable, total # of lice
19/04/2022		20	0	153	102	51	172	7.65	153	33	18	19	102
19/04/2022		20	0	57	36	21	82	2.85	57	9	12	25	36
20/04/2022		20	27	71	40	31	71	3.55	71	24	7	0	40
20/04/2022		20	27	71	40	31	71	3.55	71	24	7	0	40
20/04/2022		20	27	71	40	31	71	3.55	71	24	7	0	40
24/04/2022		20	47	283	164	119	283	14.15	283	73	46	0	164
24/04/2022		20	47	283	164	119	283	14.15	283	73	46	0	164
24/04/2022		20	47	283	164	119	283	14.15	283	73	46	0	164
25/04/2022		20	31	290	154	136	290	14.50	290	75	61	0	154
25/04/2022		40	78	550	317	233	550	13.00	550	139	94	0	317
25/04/2022		20	31	290	154	136	290	14.50	290	75	61	0	154
30/04/2022		20	6	203	135	68	237	10.15	203	30	38	34	135
01/05/2022		20	3	208	161	47	220	10.40	208	32	15	12	161
01/05/2022		20	0	44	17	27	44	2.20	44	15	12	0	17
02/05/2022		20	0	42	9	33	42	2.10	42	13	20	0	9
02/05/2022		20	2	407	282	125	430	20.35	407	43	82	23	282
03/05/2022		20	0	91	17	74	91	4.55	91	33	41	0	17
03/05/2022		20	8	540	333	207	560	27.00	540	85	122	20	333
04/05/2022		20	9	467	282	185	495	23.35	467	114	71	28	282
04/05/2022		20	0	129	22	107	134	6.45	129	59	48	5	22
05/05/2022		20	29	663	456	207	711	33.15	663	100	107	48	456
05/05/2022		20	0	104	24	80	107	5.20	104	46	34	3	24
06/05/2022		20	2	142	35	107	147	7.10	142	59	48	5	35
Grand total													
		1,160	294	10,568	5,537	5,031	11,349	5.22	10,568	2,608	2,423	781	5,537

s.20(1)(b)

From: Sitter, Laura
Sent: Friday, May 27, 2022 4:59 PM
To: McCorquodale, Brenda
Subject: RE: Sea lice update- May 27, 2022

Yes, that is accurate! This is usually because of anesthetic withdrawal times (we require companies to count sea lice on fish before and after treatments and the fish need to be anesthetized in order to count the sea lice…).

In addition to that, mechanical and bath treatments can damage large fish and affect their market value, along with increased mortalities associated with handling. When it comes to medicated feed (SLICE), there is also a withdrawal period on that medication that companies need to be aware of.

Laura

From: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 1:56 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: RE: Sea lice update- May 27, 2022

That is helpful. Thank you.
Would it be accurate to say that companies wouldn't generally treat while in the process of harvesting?
Brenda

Brenda McCorquodale (she/ her/ elle)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 1:54 PM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Subject: RE: Sea lice update- May 27, 2022

s.19(1)

You're welcome!

Monday Rocks is harvesting as their mitigation. They plan to be under by day 40 of their exceedance (like Mahatta West). I can look back at their treatment histories to let you know how previous sea lice treatments have fared, if that's valuable to you?

The confirmation we got from MOWI about Mahatta West was an email confirmation from t[redacted] who confirmed that they had harvested out within the 42 days. The inventory information gets verified when companies submit their monthly inventory updates submitted on the 15th of the following month, so we will triple confirm at that time.

Let me know if there's anything else I can help with!

Laura

From: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 1:48 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: RE: Sea lice update- May 27, 2022

Thanks Laura. What's the deal with Monday Rocks? Are they harvesting, or have treatments failed? Will they exceed the 42 days?
Also what confirmation did we get that the other MOWI site (was it Mahatta?) was harvested out in time to meet the 42 day limit in Quatsino?
Brenda

Brenda McCorquodale (she/ her/ elle)

Director / Directrice
Aquaculture Management / Gestion de l'aquaculture
Fisheries Management Branch / Direction de la gestion des pêches
Fisheries and Oceans Canada / Pêches et Océans Canada
1965 Island Diesel Way |Nanaimo, BC | Nanaimo, CB |V9S 5W8
250-902-8865
Email | Courriel: Brenda.McCorquodale@dfo-mpo.gc.ca

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 1:00 PM
To: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: Sea lice update- May 27, 2022

Hi Brenda and Kerra,

Here are your sea lice and field updates for this week (as of May 27, 2022)

- **Sea lice updates**
  - **Broughton-** 10 active, 0 over
  - **Central Coast-** 4 active, 1 over (Cougar continued)
  - **Clayoquot North-** 3 active, 1 over (Dixon continued, Bawden and Millar now under)
  - **Clayoquot South-** 5 active, 1 over (Mussel new)
  - **Esperanza –** 3 active, 0 over (Lutes is now operational)
  - **Nootka-** 5 active, 1 over (Concepcion new)
  - **Port Hardy-** 5 active, 0 over
  - **Quatsino-** 1 active, 1 over (Monday Rocks continued)
  - **Sunshine Coast –** 5 active, 0 over
  - **Summary: 41 sites, 5 over**
  - **42d threshold:** Monday Rocks 34 days, Dixon 30 days, Cougar 20 days.
  - 8 sites have exceeded the sea lice threshold multiple times during this outmigration: Bedwell,

Dixon, Fortune, Bawden, Millar, Plover, Cougar and Mussel.

- **Field updates**
  - This week AFH conducted fish health audits at 5 sites in Nootka Sound/Esperanza Inlet. 4/5 audits included sea lice counts.
  - One DFO-conducted sea lice count resulted in a threshold exceedance. The company should be reporting this by the end of today. One sea lice audit was not able to be completed due to an issue collecting the appropriate number of fish for the count. This has been noted as an HMP deficiency.
  - Data is still being reviewed from the visits, but no obvious issues of non-compliance have otherwise been identified.

Please let me know if you have any questions!

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Sitter, Laura
Sent: Friday, May 27, 2022 7:06 PM
To: Neumann, Carla
Cc: Oswell, Alexandria
Subject: [redacted]

Hi Carla,

Please find all files related to [redacted] at this location on the Aqua Drive: Y:\Active Marine FF Information\Compliance Tracking\SL non compliance- Mar 2022

Please let me know if there is any other way I can assist.

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Neumann, Carla <Carla.Neumann@dfo-mpo.gc.ca>
Sent: Saturday, April 23, 2022 9:37 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: [redacted]

Laura,

I have been in receipt of your Conservation and Protection Aquaculture Occurrence Referral for [redacted]

In order to proceed with this file I will need more information from your sector.

Although not an exhaustive list can you please forward the following:
-Notes written or electronic.
-Emails between the company and DFO on this matter.
-How and when you initially became aware of the Sea Lice exceedance.
-Any other items relevant to this matter.

As a reminder it is asked that you keep email chatter to a minimum on this topic and all conversations will be disclosable and therefore need to be forwarded to myself.

Please let me know if you have any questions.

s.16(1)(c)

Thanks,
Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

No information has been removed or severed from this page

From: Sitter, Laura
Sent: Friday, May 27, 2022 7:07 PM
To: Aitken, Kelly
Subject: RE:

Hi Kelly,

Please find all files related to [redacted] at this location on the Aqua Drive:
Y:\Active Marine FF Information\Compliance Tracking\SL non compliance- Mar 2022

Please let me know if there is any other way I can assist.

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Aitken, Kelly <Kelly.Aitken@dfo-mpo.gc.ca>
Sent: Wednesday, April 20, 2022 8:14 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject:

Hi Laura,
I will need all of the emails and correspondence between DFO and [redacted] detailed in the referral form, as well as any other supporting documents specific to this suspected violation.
I will request a cansay at a future date.
Thanks so much,
Kelly

s.16(1)(c)

Kelly Aitken (she/her)
Fishery Officer | Agent des Pêches
Fisheries and Oceans Canada | Pêches et Océans Canada
Pacific Region | Région du Pacifique
1520 Tamarac Street, Campbell River
Phone | Téléphone: (250) 286-5816
Fax: (250) 754-0391
To report a violation: 1-800-465-4336 or 604-607-4186
Email | Courriel: kelly.aitken@dfo-mpo.gc.ca
This email was sent from the traditional territory of the We Wai Kai and We Wai Kum Nations

Fisheries and Oceans Canada | Pêches et Océans Canada

No information has been removed or severed from this page

From: Sitter, Laura
Sent: Friday, May 27, 2022 7:36 PM
To: Manchester, Howie
Subject: RE: Coastal Server - Skamik 1.5 Vessel Inspection

Hi Howie,

Looks good to me! I just edited some of the punctuation/grammar (you know me).

Laura

From: Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 3:03 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Subject: Coastal Server - Skamik 1.5 Vessel Inspection

Hi Laura,

Here is what I have so far for a description of the Skamik 1.5 system. Please let me know if I've missed anything and if its good to send.

s.20(1)(b)

Hello everyone,

Please find attached the inspection form for the Coastal Server visit conducted on Friday, May 20th.

The inspection occurred while the Coastal Server was at Atrevida in Nootka Sound. The Atrevida aquaculture facility consist of 5 x 200 meter (circumference) polar circles, four of which contain fish and one is left empty for sea lice treatment purposes. The sea lice treatment done was using the Skamik mechanical hydrolicer. DFO Biologists and a Veterinarian witnessed the treatment of pen [redacted] into an empty pen ([redacted] . Prior to treatment, fish were fasted for two or three days to minimize the effects of stress. The pen was prepared for handling by the support vessels and farm personnel. This included the removal of air lines and feeding and mortality retrieval equipment. After the Coastal Server was in position, a cork line deployed by the operations crew was pulled by farm and boat personnel and a pocket was made from which the fish were pumped onto the vessel for treatment. Oxygen may be added to the crowded fish in the pocket using a 'Nano bubbler' if water quality deteriorates or fish behaviour appears altered. The Coastal Server brings fish up from the pocket from one intake pipe, which is lowered into the crowded pocket. Fish enter through the intake and once on board, go through an adjustable set of dewatering bars before entering the Skamik system. Here, water and by-catch are separated and a second set of de-watering bars below the first further separates the by-catch from incoming water. By-catch go directly into the receiving pen while effluent water goes into a large drum filter [redacted] microns). The farmed salmon that go over the initial set of de-watering bars then go through the Skamik system (a set of water jets (hydrolicer) and brushes (6 columns of brushes parallel to each other)). The fish spend about 2 -3 seconds each going through this process. The cleaned fish then go into a trough at the end of the Skamik hydrolicer, where 'clean' sea water is brought in from below the vessel to move the fish into the receiving pen.

All effluent water that has gone through first set of de-watering bars (no lice removal at this point) and through the hydrolicer (including the water used to remove lice) goes into a large drum filter. All 'clean' water that is brought up post-hydrolicer to move the salmon and by-catch goes directly into the receiving pen. All captured lice in the drum filter is then moved through a pipe and deposited onto a belt filter ([redacted] micon). At this point all

lice, scales, and debris are captured and deposited into a 1 m3 tote. Any water that goes through the belt filter at this point goes back into the drum filter. The solid waste is then given to the farmers for disposal with mortalities. Effluent water that has gone through the drum filter, and has had lice and scales removed, then exits the vessel at the stern. At the stern, effluent water goes through a final filter sock which is placed in order to capture any lice that may have gone through the primary filters. This sock is also used as a warning system- if any amount of lice/scales are noted to start accumulating in this sock it indicates that something has gone wrong in the filtering system. If this occurs all treatment stops and the drum filter is inspected and repaired if necessary.

Each fish spends about 2-3 seconds going through the Skamik hydrolicer system, but fish can spend up to 1- 2 hours in the seine waiting to go into one of the four intakes. Within the seine it is expected that some sea lice will be dislodged into the environment. Pen [redacted] had a population of approximately [redacted] fish with an average weight of [redacted] kg and an average motile *L. salmonis* count of 2.35 lice/fish, post was 0.80 lice/fish. The hydrolicer needs to be adjusted for each cage based on fish size and amount of lice. This occurs at the beginning of the treatment process using feedback from a technician as to fish welfare and lice removal efficacy. Once this is set, the adjustments remain for the entire pen treatment. There are challenges with treatment if the pen has a high size variation; in this case some fish will be damaged while others won't have effective lice removal.

Thanks
Howie

Howie Manchester BSc
Senior Aquatic Science Biologist
Fisheries and Oceans Canada / Peches et Oceans Canada
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations - Fish Health
#103 2435 Mansfield Drive
Courtenay, B.C
Cell: 250 331 1927
Fax: 250 703 0921

s.20(1)(b)

From: [redacted]
Sent: Monday, May 30, 2022 5:51 PM
To: AQFF.FishHealth (DFO/MPO); Sitter, Laura
Cc: [redacted]
Subject: Peroxide ACDRP update
Attachments: Grieg Seafood COL 6.13 Submission (May 30 2022).pdf

Hello,

Please find an attached summary of the ACDRP presentation to fulfill the requirement of COL 6.13.

Cheers

[redacted]
Grieg Seafood BC Ltd.
#106-1180 Ironwood Street
Campbell River, BC
V9W 5P7
[redacted]

s.19(1)

Date: May 30, 2022

Re: Condition of Licence 6.13

To satisfy the COL 6.13 that by June 1, 2022, Grieg is submitting the preliminary results from the scientific analysis regarding the viability of sea lice that are captured before, during and after sea lice bath treatments. An ACDRP project was designed to determine:

1) The viability and infectivity of mobile stages of *L. salmonis* following in vitro exposure to H_2O_2.
2) Study the hatch rate and development of larval *L. salmonis* following in vitro exposure to H_20_2.

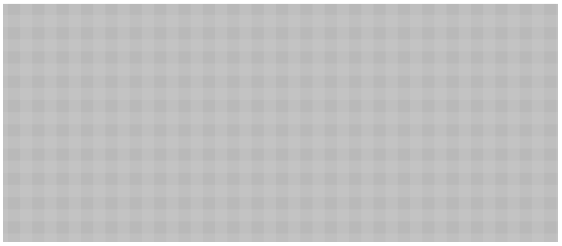
A presentation of the experimental design, summary and conclusions was presented to Fish Health Team at the DFO Aquaculture Management division on May 26, 2022.

In summary laboratory treatment with 500 and 1500 ppm H_2O_2 caused:

a) Temporary loss of mobility of adult female *L. salmonis*.
b) Significant reduction in infectivity of adult female *L. salmonis*.
c) Significant reduction in abundance of nauplius 2 and copepodid larvae.
d) Prolonged presence of nauplius 1 larvae, suggesting inhibition of moulting.

This research aligns with previous studies including Johnson, S.C et al. 1993 "Laboratory investigations on the efficacy of hydrogen peroxide against the salmon louse *Lepeophtheirus salmonis* and its toxicological and histopathological effects on Atlantic Salmon *Salmo salar* and chinook salmon *Oncorhynchus tshawytscha*" Dis. Aquat. Org. 17: 197-204.

A full version of the ACDRP report will be submitted once it has been finalized.



s.19(1)

Grieg Seafood BC Ltd.
106-1180 Ironwood Street
Campbell River, BC
Canada V9W 5P7
+1 250 286 0838
griegseafoodcanada.com

ROOTED IN NATURE

From: Manchester, Howie
Sent: Monday, May 30, 2022 5:46 PM
To: Paylor, Adrienne; Sitter, Laura; Price, Derek; Oswell, Alexandria
Cc: Shaw, Kerra; Blasco, Nathan; Mercer, Nick
Subject: Coastal Server - Skamik 1.5_ Vessel Inspection - May 20 2022
Attachments: Coastal server front view.jpg; Coastal Server pocket.jpg; Coastal Server dewatering bars.jpg; Coastal Server Skamik 1.5 hydrolicer.jpg; Coastal server drum filter panel small pore.jpg; Coastal Server Skamik 1.5 brushes 2.jpg; Coastal server belt filter (2).jpg; Coastal server exit trough.jpg; Coastal Server Stern sock.jpg; Coastal Server Stern sock close up.jpg; Coastal server debris tote.jpg; risk_tool_Coastal Server - Skamik_Atrevida_20220520.xlsx **Provided in excel format**

Hello everyone,

Please find attached the inspection form for the Coastal Server visit conducted on Friday, May 20th.

The inspection occurred while the Coastal Server was at Atrevida in Nootka Sound. The Atrevida aquaculture facility consist of 5 x 200 meter (circumference) polar circles, four of which contain fish and one is left empty for sea lice treatment purposes. The sea lice treatment done was using the Skamik mechanical hydrolicer. DFO Biologists and a Veterinarian witnessed the treatment of pen into an empty pen (. Prior to treatment, fish were fasted for two or three days to minimize the effects of stress. The pen was prepared for handling by the support vessels and farm personnel. This included the removal of air lines and feeding and mortality retrieval equipment. After the Coastal Server was in position, a cork line deployed by the operations crew was pulled by farm and boat personnel and a pocket was made from which the fish were pumped onto the vessel for treatment. Oxygen may be added to the crowded fish in the pocket using a 'Nano bubbler' if water quality deteriorates or fish behavior appears altered. The Coastal Server brings fish up from the pocket from one intake pipe, which is lowered into the crowded pocket. Fish enter through the intake and once on board, go through an adjustable set of dewatering bars before entering the Skamik system. Here, water and by-catch are separated and a second set of de-watering bars below the first further separates the by-catch from incoming water. By-catch go directly into the receiving pen while effluent water goes into a large drum filter microns). The farmed salmon that go over the initial set of de-watering bars then go through the Skamik system (a set of water jets (hydrolicer) and brushes (6 columns of brushes parallel to each other)). The fish spend about 2 -3 seconds each going through this process. The cleaned fish then go into a trough at the end of the Skamik hydrolicer, where 'clean' sea water is brought in from below the vessel to move the fish into the receiving pen.

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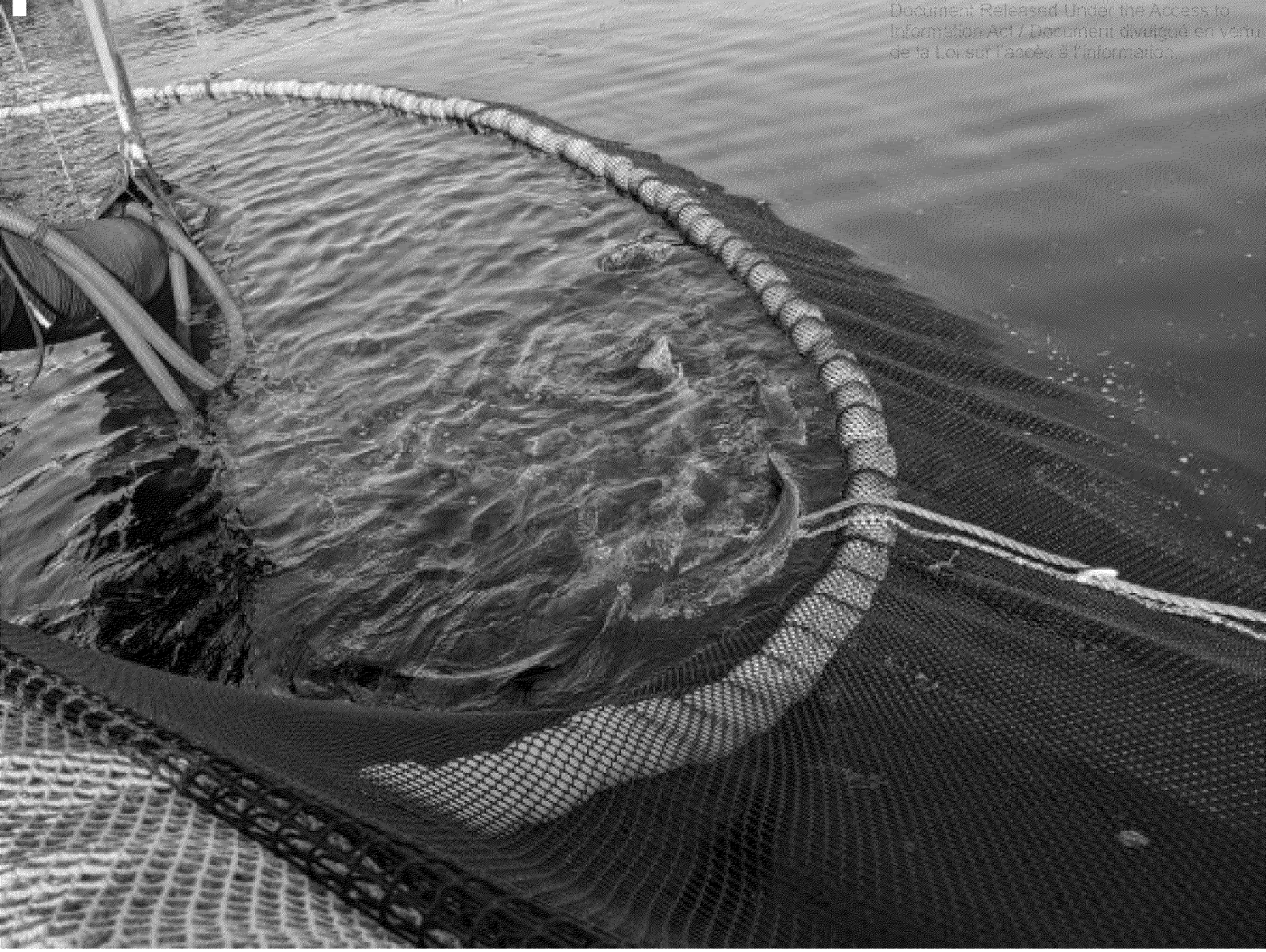
s.20(1)(b)

dislodged into the environment. Pen [redacted] had a population of approximately [redacted] fish with an average weight of [redacted] kg and an average motile *L. salmonis* count of 2.35 lice/fish, post was 0.80 lice/fish. The hydrolicer needs to be adjusted for each cage based on fish size and amount of lice. This occurs at the beginning of the treatment process using feedback from a technician as to fish welfare and lice removal efficacy. Once this is set, the adjustments remain for the entire pen treatment. There are challenges with treatment if the pen has fish with a high size variation; in this case some fish will be damaged while others won't have effective lice removal.

Thanks
Howie

Howie Manchester BSc
Senior Aquatic Science Biologist
Fisheries and Oceans Canada / Peches et Oceans Canada
Aquaculture Management Division / Gestion de l'aquaculture
Aquaculture Environmental Operations - Fish Health
#103 2435 Mansfield Drive
Courtenay, B.C
Cell: 250 331 1927
Fax: 250 703 0921

s.20(1)(b)



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is withheld pursuant to section

est retenue en vertu de l'article

20(1)(b)

of the Access to Information Act

de la Loi sur l'accès à l'information

s.19(1)

000304

From: Neumann, Carla
Sent: Tuesday, May 31, 2022 3:19 PM
To: Sitter, Laura
Subject: [redacted]

Removed from the Common Drive.

Thank you.

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

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From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 4:07 PM
To: Neumann, Carla <Carla.Neumann@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: [redacted]

Hi Carla,

Please find all files related to [redacted] at this location on the Aqua Drive: Y:\Active Marine FF Information\Compliance Tracking\SL non compliance- Mar 2022

Please let me know if there is any other way I can assist.

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

From: Neumann, Carla <Carla.Neumann@dfo-mpo.gc.ca>
Sent: Saturday, April 23, 2022 9:34 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: [redacted]

s.16(1)(c)

Laura,

I have been in receipt of your Conservation and Protection Aquaculture Occurrence Referral for [redacted]

In order to proceed with this file I will need more information from your sector.

Although not an exhaustive list can you please forward the following:
-Notes written or electronic.
-Emails between the company and DFO on this matter.
-How and when you initially became aware of the Sea Lice exceedance.
-Any other items relevant to this matter.

As a reminder it is asked that you keep email chatter to a minimum on this topic and all conversations will be disclosable and therefore need to be forwarded to myself.

Please let me know if you have any questions.

Thanks,
Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

s.16(1)(c)

From: Neumann, Carla
Sent: Tuesday, May 31, 2022 3:20 PM
To: Sitter, Laura
Subject: [redacted]

Removed from Common Drive.

Thank you,

Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

---

From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: Friday, May 27, 2022 4:07 PM
To: Neumann, Carla <Carla.Neumann@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: [redacted]

Hi Carla,

Please find all files related to [redacted] at this location on the Aqua Drive:
Y:\Active Marine FF Information\Compliance Tracking\SL non compliance- Mar 2022

Please let me know if there is any other way I can assist.

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular – (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

s.16(1)(c)

From: Neumann, Carla <Carla.Neumann@dfo-mpo.gc.ca>
Sent: Saturday, April 23, 2022 9:36 AM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Cc: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: [redacted]

Laura,

I have been in receipt of your Conservation and Protection Aquaculture Occurrence Referral for [redacted]

In order to proceed with this file I will need more information from your sector.

Although not an exhaustive list can you please forward the following:
-Notes written or electronic.
-Emails between the company and DFO on this matter.
-How and when you initially became aware of the Sea Lice exceedance.
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Please let me know if you have any questions.

Thanks,
Carla

Carla Neumann (she/her)

Fishery Officer | Agent des Péches
Fisheries & Oceans | Péches et Océans
Aquaculture Unit
Campbell River Office
This email was sent from the traditional territories of the Coast Salish, K'ómoks, We Wai Kum, We Wai Kai and Homalco First Nations

s.16(1)(c)

From: [redacted]
Sent: Tuesday, May 31, 2022 3:41 PM
To: AQFF.FishHealth (DFO/MPO)
Cc: Sitter, Laura; Paylor, Adrienne; McCorquodale, Brenda; Oswell, Alexandria; Shaw, Kerra; Price, Derek; Manchester, Howie; [redacted]
Subject: Viability of sea lice following freshwater bath application
Attachments: Summary data report commercial scale freshwater bath application sea lice viability.pdf; Sea Lice egg survival at Low Salinity.pdf; V0487 Shelter Pass Low Salinity Bioassay.pdf; V0565 Shaw Point Low Salinity Bioassay.pdf; V0589 Monday Rocks Low Salinity.pdf; W0171 Mahatta West Low Salinity.pdf

Good afternoon,
Please find attached a summary data report outlining the viability of sea lice (*Lepeophtheirus salmonis*) associated with commercial scale application of freshwater baths. Appendices referenced in the summary report are also enclosed.

We trust this satisfies condition of license 6.13.

If you have any questions, please let me know.

Best regards,

[redacted]
Mowi Canada West
Mobile: [redacted]
Email: [redacted]

MOWI

s.19(1)

Summary data report: Viability of sea lice (*Lepeophtheirus salmonis*) associated with commercial scale application of freshwater baths aboard the live fish carrier vessel the *Aqua Tromoy*

Submitted by Mowi Canada West, May 31 2022

Contents

Summary

Mowi Canada West (MCW) commenced application of freshwater baths administered aboard the live fish carrier vessel the *Aqua Tromoy* as a non-medicinal sea lice management modality in 2019. Evaluation of the performance of freshwater bath application using the *Aqua Tromoy* on select farm pens (n=231) indicates this modality is highly effective at removing all post-larval stages of *L. salmonis* (chalimus and motile stages) consistent with previous studies of similar vessel-based freshwater bath application systems. Use of this this system also removes detached lice from recirculation abord the vessel via filtration. To assess the sensitivity of *L. salmonis* to freshwater (e.g., viability after exposure), preliminary bioassay and egg viability assays demonstrate all life history stages of *L. salmonis* (including egg strings) are unable to survive exposure to salinity close to freshwater (0% viability at 1 ppt or below). Continued evaluation of the performance of freshwater bath application aboard the *Aqua Tromoy*, as well as expanding baseline characterization of *L. salmonis* sensitivity to freshwater using bioassays support this modality as a continued sustainable option for sea lice management in BC.

Introduction

Diversification of sea lice management modalities is integral for supporting sustainable salmon farming practices to reduce dependency and defer resistance developing against the prescription therapeutants. In recent years, the salmon farming industry has prioritized incorporation of integrated pest management practices and especially those involving non-medicinal modalities such as mechanical and thermal delousing processes[1–4]. Included among these, is the use of low saline baths to immediately reduce the number of Lepeophtheirus salmonis (sea lice) on select pens as opposed to the use of prescription medications applied at the level of an entire farm[3,5]. This modality is also used to managed parasitic infections such as amoebic gill disease (*Neoparamoeba perurans*) and can be deployed either by creating a low-saline lens near at the surface of selected fish pens encompassed by snorkel barriers[6], tarpaulins[1,3], or by loading all fish from a pen into a well boat vessel for application of a freshwater bath[3,7,8]. By necessity, the latter of these application methods provides a combined modality of both freshwater to promote detachment of sea lice from the host fish[1,3,6] as well as mechanical removal associated with crowding and handling of the fish to apply the bath in a contained vessel[3,7]. This has been demonstrated by loading market sized fish (mean weight of 4.4 kg) into well holds containing either freshwater (salinity 0.16 ppt) or seawater (salinity 33.7 ppt) for 3-4 hours and observing an overall reduction of 51% for all stages of infective lice among fish subjected to a seawater bath, and an overall reduction of 96% for all stages of infective lice among fish subjected to freshwater baths[7]. In addition, the freshwater used during treatments is recirculated aboard the vessel and filtered to 100 µm to remove all stages of lice that are detached[3]. Advantages of vessel-based freshwater baths applications include: 1) lower impact on the surrounding environment compared to chemical applications[9]; 2) physical removal of lice from the ecosystem by way of filtration[3]; and 3) a high level of lice removal efficacy observed for this combined modality[3,7,8]. Collectively, these advantages support vessel-based freshwater baths applications as a suitable candidate as a sustainable sea lice management modality.

To apply this technology consistently at a commercial scale, MCW received delivery of the custom-built live fish carrier the *Aqua Tromoy* in 2019. Measuring 76.9 m in length overall, and a breadth of 15m. The *Aqua Tromoy* has a total cargo tank volume of 3000 m^3, and a closed circulation capacity of 8 X 3000 m^3/h including filtration with pressure filter to 150 µm, and the contents of which are discharged into 100 µm bag filters. MCW commenced application of

freshwater baths (salinity below 1 ppt) aboard the *Aqua Tromoy* in 2019 and since it's arrival it has been used to immediately reduce the number of lice on fish in pens on farms. When on site at a farm, fish from a pen are loaded into the freshwater containing well holds aboard the *Aqua Tromoy* and maintained in the recirculating system for 4-7 hours then transferred back into a full seawater pen. The entire process including the logistics of loading and unloading fish from the vessel, are usually conducted at a rate of approximately one to two pens per day. Sea lice counts from before and after are determined according to industry standard practices by calculating the mean abundance of sea lice stages from 20 fish per pen conducted within 7 days pre and post application of the freshwater bath.

Performance of the Aqua Tromoy for L. salmonis removal efficacy

Since 2019, MCW has conducted over 200 freshwater bath application events at the pen-level using the *Aqua Tromoy.* Evaluation of the performance of this initial 2 year dataset revealed application of freshwater baths is highly effective at reducing the mean number of all post-larval stages (chalimus though adult) of *L. salmonis* (Table 1; Eaves et al., in prep). The modality is particularly effective achieving median efficacy values of 100% for chalimus and 91.5% for all motile stages combined (pre-adult and adult males and females). When examined according to the average size (weight) of fish, the median efficacy of removal of motile lice was 89% or greater among size classes of fish larger than 1.0 kg, and 100% for chalimus stages (Table 2; Eaves et al., in prep). Efficacy was slightly lower against motile stages of sea lice (approximately 79%) for size class of < 1.0 kg fish, however, median mortality was also significantly ($p<0.01$) elevated (close to 6.0%) among fish in this smallest size class (< 0.5 kg) indicating use of this modality should be confined to fish at least greater than 0.5 kg.

Overall, application of freshwater baths aboard the *Aqua Tromoy* is a highly effective modality for removing *L. salmonis* from host salmon consistent with previous studies reporting the performance of well boats for application of this modality [3,7,8].

Table 1: Median efficacy values of freshwater bath application aboard the Aqua Tromoy against Lepeophtheirus salmonis development stages according to matched pen-level pre and post average sea lice counts (n=231). Median (1st quantile - 3rd quantile)

Chalimus	Pre-Adult	Adult Male	Adult Female (no eggs)	Adult Female (gravid)	Motile
100%	98.5%	92.7%	84.2%	93.8%	91.5%

(99.4–100)	(90.4-100)	(83.3–98.6)	(66.7–95.8)	(78.0-100)	(82.8-96.2)

Table 2: Treatment efficacies of freshwater bath application aboard the Aqua Tromoy against Lepeophtheirus salmonis according to categories of average fish weight(n=231). Median (1st quartile - 3rd quartile). 5kg-6kg is not shown as n=2.

	< 1kg (n=48)	1kg – 2kg (n=51)	2kg – 3kg (n=44)	3kg – 4kg (n=42)	4kg – 5kg (n=22)
Chalimus	100.0% (63.5-100.0)	100.0% (99.3-100.0)	100.0% (99.3-100.0)	100.0% (100.0-100.0)	100.0% (100.0-100.0)
Motile	79.0% (63.0-83.4)	89.1% (80.8-95.3)	95.5% (92.5-98.2)	96.2% (91.0-98.1)	93.5% (90.3-95.4)

Bioassay for sensitivity of *L. salmonis* to low salinity exposure

In the absence of mechanical turbulence associated with vessel-based freshwater bath applications[3,7,8] (described above), sea lice that remain attached to a host are able to withstand exposure to freshwater for days or weeks using a host dependent mechanism for osmoregulation, whereas free-swimming copepodids [10–12] and detached pre-adult and adult lice die within hours [1,13,14]. Although the recirculating system aboard the *Aqua Tromoy* is designed to filter and remove sea lice stages, the fate of detached motile stages and egg strings following exposure to low salinity and freshwater conditions was further explored to begin characterizing a baseline sensitivity for *L. salmonis* to low salinity and freshwater in BC.

Motile (pre-adult and adult) stages of *L. salmonis* were collected from four farms in 2021-22 using methods similar to previous bioassay studies[15,16,9]. Bioassays were conducted using a modified version of the protocol used in B.C. to assess sensitivity to the prescription sea lice therapeutant emamectin benzoate (EMB a.k.a. SLICE®) [16]. Briefly, live lice were collected from farm fish and transported to the BC Centre for Aquatic Health Sciences (Campbell River, BC) where they were maintained at 10°C. Viable lice were sorted according to gender and randomly distributed into Petri dishes (10 lice of one gender per dish). Modifications to the procedure included: 1) a range of salinity concentrations were used instead of a series of EMB dilutions [16]; 2) the duration of the bioassay was reduced to 4-7 hours to simulate the duration of exposure to freshwater aboard the *Aqua Tromoy*. After the bioassay exposure period the lice in each Petrie dish were assessed according to their viability [16] into two categories: live/ healthy indicating

good swimming with strong attachment to the sides of the dish; or weak/moribund indicating lice can still move but are unable to remain attached to the sides of the dish or appear to be dead. The number of unaffected sea lice (live) and affected lice (moribund and dead) at different test concentrations were combined for analysis to calculate the effective concentration at which 50% of the lice are not prone to natural response (EC_{50}) [15,16] using Probit analyses.

It is important to note the freshwater bioassay protocol is still under development as the methodology is refined towards improving sensitivity of the assay. For example, increasing resolution of the assay using more lower salinity values; initial bioassays conducted in 2021 used salinities at even intervals between freshwater and full seawater (0, 5, 10, 15, 20, 25 ppt). Whereas in 2022, the dilution was modified to emphasise concentrations closer to freshwater (0, 1, 2, 4, 8, 16, 27 ppt) to increase the accuracy of the LC_{50} value range (Tables 3 and 4). Values for LC_{50} obtained so far range from approximately 6.7 – 11.5 ppt, and 1.8 -9.0 ppt respectively after 4 and 7 hours exposure to salinity test concentrations for female *L. salmonis* (Table 3). For male L. salmonis, LC_{50} values range from approximately 4.1 – 10.5 ppt after 4 hours exposure and 3.9 – 10.7 ppt after 7 hours exposure. As the protocol becomes further optimized and reproducible, assays will be conducted from sea lice collected from different regions in BC for regional surveillance purposes of sensitivity of sea lice to freshwater[9]. All low salinity bioassay reports are included as appendices 1-4.

Table 3: Summary of results of low salinity bioassays using L. salmonis females.

Collection location CAHS file #	Date	Salinity Concentration (ppt)	LC50 ppt Female (Upper, lower 95%ile) 4hr	LC50 ppt Female (Upper, lower 95%ile) 7hr	LC50 ppt Female (Upper, lower 95%ile) 18hr
V0589 Monday Rocks	2021 12 23	0, 5, 10, 15, 20, 26	6.8 (6.1, 7.6)	6.9 (5.8, 8.0)	
V0565 Shelter Pass	2021 12 16	0, 5, 10, 15, 20, 29	11.5 (9.54, 12.73)	9.02 (8.02, 10.02)	10.85 (9.67, 10.85)
V0487 Shelter Pass	2021 11 16	0.3, 5, 10, 15, 20, 30	6.707 (8.659, 5.196)	7.081 (9.04, 5.547)	
W0171 Mahatta West	2022 05 04	0, 1, 2, 4, 8, 16, 27	8.861 (10.52, 7.461)	1.786 (2.31, 1.381)	

Table 4: Summary of results of low salinity bioassays using L. salmonis males.

Collection location CAHS file	Date	Salinity Concentration (ppt)	LC50 ppt Male (Upper, lower 95%ile) 4hr	LC50 ppt Male (Upper, lower 95%ile) 7hr	LC50 ppt Female (Upper, lower 95%ile) 18hr
V0589 Monday Rocks	2021 12 23	0, 5, 10, 15, 20, 26	7.9 (6.2, 9.5)	7.9 (6.2, 9.6)	-
V0565 Shaw Point	2021 12 16	0, 5, 10, 15, 20, 29	10.53 (9.16, 11.87)	10.66 (1.25, 12.05)	10.28 (8.97, 11.57)
V0487 Shelter Pass	2021 11 16	0.3, 5, 10, 15, 20, 30	4.337 (5.807, 3.239)	4.055 (5.28, 3.114)	-
W0171 Mahatta West	2022 05 04	0, 1, 2, 4, 8, 16, 27	4.053 (5.089, 3.228)	3.932 (4.91, 3.148)	-

Egg viability assays

To assess the viability and hatching success of *L. salmonis* egg strings following exposure to low saline seawater, egg strings harvested from female *L. salmonis* were submitted for low salinity bioassay (see section above). Harvested egg strings were sorted according to qualitatively observed pigmentation and opacity in to two groups referred to as 'dark' and 'opaque' groups respectively. Dark egg strings contained early and pre-hatching nauplii larvae with darkly pigmented larval features (such as eyespots), and opaque egg strings referred to eggs containing predominantly yolk and no distinctive nauplius larvae were yet apparent. 3 egg strings were selected at random for from each category for each replicate and the number of eggs in 0.5 cm of egg string were counted to determine an estimate of the total number of eggs per string. Egg strings were then immersed in control (27 ppt) or low saline (1 ppt) water for 4 and 7 hours and assayed for hatching success. After 7 hour exposure, each treatment was filtered and returned to saltwater and monitored for an additional 18-24 hours to assess the hatching success of eggs strings following exposure to low saline conditions. For further details please refer to Appendix 5.

Table 5: Summary of results of L. salmonis egg exposure to low salinity conditions (all replicates combined). See BC CAHS report "Sea lice egg survival at low salinity" for additional details.

Egg string type	Salinity ppt	Estimated total number of eggs	Average % survival post 4 hr exposure	Average % survival post 7 hr exposure
Opaque	27	2910	0	0
Opaque	1	3015	0	0
Dark	27	3162	51.7	90.0
Dark	1	2834	0	0

Hatching was only observed among pre-hatching naupliar stage L. salmonis egg strings maintained in surface collected seawater from sampling site (27 ppt). No early stage/ undifferentiated eggs (opaque) *L. salmonis* eggs hatched following exposure to either salinity after 4 or 7 hours, or after an additional 7 days of incubation in seawater. No eggs from any category of development (early/ opaque or pre-hatch / dark) survived to hatch following exposure to 1 ppt salinity. These results are comparable to previous studies where no egg development was observed when eggs were maintained at 10%o salinity[17].

Conclusions

Application of freshwater baths contained aboard the *Aqua Tromoy* is highly effective at removing all post larval stages of *L. salmonis* (chalimus and motile stages). Use of this this system also removes detached lice from the recirculating system via filtration. Initial bioassays for testing the sensitivity of *L. salmonis* to low salinity and freshwater, as well as egg viability assays indicate all life history stages of *L. salmonis* (including egg strings) are unable to survive following exposure to salinity close to freshwater (0% viability at 1 ppt or below). Continued evaluation of the performance of freshwater bath application aboard the *Aqua Tromoy*, as well as expanding baseline characterization of L. salmonis sensitivity to freshwater using bioasays[9] support this modality as a continued sustainable option for sea lice management in BC.

References

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List of Appendices

BC CHAS assay results submitted with this report:

1 - V0589 Monday Rocks bioassay results

2 - V0565 Shaw Point bioassay results

3 - V0487 Shelter Pass bioassay results

4 - W0171 Mahatta West bioassay results

5 - Sea lice egg survival at low salinity

CALA Testing Accreditation No. A4144

Total Number of Eggs

	Dark Egg strings				Opaque egg strings		
		1 ppt		27 ppt		1 ppt	27 ppt
Replicate #		# eggs/mm	total # eggs/string	total # eggs/string	# eggs/mm	total # eggs/string	total # eggs/string
1		18	291	345	15	240	225
			581	581		375	390
			145	236		450	405
	Total eggs		**1017**	**1163**	Total eggs	**1065**	**1020**
2		18	418	382		300	300
			327	418		255	225
			254	363		375	405
	Total eggs		**999**	**1163**	Total eggs	**930**	**930**
3		18	273	200		330	315
			236	345		315	300
			309	291		375	345
	Total eggs		**818**	**836**	Total eggs	**1020**	**960**

4 Hour Survival

	Dark Egg strings		
	1 ppt	27 ppt	
Replicate #	Hatched/Alive larvae	Hatched/ Alive larvae	
1	0%	41%	
2	0%	30%	one egg string no hatch
3	0%	84%	

	Opaque Egg Strings	
	1 ppt	27 ppt
Replicate #	Hatched/Alive larvae	Hatched/Alive larvae
1	0%	0%
2	0%	0%
3	0%	0%

7 hour Survival

	Dark Egg strings		
	1 ppt	27 ppt	
Replicate #	Hatched/	Hatched	
1	0%	100%	
2	0%	70%	one egg string no hatch
3	0%	100%	

	Opaque Egg Strings	
	1 ppt	27 ppt
Replicate #	Hatched	Hatched
1	0%	0%
2	0%	0%
3	0%	0%

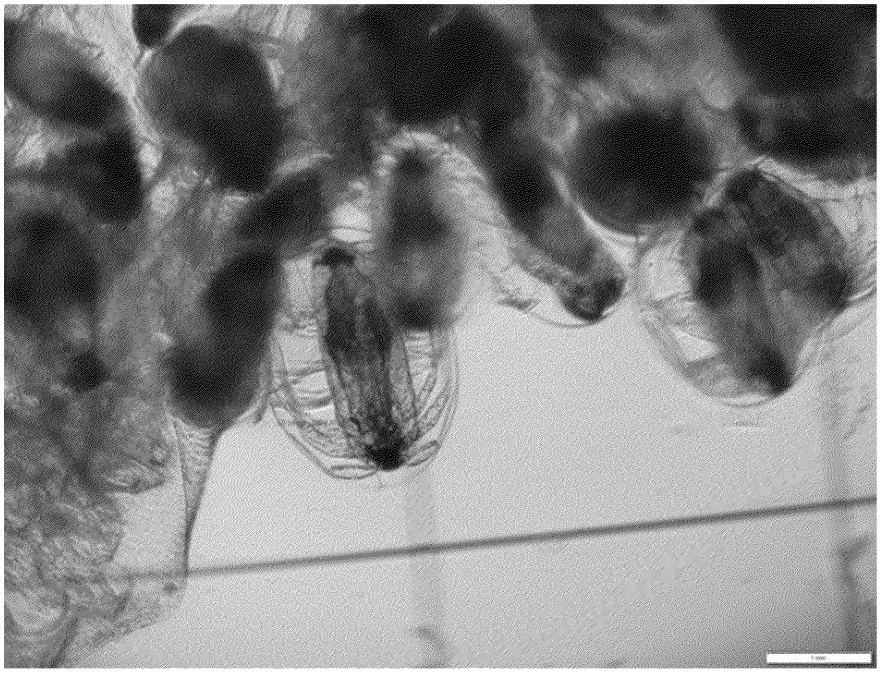
Comments:
Three egg strings were selected for each treatment replicate.
As we were doing a bioassay at the same time, females had to be chosen first then egg strings removed after selection so many had already hatched.

The Dark Egg strings exposed to 1ppt seemed to 'explode' off the egg string and swell up.
None of the eggs hatched into larvae

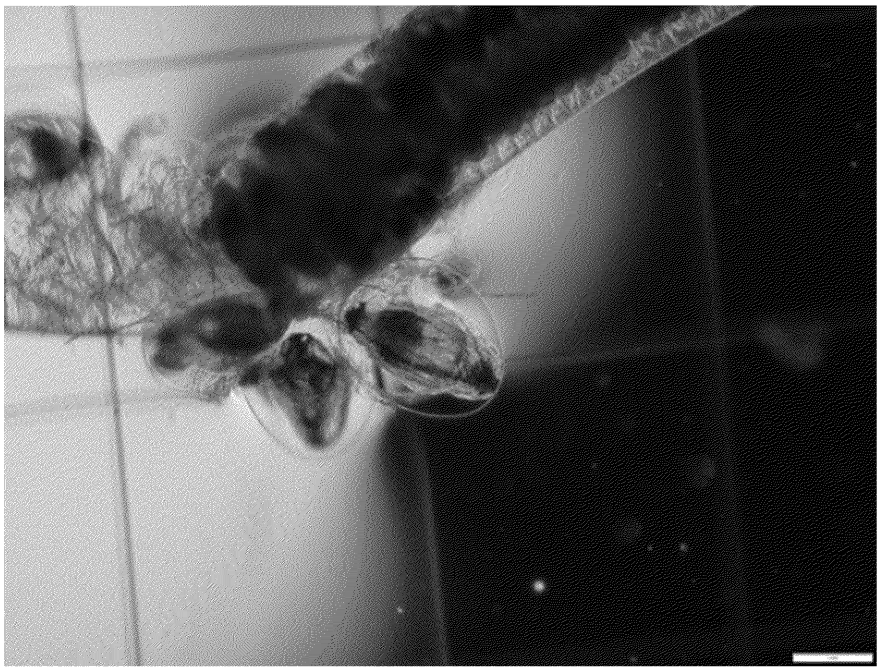
After 7 days, the Opaque egg strings have not hatched- both 27ppt and 1ppt.

Photos show egg/larvae hatching at 21ppt and 1 ppt and dead eggs of Dark Egg Strings

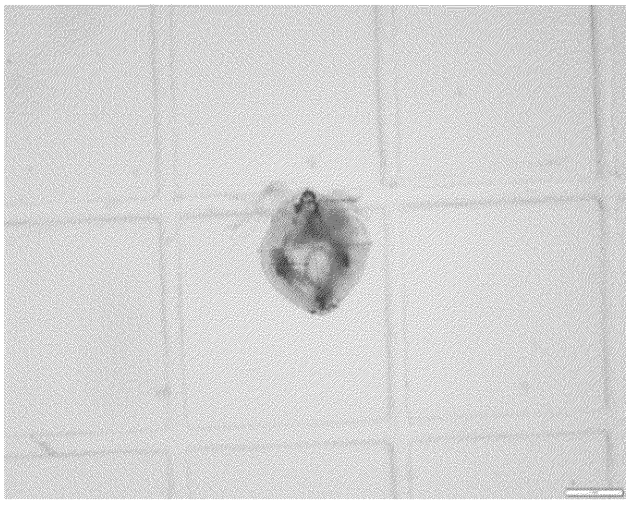
Dark Egg Strings



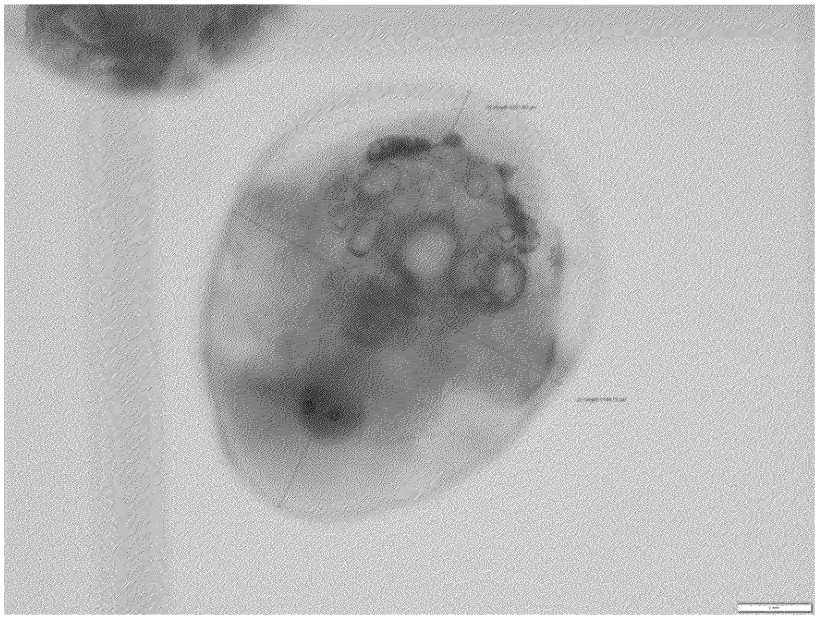
Salinity 27ppt
Lep. Salmonis egg
x40
immediatley before hatch
50um x 65 um



Salinity 27ppt
Lep. Salmonis egg
x40
immediatley before hatch
47um x 58um

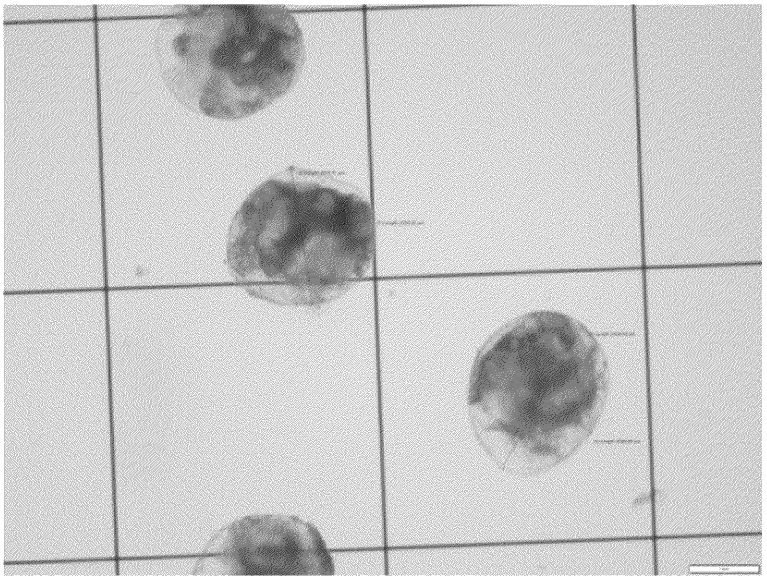


Salinity 1ppt
Lep. Salmonis larvae at hatch
20 um x 22um
x100
egg has 'exploded' as opposed to 'hatch'



Salinity 1ppt
Lep. Salmonis larvae at hatch
52 um x 63 um
x100

egg would appear to have swelled with water.



BC Centre for Aquatic Health Sciences
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SEA LICE BIOASSAY RESULTS

Company: Mowi Canada West
Date submitted: 14-Nov-21
Bioassay conducted 15-Nov-21

Farm Site: Shelter Pass
Client Ref #: 21-4766
Product Assayed: **Low Salinity**

4 hour Post Exposure

	REP	1		2		3		4	
	Conc ppt	Unaffected Female	Affected Female	Unaffected Female	Affected Female	Unaffected Female	Affected Female	Unaffected Female	Affected Female
O Hr (# live lice)	0.3	10	10	10	10	10	9	10	10
	5	10	10	10	10	10	10	10	8
	10	10	10	10	10	10	10	10	10
	15	10	10	10	10	10	10	10	11
	20	10	11	10	10	10	10	10	10
	Control	10	10	10	10	10	10	10	10
24Hr (# lice still alive - healthy and weak)	0.3	0	0	0	0	0	0	0	1
	5	5	5	3	4	4	1	3	2
	10	9	8	7	10	6	7	6	6
	15	7	8	6	7	8	8	8	6
	20	7	11	9	10	7	6	10	7
	Control	10	10	10	7	9	8	10	10

Comments: LOTS of lice were submitted (although significantly more females than males).
We ran 10 females and 10 males together in each treatment.

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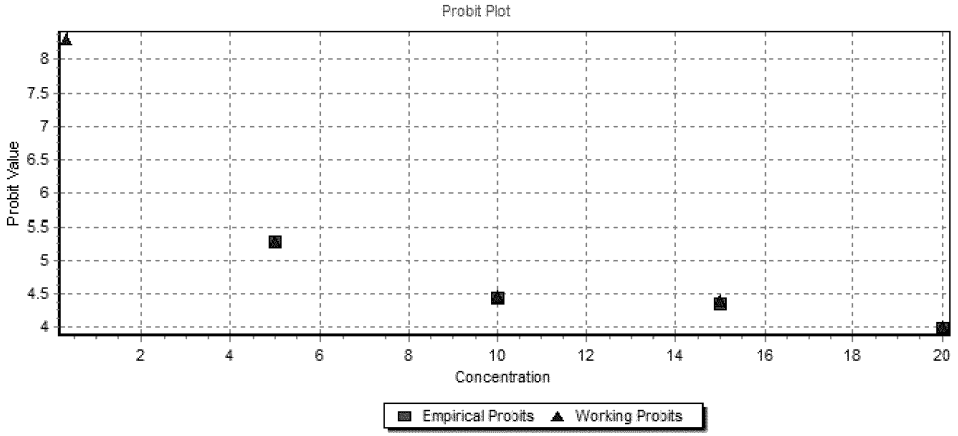
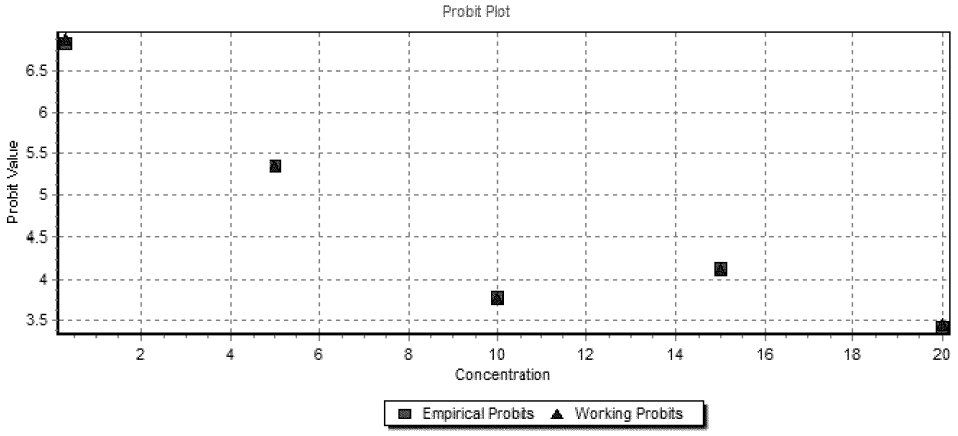
Bioassay Results Contact: [redacted] s.19(1)



Results **Females**

Lethal value (50) = 6.707
Upper 95 %ile = 8.659
Lower 95 %ile = 5.196

Lethal value (90) = 1.724
Upper 95 %ile = 3.208
Lower 95 %ile = 0.9267



Results **Male**

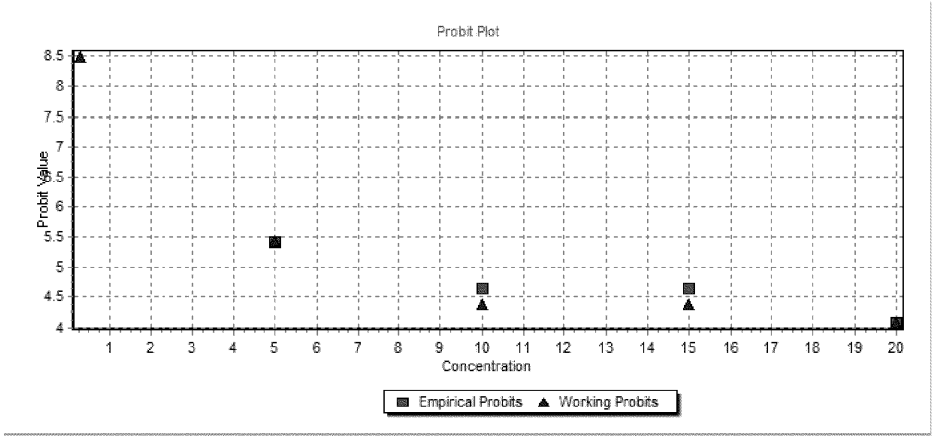
Lethal value (50) = 4.337
Upper 95 %ile = 5.807
Lower 95 %ile = 3.239

Lethal value (90) = 1.015
Upper 95 %ile = 1.797
Lower 95 %ile = 0.5735

Bioassay Results Contact: s.19(1)

7 hour Post Exposure

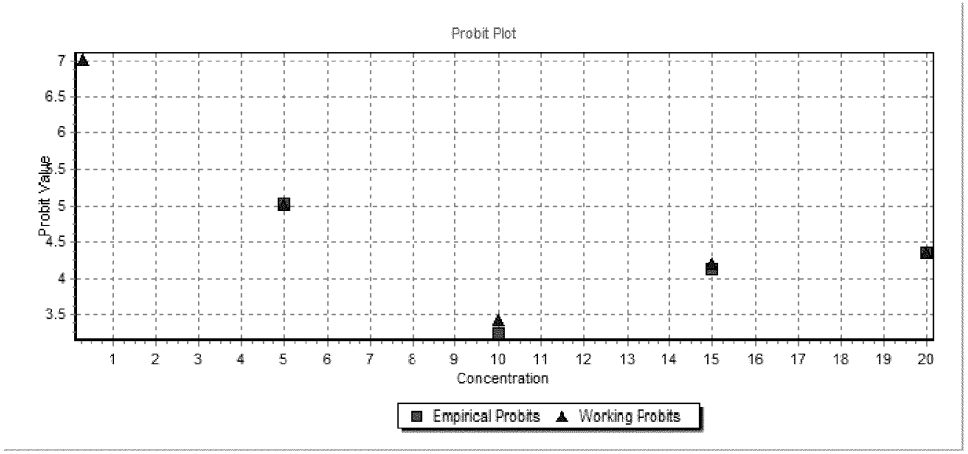
	REP	1		2		3		4	
	Conc ppt	Unaffected Female	Affected Female	Unaffected Female	Affected Female	Unaffected Female	Affected Female	Unaffected Female	Affected Female
O Hr (# live lice)	0.3	10	10	10	10	10	10	10	10
	5	10	10	10	10	10	10	10	10
	10	10	10	10	10	10	9	10	10
	15	10	11	10	10	10	9	10	10
	20	10	10	10	10	10	10	10	10
	Control	10	10	10	10	10	10	10	10
24Hr (# lice still alive - healthy and weak)	0.3	0	0	0	0	0	0	0	0
	5	4	7	3	3	4	3	2	2
	10	9	7	7	10	4	6	5	6
	15	7	8	5	7	6	7	7	3
	20	8	7	9	7	8	6	7	3
	Control	10	10	9	5	10	9	10	7



Results Females

Lethal value (50) = 7.081
Upper 95 %ile = 9.04
Lower 95 %ile = 5.547

Lethal value (90) = 1.941
Upper 95 %ile = 3.558
Lower 95 %ile = 1.058



Results Male

Lethal value (50) = 4.055
Upper 95 %ile = 5.28
Lower 95 %ile = 3.114

Lethal value (90) = 0.731
Upper 95 %ile = 1.123
Lower 95 %ile = 0.476

18 hour saltwater exposure

	F1	F2	F3	F4		M2	M3	M4	
0 hour	30	10	10	10	10		10	10	10
	20	10	10	10	10		10	10	10
	15	10	10	10	10		10	10	10
	10	10	10	10	10		10	10	10
	5	10	10	10	10		10	9	10
	0.3	10	10	10	10		10	10	10
18 hr. saltwater survival	30	10	7	9	10		7	9	7
	20	5	8	8	9		4	5	5
	15	4	9	7	7		6	8	3
	10	5	5	3	4		4	2	2
	5	6	0	0	0		0	0	1
	0.3	0	0	0	0		0	0	0

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SEA LICE BIOASSAY RESULTS

Company:	Mowi Canada West	Farm Site:	Shaw Point
Date submitted:	13-Dec-21	Client Ref #:	21-4822
Bioassay conducted	14-Dec-21	Product Assayed:	**Low Salinity**

4 Hour Post Exposure

	Conc ppt	Female	Female	Female	Male	Male	Male
O Hr (# live lice)	29	10	10	10	10	11	11
	0	10	10	10	11	10	12
	5	10	11	10	10	11	10
	10	11	10	10	10	11	10
	15	10	10	10	10	10	9
	20	10	11	10	10	10	9
4Hr (# lice unaffected)	29	10	10	10	10	9	11
	0	0	0	0	0	0	0
	5	0	3	1	2	2	3
	10	3	8	3	7	7	5
	15	8	9	8	9	7	5
	20	9	11	7	8	8	8

Comments:

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Bioassay Results Contact: s.19(1)

Results **Adult Female**

Lethal value (50) = 11.5 ppt
Upper 95 %ile = 9.54
Lower 95 %ile = 12.73

Results **Adult/Pre-Adult Male**

Lethal value (50) = 10.53 ppt
Upper 95 %ile = 9.16
Lower 95 %ile = 11.87

s.19(1)

7 hour Post Exposure

		Female	Female	Female	Male	Male	Male
	Conc ppt						
O Hr (# live lice)	29	10	10	10	10	11	11
	0	10	10	10	11	10	12
	5	10	11	10	10	11	10
	10	11	10	10	10	11	10
	15	10	10	10	10	10	9
	20	10	11	10	10	10	9
7 Hr (# lice unaffected)	29	10	10	10	10	9	11
	0	0	0	0	0	0	0
	5	0	3	1	2	2	3
	10	3	8	3	7	7	5
	15	8	9	8	9	7	5
	20	9	11	7	8	8	8

Results **Adult Female**

Lethal value (50) = 9.02 ppt
Upper 95 %ile = 8.02
Lower 95 %ile = 10.02
SE log LDx = 0.0565

Results **Adult pre adult male**

Lethal value (50) = 10.66 ppt
Upper 95 %ile = 1.25
Lower 95 %ile = 12.05
SE log LDx = 0.0565

s.19(1)

18 Hour Exposure to Saltwater

		Female	Female	Female	Male	Male	Male
	Conc ppt						
O Hr (# live lice)	29	10	10	10	10	11	11
	0	10	10	10	11	10	12
	5	10	11	10	10	11	10
	10	11	10	10	10	11	10
	15	10	10	10	10	10	9
	20	10	11	10	10	10	9
18Hr s/w (# lice unaffected)	29	10	10	10	10	9	11
	0	0	0	0	0	0	0
	5	0	3	1	2	2	3
	10	3	8	3	7	7	5
	15	8	9	8	9	7	5
	20	9	11	7	8	8	8

Results **Female**

Lethal value (50) = 10.85 ppt
Upper 95 %ile = 9.67
Lower 95 %ile = 10.85

Results **Males**

Lethal value (50) = 10.28 ppt
Upper 95 %ile = 8.97
Lower 95 %ile = 11.57

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Bioassay Results Contact: s.19(1)

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SEA LICE BIOASSAY RESULTS

Company: Mowi Canada West
Date submitted: 20-Dec-21
Bioassay conducted 21-Dec-21

Farm Site: Monday Rocks
Client Ref #: 21-4892
Product Assayed: **Low Salinity**

4 hour post exposure

	REP	1	2	3	4	5	6
	Conc ppt	Female	Female	Female	Male	Male	Male
O Hr (# live lice)	0.3	10	10	10	9	10	9
	5	10	10	10	10	10	8
	10	11	11	10	11	10	11
	15	10	11	12	10	11	11
	20	10	10	10	11	10	11
	Control	10	10	10	10	10	10
24Hr (# lice still alive - healthy and weak)	0.3	0	0	0	0	0	0
	5	1	10	1	6	7	7
	10	7	10	10	9	8	9
	15	10	11	10	8	10	10
	20	10	10	10	10	7	8
	Control	10	10	10	10	10	8

Comments Control is seawater at 26ppt
No 24 hour read.

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Bioassay Results Contact: s.19(1)

Results **Females**

Lethal value (50) = 6.8 ppt
Upper 95 %ile = 6.1
Lower 95 %ile = 7.6

Results Male

Lethal value (50) = 7.9 ppt
Upper 95 %ile = 6.2
Lower 95 %ile = 9.5

7 hour post exposure

	REP	1	2	3	4	5	6
	Conc ppt	Female	Female	Female	Male	Male	Male
O Hr (# live lice)	Control	10	10	9	10	9	10
	0	10	10	10	8	10	9
	5	10	10	10	9	10	8
	10	11	11	10	11	10	10
	15	10	11	12	10	10	11
	20	10	10	10	9	10	11
24Hr (# lice still alive - healthy and weak)	Control	10	9	8	10	9	9
	0	0	0	0	0	0	0
	5	1	0	9	4	6	8
	10	8	9	10	8	7	8
	15	8	11	9	9	7	8
	20	9	10	10	8	9	9

Results **Females**

Lethal value (50) = 6.9 ppt
Upper 95 %ile = 5.8
Lower 95 %ile = 8.0

Results **Males**

Lethal value (50) = 7.9 ppt
Upper 95 %ile = 6.2
Lower 95 %ile = 9.6

BC Centre for Aquatic Health Sciences
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SEA LICE BIOASSAY RESULTS

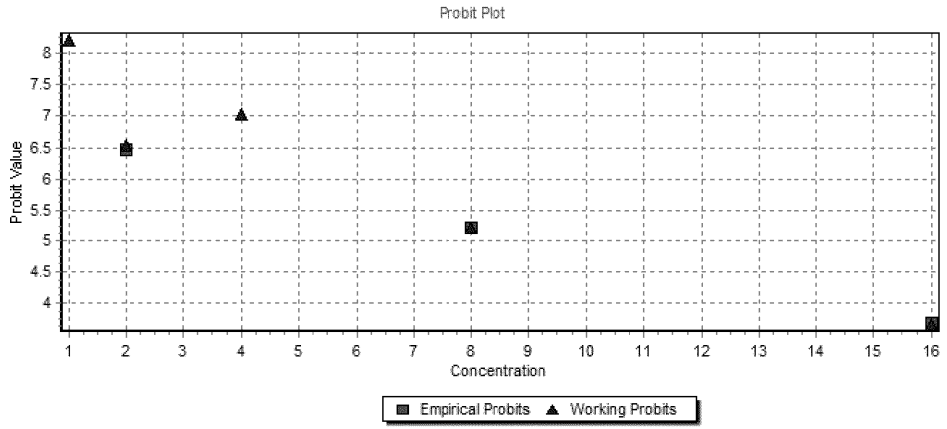
Company: Mowi Canada West
Date submitted: 2-May-22
Bioassay conducted 03-May-22

Farm Site: Mahatta West
Client Ref #: 22-4961
Product Assayed: **Low Salinity**

	REP	1	2	3	4	5	6
		Female	Female	Female	Male	Male	Male
	Conc ppt						
O Hr (# live lice)	27	10	10	11	11	11	12
	16	10	12	10	11	12	12
	8	10	10	10	10	11	10
	4	10	11	10	11	9	10
	2	11	10	10	10	10	11
	1	10	10	11	10	10	11
	0	11	10	10	11	10	10
4 Hr (# lice still alive - healthy and weak)	27	10	9	11	9	10	12
	16	10	11	7	11	10	12
	8	5	5	2	8	7	5
	4	0	0	0	6	5	5
	2	0	2	0	0	7	0
	1	0	0	0	1	0	0
	0	0	0	0	0	0	0

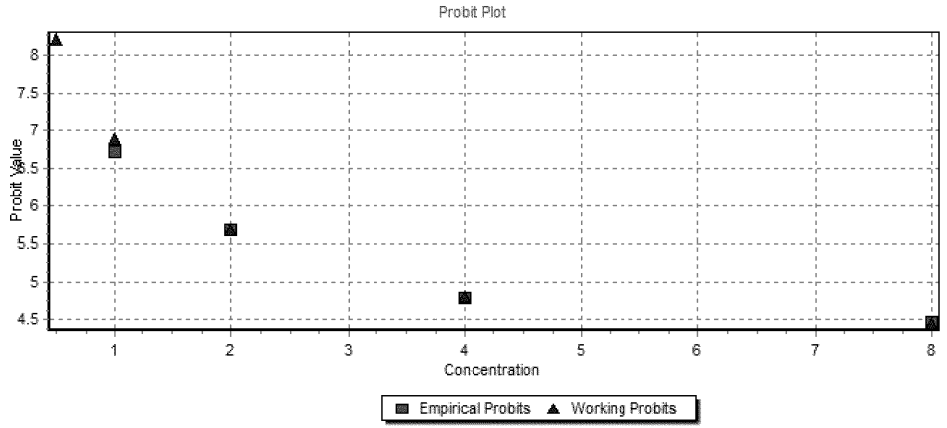
Comments:

871 A Island Hwy, Campbell River - PO Box 25070 Tyee, Campbell River, BC, V9W 0B7 - Ph: 250-286-6102 - Fax: 250-286-6103 - www.cahs-bc.ca
Bioassay Results Contact: s.19(1)



Results Females

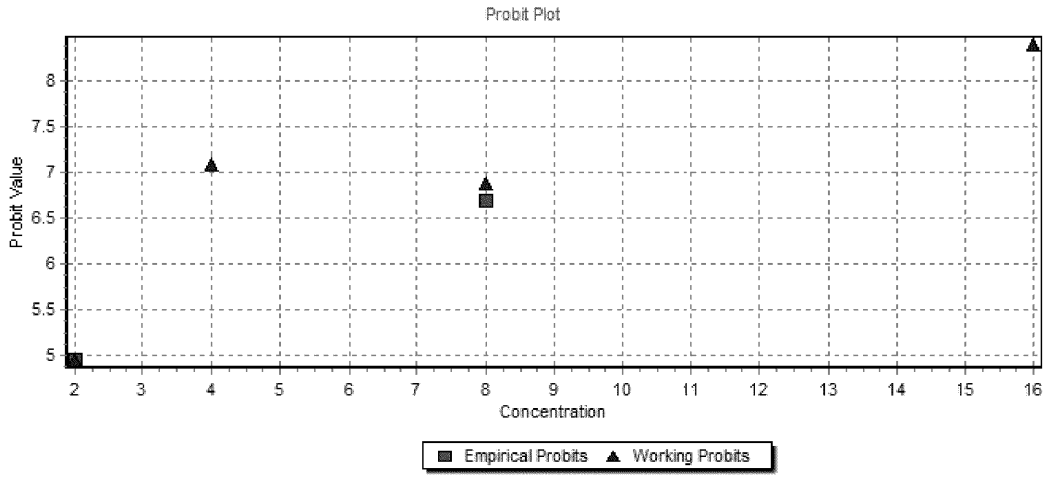
Lethal value (50) = 8.861 ppt
Upper 95 %ile = 10.52
Lower 95 %ile = 7.461



Results Males

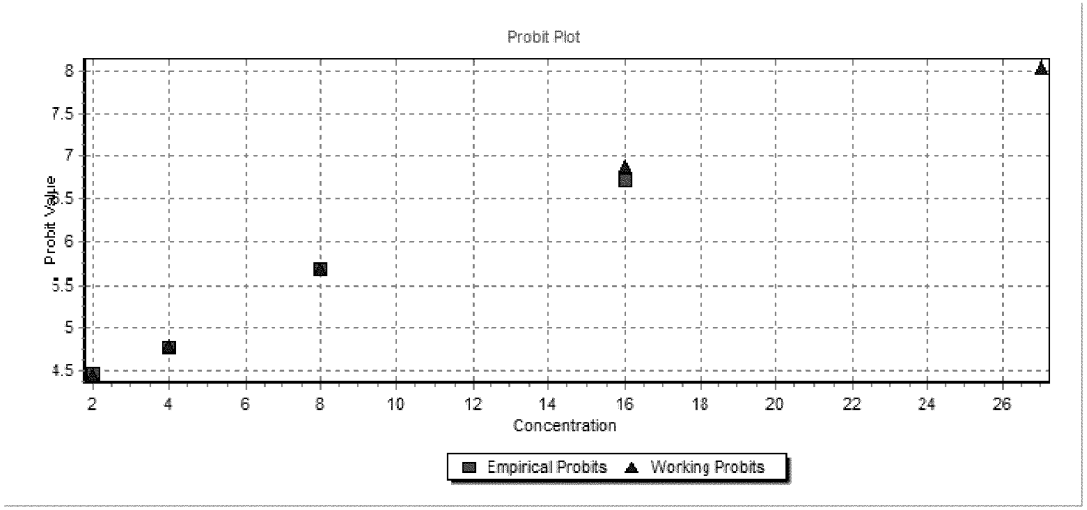
Lethal value (50) = 4.053 ppt
Upper 95 %ile = 5.089
Lower 95 %ile = 3.228

	REP	1 Female	2 Female	3 Female	4 Male	5 Male	6 Male
	Conc ppt						
O Hr (# live lice)	27	10	10	10	11	11	11
	16	10	12	10	11	11	10
	8	10	10	10	10	11	10
	4	10	11	10	11	10	8
	2	10	10	11	10	10	12
	1	10	10	10	10	10	10
	0	11	10	10	11	9	10
7 Hr alive healthy and weak)	27	9	10	8	11	11	11
	16	10	11	8	11	9	10
	8	9	3	2	9	10	4
	4	0	0	0	0	6	4
	2	0	1	0	0	2	0
	1	0	0	0	1	0	0
	0	0	0	0	0	0	0



Results Female

Lethal value (50) = 1.786 ppt
Upper 95 %ile = 2.31
Lower 95 %ile = 1.381



Results Male

Lethal value (50) = 3.932 ppt
Upper 95 %ile = 4.91
Lower 95 %ile = 3.148

s.19(1)

From: [redacted]
Sent: Tuesday, May 31, 2022 4:20 PM
To: Sitter, Laura
Cc: AQFF.FishHealth (DFO/MPO); [redacted]
Subject: RE: Smon Jones ACRDP Presentation to AMD Staff
Attachments: 2022-05-30 Condition 6.13.pdf

Hello,

Here is the Cermaq summary for the ACRDP project conducted by Simon Jones.

Kind Regards,

[redacted]

Phone - [redacted]

Cermaq Canada Ltd.
203 - 919 Island Hwy
V9W 2C2 Campbell River, BC, Canada

Cermaq.ca Facebook Twitter

-----Original Message-----
From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: May 27, 2022 3:37 PM
To: [redacted] Jones, Simon <Simon.Jones@dfo-mpo.gc.ca>; McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; [redacted] AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>
Cc: [redacted]
Subject: RE: Smon Jones ACRDP Presentation to AMD Staff

Good afternoon,

We wanted to thank you for arranging the presentation for Dr. Jones to present his work to us in collaboration with BCSFA through the ACRDP re: viability of sea lice following hydrogen peroxide treatment. It was a very informative and helpful presentation.

To satisfy condition of licence 6.13, please submit a one-page written summary of the analysis conducted by Dr.

s.19(1)

Jones no later than June 1, 2022. This will accompany the powerpoint presentation previously submitted. Please also submit copies of the ACRDP report as they become available.

Any licence holder operating vessels that perform freshwater bath treatments should submit their scientific analysis to the AQFF.Fish Health email inbox (copied here) no later than June 1, 2022 in order to comply with condition of licence 6.13.

Please don't hesitate to contact myself or any member of the Aquaculture Fish Health team, including the AQFF.Fish Health inbox, with any questions.

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular - (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

-----Original Appointment-----
From:
Sent: Tuesday, May 24, 2022 12:44 PM
To: Sitter, Laura; Jones, Simon; McCorquodale, Brenda; Shaw, Kerra; Price, Derek; Manchester, Howie; Paylor, Adrienne; Oswell, Alexandria;
Cc:
Subject: Smon Jones ACRDP Presentation to AMD Staff
When: Thursday, May 26, 2022 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fus02web.zoom.us%2Fj%2F84089711896%3Fpwd%3DNEtSM0ZyZitiMHRQMmwrQjBBNkVqUT09&data=05%7C01%7C%40cermaq.com%7C674fac53fb9c4562900b08da403179a6%7Cb39979aa16914c50b89ffb8bc35e9e09%7C0%7C0%7C637892878501191483%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=HFbSWsOVQa5VOyzeUT57mrft%2FBR7HfFtqHBbiBWQoks%3D&reserved=0

Thank-you for responding to the Doodle Poll - this time was the clear winner for DFO AMD staff and Simon Jones. I will be at a conference in Vancouver and will be hosting. For those industry fish health professionals who cannot attend I will request a copy of Simon's presentation.

BC Salmon Farmers Association is inviting you to a scheduled Zoom meeting.

Join Zoom Meeting
https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fus02web.zoom.us%2Fj%2F84089711896%3Fpwd%3DNEtSM0ZyZitiMHRQMmwrQjBBNkVqUT09&data=05%7C01%7C%40cermaq.com%7C674fac53fb9c4562900b08da403179a6%7Cb39979aa16914c50b89ffb8bc35e9e09%7C0%7C0%7C637892878501191483%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=HFbSWsOVQa5VOyzeUT57mrft%2FBR7HfFtqHBbiBWQoks%3D&reserved=0

Meeting ID:
Passcode:
One tap mobile
+13126266799,, # US (Chicago)
+13462487799,, # US (Houston)

Dial by your location
+1 312 626 6799 US (Chicago)
+1 346 248 7799 US (Houston)
+1 669 900 6833 US (San Jose)
+1 929 436 2866 US (New York)
+1 253 215 8782 US (Tacoma)
+1 301 715 8592 US (Washington DC) Meeting ID:
Passcode:
Find your local number: https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fus02web.zoom.us%2Fu%2FkUqygxuD2&data=05%7C01%7C%40cermaq.com%7C674fac53fb9c4562900b08da403179a6%7Cb39979aa16914c50b89ffb8bc35e9e09%7C0%7C0%7C637892878501191483%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=dFbBccETIE6whNS64vUpG8zIpMN9WLhYtiMznKfl58Q%3D&reserved=0
.....

s.16(2)(c)

CERMAQ

May 31st, 2022

Re: DFO Conditions of License 6.13

To fulfill the Marine Finfish Aquaculture License condition 6.13, "By June 1, 2022, the License Holder must complete and submit a scientific analysis, to the satisfaction of the Department, regarding the viability of sea lice that are captured before, during and after sea lice bath treatments", Cermaq Canada through the BCSFA contributed to an ACRDP project (ACRDP 21-P-01).

The project aimed to generate knowledge relating to the infectivity and reproductive potential of mobile *Lepeophtheirus salmonis* following treatment with hydrogen peroxide. Two separate studies were completed:

1. Viability and infectivity of mobile stages of *L. salmonis* following in vitro exposure to H_2O_2
2. Study hatch rate and development of larval *L. salmonis* following in vitro exposure to H_2O_2

The conclusions from the above studies showed that laboratory treatment with 500 and 1500 ppm H_2O_2 caused:

- Temporary loss of mobility of adult female *L. salmonis*
- Significant reduction in infectivity of adult female *L. salmonis*
- Significant reduction in abundance of nauplius 2 and copepodid larvae
- Prolonged presence of nauplius 1 larvae, suggesting inhibition of molting

These results match what was previously found in a published study from 1993 - Johnson SC, Constible JM, Richard J (1993) Laboratory investigations on the efficacy of hydrogen peroxide against the salmon louse *Lepeotheirus salmonis* and its toxicological and histopathological effects on Atlantic salmon *Salmo salar* and chinook salmon *Oncorhynchus tshawytscha*. Diseases of Aquatic Organisms (17) 197-204.

The outcomes from the project were presented to DFO Aquaculture Management Department on 26th May 2022. A final report for this ACRDP project will be submitted to the Department once it is available.

From:
Sent: Tuesday, May 31, 2022 6:29 PM
To: Sitter, Laura; Jones, Simon; McCorquodale, Brenda; Shaw, Kerra; Price, Derek; Manchester, Howie; Paylor, Adrienne; Oswell, Alexandria; ; AQFF.FishHealth (DFO/MPO)
Cc:
Subject: RE: Smon Jones ACRDP Presentation to AMD Staff
Attachments: Summary page S. Jones Sea lice viability post H2O2 exposure 21-P-01 (002).pdf

Good afternoon Laura,
As requested below, please find enclosed a one-page written summary of the analysis conducted by Dr. Jones.

We trust this satisfies condition of licence 6.13.

Best regards,

Mowi Canada West

Mobile:
Email:

-----Original Message-----
From: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>
Sent: May 27, 2022 3:37 PM
To: ; Jones, Simon <Simon.Jones@dfo-mpo.gc.ca>; McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Price, Derek <Derek.Price@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>; ; AQFF.FishHealth (DFO/MPO) <AQFF.FishHealth@dfo-mpo.gc.ca>
Cc:
Subject: RE: Smon Jones ACRDP Presentation to AMD Staff

ALERT: This message originated outside of Mowi's network. BE CAUTIOUS before clicking any link or attachment.

Good afternoon,

We wanted to thank you for arranging the presentation for Dr. Jones to present his work to us in collaboration with BCSFA through the ACRDP re: viability of sea lice following hydrogen peroxide treatment. It was a very informative and helpful presentation.

To satisfy condition of licence 6.13, please submit a one-page written summary of the analysis conducted by Dr. Jones no later than June 1, 2022. This will accompany the powerpoint presentation previously submitted. Please also submit copies of the ACRDP report as they become available.

Any licence holder operating vessels that perform freshwater bath treatments should submit their scientific analysis to the AQFF.Fish Health email inbox (copied here) no later than June 1, 2022 in order to comply with condition of licence 6.13.

Please don't hesitate to contact myself or any member of the Aquaculture Fish Health team, including the AQFF.Fish Health inbox, with any questions.

Thank you,

Dr. Laura Sitter [she/her]
Veterinarian
Aquaculture Management- Pacific Region
Fisheries and Oceans Canada (DFO)
Courtenay, British Columbia
Cellular - (778) 229-2576
Laura.Sitter@dfo-mpo.gc.ca

-----Original Appointment-----
From: [redacted]
Sent: Tuesday, May 24, 2022 12:44 PM
To: [redacted] Sitter, Laura; Jones, Simon; McCorquodale, Brenda; Shaw, Kerra; Price, Derek; Manchester, Howie; Paylor, Adrienne; Oswell, Alexandria; [redacted]
Cc: [redacted]
Subject: Smon Jones ACRDP Presentation to AMD Staff
When: Thursday, May 26, 2022 9:00 AM-10:00 AM (UTC-08:00) Pacific Time (US & Canada).
Where: https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fus02web.zoom.us%2Fj%2F84089711896%3Fpwd%3DNEtSM0ZyZitiMHRQMmwrQjBBNkVqUT09&data=05%7C01%7C[redacted]%40mowi.com%7C7fe1a57068e3406c5c7608da40317d2f%7C84659319c8cc4302a6cf508dde8aaefe%7C0%7C0%7C637892878548221342%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=ZwmBzwCWYs5hnVgqs6gpivV%2BOek8OyLaStzSTWYtJ6o%3D&reserved=0

Thank-you for responding to the Doodle Poll - this time was the clear winner for DFO AMD staff and Simon Jones. I will be at a conference in Vancouver and [redacted] will be hosting. For those industry fish health professionals who cannot attend I will request a copy of Simon's presentation.

BC Salmon Farmers Association is inviting you to a scheduled Zoom meeting.

Join Zoom Meeting
https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fus02web.zoom.us%2Fj%2F84089711896%3Fpwd%3DNEtSM0ZyZitiMHRQMmwrQjBBNkVqUT09&data=05%7C01%7C[redacted]%40mowi.com%7C7fe1a57068e3406c5c7608da40317d2f%7C84659319c8cc4302a6cf508dde8aaefe%7C0%7C0%7C637892878548221342%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=ZwmBzwCWYs5hnVgqs6gpivV%2BOek8OyLaStzSTWYtJ6o%3D&reserved=0

Meeting ID: [redacted]

s.16(2)(c)
s.19(1)

Passcode:
One tap mobile
+13126266799, # US (Chicago)
+13462487799, # US (Houston)

Dial by your location
+1 312 626 6799 US (Chicago)
+1 346 248 7799 US (Houston)
+1 669 900 6833 US (San Jose)
+1 929 436 2866 US (New York)
+1 253 215 8782 US (Tacoma)
+1 301 715 8592 US (Washington DC) Meeting ID:
Passcode:
Find your local number: https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fus02web.zoom.us%2Fu%2FkUqygxuD2&data=05%7C01%7C%40mowi.com%7C7fe1a57068e3406c5c7608da40317d2f%7C84659319c8cc4302a6cf508dde8aaefe%7C0%7C0%7C637892878548221342%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=WHLdV6GD8Z1Vo6GRRGvQK9clN21zvTAsuIIDtksId2I%3D&reserved=0
.....

s.16(2)(c)
s.19(1)

Page 347

is withheld pursuant to section

est retenue en vertu de l'article

18(c)

of the Access to Information Act

de la Loi sur l'accès à l'information

From: Oswell, Alexandria
Sent: Tuesday, May 31, 2022 6:31 PM
To: Sitter, Laura
Subject: FW: DRAFT lines for review - media inquiry - foam Tofino Harbour

---

From: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Sent: Tuesday, May 31, 2022 3:27 PM
To: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Cc: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Subject: DRAFT lines for review - media inquiry - foam Tofino Harbour

Hi there. I just went ahead and put together some media lines for your review just to start moving this along.

Note that the reporter originally asked about residue in Tofino harbour. She assumed that it was due to Cermaq treating for sea lice. As Cermaq doesn't have any facilities in Tofino, both Laura and Kerry thought it unlikely that the foam was connected to sea lice treatment considering that Clayoquot Sound is some distance away from Tofino.

Laura also verified that hydrogen peroxide wasn't used in Clayoquot Sound last week. But she was going to investigate if there had been any other sea lice treatments in Clayoquot last week.

Now the reporter updates and says that the residue was seen off of Vargas Island – so closer to Clayoquot Sound.

Could you please take a look at these proposed media lines and update/correct any misinformation? Thank you!

- There were (xx number or no) sea lice treatments conducted at aquaculture sites in Clayoquot Sound during the week of May 23-27, 2022.
- Hydrogen peroxide was not used at any aquaculture site in Clayoquot Sound during this time period.
- As the regulator of aquaculture in British Columbia, DFO implemented new conditions of licence for marine salmon farms to submit sea lice numbers before and after sea lice treatments. This allows DFO to determine the success or efficacy of the treatment, as well as become aware of resistance. This applies to all sea lice treatments including SLICE®, mechanical removal, and bath treatments.
- Aquaculture sites must report sea lice treatments to DFO as a condition of licence. (I'm assuming this given the above approved statement)
- DFO encourages an "integrated pest management" approach to managing sea lice on farms in BC. This means that farmers are able to use multiple tools to manage sea lice on farms, and can choose the one most appropriate for each situation. By using many different tools, it reduces the risk that resistance to one tool may develop.
- New sea lice treatment methods are now being used in BC, including mechanical removal and bath treatments of fresh water or Paramove 50 (also known as hydrogen peroxide), which has been approved for use by Health Canada. These all take a significant financial investment to implement. DFO's analysis has shown that companies are using these other technologies more and more often.

Then there is that question of foam residue – would any treatment leave behind a residue and would it be harmful to the marine environment?

Thank you!

Jennifer Young (she/her/elle)
Communications Advisor
Fisheries and Oceans Canada / Government of Canada
Pêches et Océans Canada / Gouvernement du Canada
jennifer.young2@dfo-mop.gc.ca / Cell: 236-330-4025

From: Young, Jennifer A
Sent: Tuesday, May 31, 2022 12:50 PM
To: Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Cc: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>; Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Subject: FW: media inquiry - foam Tofino Harbour
Importance: High

Hello Dr. Oswell. We haven't met yet but I wonder if you could help with this media inquiry?

See below – I'm wondering if you could provide any information about whether or not there were any recent sea lice treatments in Clayoquot Sound – the time frame would be May 26. The reporter has provided more info that the residue was seen near Vargas Island.

And if there had been a sea lice treatment, does that leave a foam residue behind?

Thank you!

Jennifer Young (she/her/elle)
Communications Advisor
Fisheries and Oceans Canada / Government of Canada
Pêches et Océans Canada / Gouvernement du Canada
jennifer.young2@dfo-mop.gc.ca / Cell: 236-330-4025

From: Young, Jennifer A
Sent: Tuesday, May 31, 2022 12:09 PM
To: Shaw, Kerra <Kerra.Shaw@dfo-mpo.gc.ca>; Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Cc: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: media inquiry - foam Tofino Harbour
Importance: High

Hi all – following up on this request from the Westerly that we received last Friday:

"I am getting reports that a large amount of seafoam was drifting in the Tofino Harbour yesterday (May 26) and went up browning pass.

Some are linking it to the well boats Cermaq uses for pesticides. Did Cermaq dumb any pesticides yesterday? Is

the seafoam harmful to the marine environment?"

The reporter has contacted again and added this info:

"I have a witness that claims they saw a stream of foam coming off of the cermaq pesticide boat off of vargas…"

Laura, you said you could check on recent sea lice treatments in Clayoquot Sound. Could you check on that? Also would sea lice treatments leave a foam residue?

Thanks.

Jennifer Young (she/her/elle)
Communications Advisor
Fisheries and Oceans Canada / Government of Canada
Pêches et Océans Canada / Gouvernement du Canada
jennifer.young2@dfo-mop.gc.ca / Cell: 236-330-4025

Appendix XX
Sea Lice Management Plan (SLMP) Requirements

This document outlines the minimum requirements to manage the sea lice of farmed fish in British Columbia. The licence holder must generate their own company Sea Lice Management Plan (SLMP) that confirms that all the elements in this template will be implemented, and develop a suite of Standard Operating Procedures (SOPs) that describes the details of implementation. Each section in the SLMP must list the relevant SOPs to meet defined objectives. As per the COLs, this plan must be reviewed on an annual basis and submitted to Fisheries and Oceans Canada (DFO) Aquaculture Management Division (AMD) by October 15th, along with a complete copy of the company's Standard Operating Procedures (SOPs). The SLMP should undergo minimal changes on an annual basis, while the SOPs may be changed more frequently.

While the company may include additional elements to their SLMP, all elements described in this appendix must be explicitly included.

1. Staff Training

On site monitoring and correct identification of sea lice is a crucial component of any SLMP.

The SLMP/SOPs must describe how the company will meet these objectives:

- Staff responsible for counting sea lice must be trained in species and life stage identification, with annual reviews of methods and information.
- Staff responsible for reporting sea lice numbers to the company Fish Health team and the Department must have appropriate training on the regulatory requirements and timelines as outlined in the COLs.

2. Monitoring

Accurate and timely counts are crucial to the successful implementation of any SLMP. Important information to be collected includes the species of sea lice found and its life stage.

The SLMP/SOPs must describe how the company will meet these objectives:

- Regular counts must be conducted by licence holders to meet the requirements as laid out in the COLs (including relevant appendices). All species and lifestages of sea louse must be recorded and reported, including chalimus, motiles, and adult females of *Lepeoptheirus salmonis* and *Caligus clemensi*.
- If regulated sea lice thresholds are reached or exceeded, this must be reported to DFO as outlined in the COLs.
- Environmental conditions, including water quality data, must also be measured and recorded.
- Internal audits must be conducted on a regular basis by the company Veterinarian or Fish Health Team to ensure that staff are monitoring sea lice accurately and consistently.

3. Record Keeping

Accurate, legible, and accessible records are important in validating and verifying sea lice data.

The SLMP/SOPs must describe how the company will meet these objectives:

- Records must be kept in such a way that they are available on site for quick and easy access by site staff and DFO, including raw data (e.g. field notebooks).
- There must be a back-up system to ensure that data is secure.
- Records must be kept for the duration of the production cycle at the facility and meet the requirements as outlined in the COLs.

4. Prevention

As with other aspects of animal husbandry and health practices, prevention is the most effective way to manage infection.

The SLMP/SOPs must describe how the company will meet these objectives:

- The health of fish through appropriate biosecurity practices, proper nutrition, good husbandry practices, and veterinary oversight must be maintained.
- Methods of exclusion of sea lice from entering farms (e.g. physical barriers) must be included.

5. Area-based management

Sea lice prevention on farms must follow an area-based approach which considers physical and biological regional characteristics, like returning wild salmon, herring, and out-migrating salmon juveniles.

The SLMP/SOPs must describe how the company will meet these objectives:

- Licences may identify Area-Management Zones (AMZ) which farms are assigned to, and the interconnectedness of farms within zones must be reflected in the SLMP.
- Coordinated and timed treatments (including all-in, all-out stocking, and coordinated fallow) can be implemented to decrease the infective pressure within the AMZ and consequently decrease the number of treatments required.
- Any agreements or partnerships with other parties (including First Nations) that specify or enhance prevention, treatment, and monitoring practices that facilitate or exceed DFO COLs requirements must be listed in the proprietary SOPs. When not confidential, the details of those agreements must be included.

6. Treatments

The data used to help guide veterinarians in the decision making process of when to treat and what treatment modality to use includes a variety of biological, physical, and medical considerations.

The SLMP/SOPs must describe how the company will meet these objectives:

- The company must describe the multiple tools and techniques which will be applied, when appropriate, and under what circumstances.
- These tools must be specifically identified with all supporting materials provided, including:

- A general description of the tool (i.e. how does it work),
- Outline when this tool is typically used (e.g. size of fish, environmental conditions),
- Appropriate permits and validity periods (e.g. Pesticide Use Permit),
- Lice recapture capabilities (including technical specifications), and
- Whether the tool is owned or borrowed and any MOUs/sharing agreements in place.
- Chemotherapeutants must be used judiciously under the direction of a licenced veterinarian and must adhere to requirements dictated by label instructions and any relevant regulations.
- Sea lice bioassays must be performed on a regular basis and prior to treatment with a chemotherapeutant.
- The efficacy of each treatment must be measured and made available to DFO AMD as per COLs or upon request.

Marine Finfish Aquaculture Licence under the Fisheries Act

Licensed for: Aquaculture Date Issued: «DATE_ISSUED»

LICENCE No. «DFO_Prefix» «DFO_Lic_No» «YEAR» Expiry Date: «EXPIRY_DATE»

ISSUED TO:
«LICENCE_HOLDER»
«CORPORATION ADDRESS»

This licence is issued under the authority of the *Fisheries Act* and confers, subject to provisions of the *Fisheries Act* and Regulations made there under, the authority to carry out aquaculture activities including cultivation and Harvest of fish and prescribed activities under the conditions included herein and/or attached hereto.

It is the responsibility of the Licence Holder to obtain all other forms of authorization from federal or provincial agencies that may have jurisdiction for marine finfish aquaculture Facilities. As well, it is the Licence Holder's responsibility to be informed of, and comply with, the *Fisheries Act* and the regulations made there under, in addition to these conditions.

The above Licence Holder is authorized by this licence to carry out aquaculture activities at the following location and for the following species:

Facility Reference Number	Location and Legal Description
«REFERENCENUMBER»	«SITECOMMONNAME» «LEGALDESCRIPTION» «LANDFILENUMBER» «PFMA»

	Licensed Species
1	«SPECIES_1»
2	«SPECIES_2»
3	«SPECIES_3»
4	«SPECIES_4»
5	«SPECIES_5»
6	«SPECIES_6»
7	«SPECIES_7»
Combined Peak Biomass (Tonnes):	

Site specific conditions:

«Section_B_Comment_1»

Required Record Keeping and Reporting: Details are contained within the attached conditions of this licence.

Compliance Advisory: No person carrying out any activity under the authority of this licence must contravene or fail to comply with any condition of this licence.

The Licence Holder is legally required to ensure that annual fees for this licence are paid each year not later than the anniversary date of this licence. The annual licence fee must be calculated as set out in section 3 of the *Pacific Aquaculture Regulations.*

A copy of this licence must be kept on site at the licensed Facility and be available for inspection by a Fishery Officer or Fishery Guardian.

This licence includes further conditions that are included herein and/or attached hereto. These conditions form part of the licence and may not be removed.

Table of Contents

PART A. Definitions

"Acoustical Deterrent" means a device that is used underwater and is intended to generate an aversive response in Marine Mammals and could cause harm, which includes but is not limited to: explosives, incendiary devices, and electronic sound recordings.

"Active Facilities" means Facilities that have live cultivated fish on site. For sea lice counting purposes: Facilities that have three or more stocked Containment Structures of live cultivated fish on site.

"Attestation" means a written declaration made by a Qualified Individual who bears witness to, confirms, or authenticates.

"Biofouling" means the organisms that attach and/or live on nets and other farm structures (excluding herring spawn).

"Broodstock" means fish used to generate gametes.

"Containment Structures" means net pens, bag cages, tanks, and similar structures used to contain finfish for the purposes of aquaculture.

"Containment Structure Array" means a group of Containment Structures physically attached to each other, or in the case of circular structures, up to a maximum of 60 m apart.

"Counting Event" means the physical counting and recording of sea lice on farmed salmon for reporting to the Department. The number of Containment Structures and fish required to be counted are defined in specific conditions of licence and Appendix VI, and counts must be completed within a 5 calendar day period to be considered a Counting Event.

"Department" means Fisheries and Oceans Canada.

"Disease" means an abnormality of structure or function which results in a measureable compromise in physiological or behavioural performance of the individual, which is not a direct result of injury and can be caused by a suite of infectious, non-infectious, and inherent factors. Specifically:

> "Clinical Disease" is a stage of the Disease continuum that reflects anatomic or physiologic changes that are sufficient to produce grossly recognizable signs of a Disease.
>
> "Infectious Disease" means a Disease caused by the invasion and growth of a microorganism in or on a fish in such a way that it affects the form or function of that fish.
>
> "Infectious Outbreak'' means an occurrence of Disease in a population as determined by the attending veterinarian with the indicating morbidity or mortality rate substantially higher than its normal level.

"Diseases of Regional, National or International Concern" means either exotic to BC or have potential to emerge from the ecosystem in the Pacific region. These diseases, listed in Appendix III, can severely impact fisheries and affect regional and national trade so they warrant urgent notification to CFIA and immediate attention.

"Environmental Data" means dissolved oxygen levels, water temperature, plankton species and counts, salinity, turbidity, and other relevant data collected.

"Evidence of Escape" includes, but is not limited to, any visual or physical evidence that demonstrates a release of cultivated fish from the Facility, including unexplained declines in feed demand or inventory discrepancies.

"Facility" means the collective structures used for the purposes of aquaculture, including but not limited to, net pens, walkways, barges, floats and living accommodations, plus associated lines and anchors.

"Fish Health Event (FHE)" means a suspected or active Disease occurrence within an aquaculture Facility that requires the involvement of a veterinarian and implementation of mitigation to reduce associated impact(s) or risk(s). Actions/mitigation could include: treatment(s), targeted sampling, site quarantine, enhanced biosecurity, or culling to control suspected or confirmed Disease.

"Fish Health Staff" means the designated personnel, with veterinary oversight, responsible for: identifying, managing, and minimizing the impact of health risk factors, making health-related decisions, and routine monitoring of health, lice and Disease parameters.

"Gross Signs of Jaundice" means yellow pigmentation of skin and/or internal organs for any physiological reason.

"Harvest" means removal of live cultivated fish for market.

"Harvest/Transfer Pens" means pens that are secured for less than 90 days to the main cage array for the purpose of feeding, handling, holding, Harvesting or moving fish.

"High Slack Tide" means the time when high tide has been reached, and water movement has ceased temporarily before starting to recede.

"Incidental Catch" means any wild finfish (excluding sharks) from within the Facility caught during Harvest, movement of fish between Facilities, or net removal.

"Licence Holder" means the individual or corporation operating the Facility.

"Marine Mammal" means cetaceans, pinnipeds, and sea otters.

"Megafauna" means Marine Mammals, turtles, and sharks.

"Mortalities" means fish that have died within the Containment Structure Array during a Production Cycle but does not include fish killed during Harvest activities.

"Mortality event" means:

(a) fish Mortalities equivalent to 4,000kg or more, or losses reaching 2% of the current Stock Inventory within a 24 hour period; or

(b) fish Mortalities equivalent to 10,000kg or more, or losses reaching 5% of the current Stock Inventory, within a five day period.

"Pathogen" means a microorganism causing damage (pathology) in or on a fish. These include bacteria, fungi, viruses, and other micro-parasites.

"Peak Biomass" means the maximum biomass of cultivated finfish within a Facility during a Production Cycle.

"Production Cycle" means:

(a) the period of time from stocking the Containment Structures to the time of Harvest or removal of all finfish; or

(b) for Facilities containing only Broodstock, the period of time immediately after a Peak Biomass up to and including the next Peak Biomass.

"Production Site" means a Facility where fish of the same age class are entered at the same time, grown, and Harvested until the site is empty. Some may also have Broodstock kept continuously on site in dedicated pen(s) for breeding purposes.

"Recurring Fish Health Event" means any Disease occurrence which has previously been reported on a farm in that Production Cycle but more than 30 days have passed since the last reporting.

"Qualified Individual" means an individual employed by or contracted by an aquaculture corporation who possesses a combination of knowledge, expertise and experience necessary to complete a task.

"Sea Lice Management Measures" means measures such as, but not limited to: use of in-feed therapeutants, topical bath treatments, or mechanical equipment to decrease or eliminate sea lice from the Facility, but does not include Harvesting.

"Fresh Silver Mortalities" means recently dead fish that from the grow-out population that may or may not have outward signs suggestive of disease. These fish most reflect the living production population.

"Stock Inventory" means the number of cultivated fish within a Facility.

"Tonnes(t)" means 1,000kg.

"Transfer" means the movement of live fish to or from a licensed marine Facility or hatchery.

"Treatment Failure" means the failure to achieve a ≥60% reduction in average sea lice number. This is measured by comparing the most proximal pre-treatment sea lice count to any count within 42 days post-treatment.

"Upon Discovery" means the time or day something was discovered. For sea lice threshold exceedance, it means the last day of a Counting Event.

PART B. Finfish Condition of Licence

1. Production

1.1 The combined Peak Biomass of cultivated fish within an authorized Containment Structure Array must not exceed the amount set out on page 1 of this licence.

1.2 The Licence Holder must report Peak Biomass information as follows:

(a) for Production Sites, the Licence Holder must submit to the Department, starting March 1, 2020, notification of the actual date and tonnage of the Peak Biomass event for each Production Cycle for the term of the licence, within 30 days of its occurrence;

(b) for Facilities with fish continuously on site, the Licence Holder must submit to the Department a notification of the actual date and tonnage of each Peak Biomass event for the term of this licence no later than January 15, 2021 and annually thereafter, and must include data from the previous calendar year.

1.3 The Licence Holder must submit to the Department starting March 15, 2020 and annually on the 15th of each month thereafter for the term of this licence:

(a) a seven month rolling inventory plan for all licensed species using the template set out in Appendix I-A(i), including biomass, number of fish, age class and Harvest activities at this Facility. One month of the plan must reflect the calculated inventory at this Facility for the previous month and the remaining six months must be the projected inventory. This plan will include data when no production is occurring; and

(b) Transfers to and from this Facility for the previous month using the template set out in Appendix I-A(ii). This report is required only if Transfers occurred.

1.4 The Licence Holder must complete the Population Harvest Declaration Form as set out in Appendix I-B which must accompany the Harvested fish and be provided to the processor.

2. Transfer of Fish

2.1 The Licence Holder must apply to the BC Introductions and Transfers (IT) Committee to obtain a licence to Transfer live fish.

2.2 The IT licence, along with the health Attestation signed by the Licence Holder's veterinarian, must:

(a) be kept at this Facility and available for inspection by the Department; and

(b) accompany all shipments of live fish to and from this Facility.

3. Containment Structure Array Requirements

3.1 The Licence Holder must comply with the Containment Structure Array Plan(s) attached to this licence with respect to location and Containment Structures. The number of Containment

Structures at the Facility may be less than that in the Containment Structure Array Plan(s), but must not exceed it.

3.2 If the Containment Structure Array is anchored for the first time or re-anchored, the Licence Holder must submit to the Department, prior to Transferring fish to this Facility, or within 30 days if fish are already on site:

(a) an Attestation completed by a Qualified Individual(s) confirming that the Facility infrastructure is installed in such a way and using such equipment as to withstand the oceanographic and meteorological conditions of the licensed location; and

(b) an accurate Containment Structure Array Plan including locational information (+/- 10m) for each corner of the Containment Structure Array at High Slack Tide, and cage number.

3.3 The Licence Holder must notify the Department when planning to change from one approved Containment Structure Array to another 10 days prior to Transferring fish to this Facility.

3.4 Harvest/Transfer Pens may be used in the same location for up to 90 calendar days. The Licence Holder must ensure that:

(a) Harvest/Transfer Pens remain empty or in an alternate location for the equivalent time that they are in operation; and

(b) Facility records of Harvest/Transfer Pen usage are maintained and available upon request of the Fishery Officer or Fishery Guardian. These records must include location, start and end dates of Harvest/Transfer Pen use.

4. Fish Health

4.1 Licence Holders culturing salmonids must comply with the Salmonid Health Management Plan (HMP) as set out in Appendix IV. Any proposed amendments to the HMP will be considered a request for licence amendment by the Licence Holder to the Department.

4.2 Starting October 15, 2020 and annually on October 15th thereafter for the term of the licence, Licence Holders culturing salmonids must submit to the Department, for its considered response:

(a) the complete Facility-specific proprietary Health Management Standard Operating Procedures (HMSOPs), with modified sections identified; or

(b) inform the Department if no changes made to the HMSOPs.

4.3 The Licence Holder must comply with carcass management, including when a Mortality Event occurs, as described in the Salmonid HMP or, in the case of non-salmonid Licence Holders, as described in a separate Carcass Management Plan (CMP) and as set out in Appendix IV-A.

4.4 The Salmonid HMP or the non-salmonid CMP must include procedures for the following measures:

(a) collecting, categorizing, recording, storing, and disposing of fish carcasses, including:

(i) the regular removal of carcasses to carcass storage containers; and

(ii) bio-security protocols; and

(iii) the secure location of stored carcasses while awaiting Transfer to land-based facilities; and

(iv) the procedures to prevent contents from leaking into receiving waters; and

(v) the secure Transfer of stored carcasses to land-based facilities; and

(vi) the methods used to sanitize carcass storage containers, equipment and other handling facilities or vessels; and

(b) a Mortality Event, including:

(i) actions to handle the additional biomass on site associated with the Mortality Event; and

(ii) identification of vessels that will be used to collect and transport Mortalities to land-based facilities in the case of a Mortality Event.

4.5 The Licence Holder must notify the Department of a Mortality Event within 24 hours Upon Discovery, using Appendix V-A; and

(a) ensure carcass numbers are assigned to the date they are recovered, rather than averaged out over previous days if carcass recovery was delayed; and

(b) ensure carcass recovery occurs in a timely manner. If the Licence Holder is unable to do so, they must provide reasons and supporting evidence.

4.6 If it is suspected that a Mortality Event has occurred and mortality retrieval was not possible, the Licence Holder must still submit a Mortality Event notification as per Section 4.5 with supporting rationale.

4.7 Not later than 10 calendar days after the initial Mortality Event notification pursuant to Section 4.5 or 4.6, the Licence Holder must submit to the Department a complete Appendix V-A, as well as:

(a) Environmental Data for seven days leading up to and during the event; and

(b) any laboratory results related to the Mortality Event that were requested during the disease investigation, as soon as they are available; and

(c) the Mortalities reported by day, updates on cause of mortality, pens affected, and actions taken; and

(d) all supporting documentation for the Mortality Event that clarifies the primary and any other contributing factor(s) must be retained and made available to the Department upon request; and

(e) until the Mortality Event is reported as resolved, the Licence Holder must provide the Deparment subsequent update reports every 10 days thereafter as long as the specific cause of mortality continues; and

(f) all Mortality Events occurring during Transfers are to be reported as occurring at the destination Facility.

4.8 Should a Fish Health Event occur, the Licence Holder must:

(a) submit a Fish Health Event notification to the Department within seven days of initiating mitigation using Appendix V-B and indicate if this is a new, ongoing, or Recurring Fish Health Event; and

(b) if concurrent Diseases are present, each Disease requires a separate Fish Health Event notification, response, and follow up reporting; and

(c) take immediate action to manage the Fish Health Event by implementing response procedures to minimize the potential spread of Pathogens if an Infectious Disease is diagnosed; and

(d) undertake follow up measures to evaluate the Fish Health Event and the efficacy of the mitigation measures taken; and

(e) submit to the Department the therapeutic management measures as set out in Appendix V-C.

4.9 For Facilities growing Atlantic salmon (*Salmo salar*), the Licence Holder must investigate any increase in mortality following a known stressful event and:

(a) if this qualifies as a Mortality Event, notify the Department as per 4.5-4.7; and

(b) if this qualifies as a Fish Health Event, notify the Department as per 4.8; and

(c) for mortality that does not fit into (a) or (b), notify the Department within seven days Upon Discovery using Appendix V-D; and

(d) collect 10 Fresh Silver Mortalities representing the fish with the elevated mortality for diagnostic testing at the direction of the Department; and

(e) submit to the Department this follow-up information as it becomes available:

(i) Environmental Data as outlined in Appendix VI-C or as directed by the Department, for seven days leading up to and during the event; and

(ii) any laboratory results that were requested by the veterinarian; and

(iii) all supporting documentation that clarifies the primary and any other contributing factor of the increased mortality.

4.10 For Facilities growing Pacific salmon, the Licence Holder must record all Mortalities that exhibit Gross Signs of Jaundice and make available for review by a Fishery Officer or Fishery Guardian upon request.

4.11 For Facilities growing Pacific salmon, in a situation where Mortalities exhibit Gross Signs of Jaundice in >0.03% of the Stock Inventory within a one week time period, the Licence Holder must do the following the first time it occurs in a Production Cycle:

(a) notify the Department within seven days using Appendix V-D; and

(b) take a sample of 10 Fresh Silver Mortalities, of which half (if available) must show Gross Signs of Jaundice; and

(c) submit these fish for diagnostic testing at the direction of the Department; and

(d) submit the results of the diagnostic testing to the Department as soon as they are available.

4.12 The Licence Holder must record "Mortality by Category" for fish within the Containment Structures. The reports must be submitted to the Department, not later than March 15, 2020 and every three months thereafter for the term of this licence, using Appendix V-C. A report is required for all Facilities in operation.

4.13 Starting March 1, 2020 and quarterly thereafter for the term of this licence, the Licence Holder must maintain and submit to the Department, records of all wild or enhanced fish Mortalities collected during routine carcass recovery, following the template set out in Appendix VII-B.

5. Fish Health Records

5.1 The Licence Holder must keep at this Facility, unless otherwise indicated, complete, up-to-date and accurate written or electronic records of stocking and fish health activity for the Facility. Records must include the following:

(a) stocking and fish health activity for the Facility as set out in Appendix V-E; and

(b) the use of all therapeutants, pest control products and anaesthetics as set out in Appendix V-F.

5.2 The Licence Holder must ensure that Fish Health Event and carcass assessment records, in written or electronic form, are reviewed by the Licence Holder's veterinarian and/or Fish Health Staff to assess patterns in fish health and to facilitate reporting of Fish Health Events as per Section 4.8 and Mortality by Category as per section 4.12.

6. Sea Lice Management

6.1 The Licence Holder must follow all area-based and site-specific sea lice monitoring Windows listed in this licence. If the licence does not list this information, the following generic dates will apply:

(a) Non-migration Window: July 1 – January 31;

(b) Pre-migration Window: February 1 – February 29;

(c) Out-migration Window: March 1 – June 30.

6.2 The Licence Holder must follow all area-based and site-specific sea lice thresholds listed in this licence. If the licence does not list this information, the following generic threshold will apply:

(a) sea lice by fish threshold: an average of 3.0 motile *Lepeophtheirus salmonis*.

6.3 For Active Facilities growing Atlantic salmon (*Salmo salar*), the Licence Holder must conduct sea lice monitoring following protocols in Appendix VI, and report data from Counting Events and threshold exceedances to the Department as described in Sections 6.4 - 6.13.

6.4 During the Non-migration Window, the Licence Holder must:

(a) conduct a Counting Event on a minimum of three stocked Containment Structures once per month; and

(b) submit the results to the Department by the 15th of the following month, using Appendix VI-A; and

(c) Upon Discovery of threshold 6.2 being exceeded, the Licence Holder must:

(i) notify the Department within seven days using Appendix VI-B; and

(ii) conduct Counting Events on a minimum of three stocked Containment Structures every two weeks thereafter so long as the exceedance continues and submit the results to the Department within seven days of each Counting Event, using Appendix VI-B; and

(d) conduct and report additional sea lice counting as per Section 6.10.

6.5 During the Pre-migration Window, the Licence Holder must:

(a) ensure all stocked Containment Structures are assessed at least once by conducting two Counting Events, each of which includes a minimum of three Containment Structures:

(i) the first on half of all stocked Containment Structures within the first two weeks of the month; and

(ii) the second on the other half of all stocked Containment Structures (a duplication is only allowed for the index pen and if there are less than six stocked Containment Structures) within the last two weeks of the month; and

(iii)submit the results to the Department within 48 hours of each Counting Event and prior to March 1, using Appendix VI-B; and

(b) within 48 hours Upon Discovery of threshold 6.2 being exceeded, notify the Department using Appendix VI-B, and describe the measures that will be taken to ensure that the sea lice levels are below the threshold by the start of the Out-migration Window; and

(i) conduct Counting Events on all stocked Containment Structures once every two weeks thereafter so long as the exceedance continues; and

(ii) submit the results to the Department within 48 hours of each Counting Event, using Appendix VI-B; and

(c) conduct and report additional sea lice counting as per Section 6.10.

6.6 The Licence Holder must ensure that sea lice numbers are below threshold 6.2 at the time of the first Counting Event of the Out-migration Window.

6.7 During the Out-migration Window, the Licence Holder must:

(a) conduct Counting Events on a minimum of three stocked Containment Structures within the first week of the Window, and once every two weeks thereafter throughout the Window; and

(b) submit the results to the Department by the 15th of the following month, using Appendix VI-A; and

(c) if the sea lice threshold set in 6.2 is exceeded:

(i) within 48 hours Upon Discovery and prior to any Sea Lice Management Measure being taken, notify the Department of the planned Sea Lice Management Measures, including harvest, to reduce sea lice levels below the threshold within 42 days using Appendix V-B; and

(ii) within 7 days Upon Discovery, conduct a Counting Event on all stocked Containment Structures; and

(iii) submit the results to the Department within 48 hours of the Counting Event, using Appendix VI-B; and

(d) conduct and report additional sea lice counting as per Section 6.10.

6.8 Within the Out-migration Window, the Licence Holder must bring the sea lice levels below the threshold set in 6.2 within 42 days Upon Discovery of an exceedance.

6.9 The Licence Holder:

(a) is not required to count sea lice in an individual Containment Structure if:

(i) the Containment Structure(s) will be Harvested within the next 10 days; or

(ii) fish are being medicated or otherwise managed for a Fish Health Event which precludes handling; or

(iii) an ongoing environmental issue would reasonably lead to additional fish stress or harm if handled; or

(iv) written approval was sought and received from the Department's veterinarian for reasons other than prescribed in 6.9(i), (ii) and (iii); and

(b) must note if any Containment Structure(s) were missed in a required Counting Event for the reasons set out in 6.9(a) in the required reporting to the Department; and

(c) must notify the Department if an entire Counting Event could not occur for the reasons set out in 6.9(a) within 24 hours Upon Discovery.

6.10 At any time of the year, if Sea Lice Management Measures are undertaken, the Licence Holder must:

(a) Using Appendix V-B; notify the Department what the Sea Lice Management Measures will be:

(i) within 48 hours Upon Discovery of an exceedance of the threshold set in 6.2 during the Pre-migration and Out-migration Windows (as per 6.5 and 6.7); and

(ii) if there was no exceedance during the Pre-migration or Out-migration Window preceeding Management Measures, and during the Non-migration Window, at least 24 hours in advance of undertaking the Measures; and

(b) conduct a Counting Event on all stocked Containment Structures in the seven days prior to the Sea Lice Management Measure; and

(c) conduct Counting Events on all stocked Containment Structures following Sea Lice Management Measures as follows:

(i) for in-feed treatments, conduct Counting Events every two weeks until at least 42 days post-treatment or until sea lice counts are below the threshold set in 6.2; and

(ii) for all other treatments, conduct at least one Counting Event within seven days of Sea Lice Management Measure completion; and

(d) submit the results of (b) and (c) to the Department within 48 hours of each Counting Event using Appendix VI-B; and

(i) based on these results, if a sea lice Treatment Failure is detected, notify the Department within 48 hours Upon Discovery.

6.11 If a sea lice Treatment Failure is detected as per 6.10(d)(i), the Licence Holder is prohibited from further use of that treatment at the facility during the current production cycle without prior written approval from the Department.

6.12 By March 1, 2020, the Licence Holder must ensure that all mechanical treatment options have technology in place to capture sea lice, and sea lice that are removed through mechanical treatments are not returned to the marine environment.

6.13 By June 1, 2022, the Licence Holder must complete and submit a scientific analysis, to the satisfaction of the Department, regarding the viability of sea lice that are captured before, during, and after sea lice bath treatments.

6.14 For Active Facilities growing Pacific salmon, the Licence Holder must:

(a) at least quarterly, conduct sea lice monitoring during fish handling events; and

(b) make sea lice count data available for review by a Fishery Officer or Fishery Guardian upon request; and

(c) notify the Department within 48 hours Upon Discovery if threshold 6.2 is exceeded using Appendix VI-B.

6.15 All data from sea lice monitoring on wild salmon conducted under a DFO scientific permit must be submitted to the Department annually or upon request of a Fishery Officer or Guardian.

7. Escape Prevention, Reporting and Response

7.1 The Licence Holder must have in place and follow an Escape Prevention and Response Plan, including all elements outlined in Appendix X, to prevent the escape of cultivated fish.

7.2 If an escape or a suspected escape of cultivated fish from the Containment Structure Array occurs, the Licence Holder must take immediate action to prevent further escapes.

7.3 The Licence Holder must notify the Department of any escape or Evidence of Escape of cultivated fish from this Facility within 24 hours Upon Discovery. The notification must include the date and time of escape and any therapeutants administered through feed as set out in Appendix XI.

7.4 The Licence Holder must submit to the Department a complete follow-up report, as set out in Appendix XI, not later than seven calendar days after the escape or suspected escape.

8. Interactions with Wild Fish and Megafauna

8.1 The Licence Holder must design and use nets and equipment and conduct operations in a manner that causes the least amount of harm to Incidental Catch or the residence of the individuals of any species listed as threatened or endangered under the *Species at Risk Act* or its critical habitat, and does not jeopardize the survival and recovery of these species.

8.2 The Licence Holder must have mitigation in place to sort farmed fish from wild fish during Transfer between Facilities, Harvest, and net removal, and take reasonable efforts to minimize the Transfer of wild fish between Facilities and to processing plants.

8.3 Unless otherwise directed by the Canadian Food Inspection Agency or the Department, the Licence Holder must ensure that any live Incidental Catch are immediately returned to waters outside the aquaculture Facility in a manner that causes the least harm.

8.4 The Licence Holder must retain all dead Incidental Catch and dispose of them in the same manner that cultivated stock carcasses are disposed of, as set out in Section 4.3.

8.5 The Licence Holder must maintain Incidental Catch records using Appendix VII-A and must submit to the Department in the following manner:

(a) for Facilities that have fish continuously on site, a report must be submitted on January 15, 2021 and annually every January 15th thereafter for the duration of the licence. Records from the previous calendar year must be included; or

(b) for all other Facilities, a report must be submitted within 15 calendar days of the final date of Harvest that includes all records generated during the production and Harvest cycle. The Licence Holder must submit a follow-up report if more Incidental Catch and/or herring spawn is discovered after all Containment Structures are removed; either at the Facility or the processing plant.

8.6 The Licence Holder must have in place and follow a Megafauna Interaction Management Plan that includes all the elements of Appendix VIII.

8.7 The Licence Holder must not use Marine Mammal Acoustical Deterrents.

8.8 Upon Discovery of live entangled or entrapped Megafauna within the farm's infrastructure, the Licence Holder must follow the reporting requirements in 8.10 and 8.11 and:

(a) make all reasonable attempts to free the animal with least harm if it is a pinniped, sea otter, turtle (see also 8.8c) or cetacean smaller than 2m in length; and

(b) make all reasonable attempts to free the animal with least harm, including following guidance in the Code of Conduct for Shark Encounters and the Code of Conduct for Basking Sharks Encounters, if it is a shark; and

(c) contact the Department's Observe, Record, Report (ORR) number (1-800-465-4336) if it is a cetacean greater than 2m in length or a leatherback turtle; identifying the Facility, location, species, situational details, and call-back information and wait to receive explicit guidance from the Department before attempting to release the animal; and

(d) excluding harbour seals and California sea lions, farm personnel must collect photographs or video of entangled or entrapped Megafauna for submission to the Department.

8.9 Upon Discovery of dead entangled or entrapped Megafauna within the farm's infrastructure, the Licence Holder must follow the reporting requirements in 8.10 and 8.11 and:

(a) dispose of pinnipeds following all municipal, regional, provincial, and federal government legislation; and

(b) seek advice from the Department within 24 hours Upon Discovery on what to do with the animal if it is a sea otter, turtle, shark, or cetacean smaller than 2m in length; and

(c) immediately contact the Department's ORR number (1-800-465-4336) if it is a cetacean greater than 2m in length; identifying the Facility, location, species, situational details, and call-back information. Do not move the animal before receiving explicit advice from the Department unless there is an immediate risk to human safety or of harm to the infrastructure that could result in a significant fish escape event; and

(d) excluding harbour seals and California sea lions, farm personnel must collect photographs or video of entangled or entrapped Megafauna for submission to the Department.

8.10 The Licence Holder must immediately record on-site and then notify the Department in writing of any Megafauna drowning, entanglement (live or dead) not later than 24 hours Upon Discovery, in addition to any specific requirements set out above. The notification must include the date and time of discovery and as much of the detail set out in Appendix IX as possible.

8.11 Not later than seven calendar days after the initial notification pursuant to Section 8.10, the Licence Holder must submit to the Department a complete follow-up report of any Megafauna drowning, entrapment or entanglement (live or dead), using Appendix IX.

8.12 In the event that deterrent efforts fail, the Licence Holder must contact the Department if there are any Marine Mammals that represent an imminent risk to human safety or harm to the infrastructure that could result in a significant fish escape event, in order to receive guidance on how to manage the situation.

9. Protection of Fish Habitat

9.1 The installation and removal of this operation is authorized under section 35(2)(a) of the *Fisheries Act.*

9.2 The Licence Holder must maintain records at this Facility of in-water net cleaning for the purposes of Biofouling removal, as set out in Appendix XII.

9.3 The Licence Holder must ensure that only anchoring equipment is in contact with the sea bed.

9.4 The Licence Holder must collect and retain, with minimal leakage, blood generated during Harvest and dispose of it at a licensed processing facility.

9.5 The Licence Holder must ensure all debris generated or used at this Facility is collected or treated and disposed of in accordance with applicable Federal, Provincial, and Municipal legislation.

10. Operation of Vessels

10.1 The Licence Holder must post signage directing all vessels not involved in the cultivation of fish to dock at the designated docking station.

10.2 The Licence Holder must monitor and post restricted use signs in those areas where vessels not involved in the cultivation of fish are not permitted access.

11. Annual Aquaculture Statistical Report

11.1 Starting January 25, 2021 and annually on January 25th thereafter for the term of this licence, the Licence Holder must complete and submit to the Department the Annual Aquaculture Statistical Report as set out in Appendix XIII for the previous calendar year.

12. Use of Lights

12.1 The Licence Holder may use lights to promote fish growth and alter fish physiology and must record the following:

(a) type of lights used; and

(b) the intensity of lights used; and

(c) the number of lights used; and

(d) dates and times when the lights are used (period of day; season).

12.2 Starting February 15, 2021 and annually on February 15th thereafter for the term of this licence, the Licence Holder must submit to the Department annual light use reports using Appendix XIV, summarizing results from Section 12.1 for the previous calendar year.

13. Administrative Matters

13.1 Unless otherwise noted under specific conditions of this licence, the Licence Holder must keep all records required by these conditions in the following manner:

(a) with respect to duration:

(i) at this Facility for the duration of the Production Cycle; and

(ii) in a suitable location: at this Facility, in a corporate office, or other accessible storage off-site, for a minimum of four additional years;

(b) accessible, legible, and protected from damage; and

(c) in either electronic or paper versions.

13.2 Unless otherwise noted in specific licence conditions, all reports and submissions required by this licence must be submitted to the Department as follows:

(a) AQFF.General@dfo-mpo.gc.ca for reports required from Sections 1, 3, 9, and 12 of this licence;

AQFF.FishHealth@dfo-mpo.gc.ca for all reports required from Sections 2, 4, 5, and 6 of this licence;

AQFF.FishEscapes@dfo-mpo.gc.ca for all reports required from Section 7 of this licence;

AQFF.MarineMammals@dfo-mpo.gc.ca for all reports required from Section 8 of this licence;

fishstats@dfo-mpo.gc.ca for all reports required from Section 11 of this licence; or

(b) to the Departmental aquaculture database.