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)

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: Chamberlain, Jon
Sent: Monday, October 24, 2022 8:06 PM
To: Young, Jennifer A
Cc: Girdler, Lauren; Davies, Leri
Subject: RE: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study

That makes a lot more sense. Thank you – good to go.

jc

Jon Chamberlain (he/him | il/ lui)
A/Manager - Aquatic Diagnostics, Genomics & Technology Division
Gestionnaire/A - Division des diagnostics, la génomique, de la technologie aquatique
Cell/Cellulaire: (250) 213-7482

From: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Sent: Monday, October 24, 2022 4:00 PM
To: Chamberlain, Jon <Jon.Chamberlain@dfo-mpo.gc.ca>
Cc: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>; Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>
Subject: FW: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study

HI Jon.

I went back to Laura Sitter and to her "out of office" contact Derek Price to make edits.

See if this rewrite addresses your concerns. Thanks!

ML_NHQ_AC_ML_Hydrogen_Peroxide_Sea_Lice_Study_2022-10-19 jp_REWRITE.docx

Approved by:
Derek Price, Epidemiologist
Laura Sitter, Veterinarian
Alexandria Oswell, Veterinarian
Brenda McCorquodale, Director, Aquaculture Management
Lauren Girdler, Acting Director of Communications Pacific, Acting Associate Regional Director General
Neil Davis, Assistant RD
David Didluck, Acting RDG.

RDG approved.

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: Price, Derek <Derek.Price@dfo-mpo.gc.ca>

Sent: Monday, October 24, 2022 3:46 PM
To: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Cc: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>; Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: RE: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study

Hi Jennifer,

Yes, I remember these lines. I can see how the way it's written made Jon think we were talking about a separate analysis, but we are in fact referring to Simon's studies. What about this version?

- The hydrogen peroxide exposure studies were conducted through an ACRDP partnership between DFO Science (Simon Jones) and the BC Salmon Farmer's Association. The results of these studies agree with existing scientific literature that sea lice are immobilized for several hours after treatment with hydrogen peroxide. The studies also suggested reattachment is unlikely, but the results were inconclusive. Finally, the viability of eggs and naupliar stages is greatly reduced but not completely eliminated.

Cheers

From: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Sent: Monday, October 24, 2022 3:17 PM
To: Price, Derek <Derek.Price@dfo-mpo.gc.ca>
Cc: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>; Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: RE: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study
Importance: High

HI Derek.

I know that Laura is out of the office but hoping you might be able to help.

You may remember seeing these media lines circulating in late July and early August. Laura had sent these bullets that I used to star to draft the lines:

- In March 2020, a new condition of licence was added to marine finfish aquaculture licences requiring that licence holders complete a scientific analysis of the viability of sea lice before, during, and after well boat treatments (freshwater baths and hydrogen peroxide baths). This analysis was required to be submitted by June 1, 2022. All three Atlantic salmon farming companies in BC completed and submitted these analyses to AMD before the required deadline..
- The analysis for hydrogen peroxide bath treatments was conducted through an ACRDP partnership between DFO Science (Simon Jones) and the BC Salmon Farmer's Association. The results of this analysis agree with existing scientific literature that sea lice are immobilized for several hours after treatment with hydrogen peroxide and viability is decreased but not eliminated.

I assumed from the above bullets that the ACRDP study that analyzed hydrogen peroxide bath treatments was an analysis of what Cermaq and Grieg had submitted as per their conditions of licences.

But from Jon's notes below, it looks like that isn't correct.

So if the ACRDP study was only a small scale laboratory study, was there also a DFO analysis of the results of

From: Young, Jennifer A
Sent: Tuesday, October 25, 2022 1:34 PM
To: Davies, Leri
Cc: Girdler, Lauren
Subject: RE: FOR APPROVAL: Media Lines - Analysis of Well Boat Treatments on Sea Lice APPROVED

Great 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

From: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>
Sent: Tuesday, October 25, 2022 10:31 AM
To: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Cc: Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: FW: FOR APPROVAL: Media Lines - Analysis of Well Boat Treatments on Sea Lice APPROVED

Good to go into Anticipatory for NHQ Jen.

Best and have a great day, Leri
(She/her | elle/la)

From: Proctor, Jody <Jody.Proctor@dfo-mpo.gc.ca>
Sent: Tuesday, October 25, 2022 10:24 AM
To: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>
Cc: Kim, Michelle <Michelle.Kim@dfo-mpo.gc.ca>; Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>
Subject: Re: FOR APPROVAL: Media Lines - Analysis of Well Boat Treatments on Sea Lice APPROVED

Approved!

Sent from my iPhone

> On Oct 25, 2022, at 12:06 PM, Davies, Leri <Leri.Davies@dfo-mpo.gc.ca> wrote:
>
> Good morning Jody and I hope that you are really well. These lines may seem somewhat familiar as the majority of them were previously approved in Region, however, they have been slightly revised with new lines added so need your approval please. They are anticipatory but we do expect media interest in the near future.
>
> The revisions have been approved by: Brenda, Neil and Andy
>
> Many thanks.

Best and have a great day, Leri
(She/her | elle/la)

Anticipatory Media Lines
Analysis Of Well Boat Treatments on Sea Lice

Issue
Among other conditions of licence established in March 2020, Atlantic salmon aquaculture facilities in the Pacific Region are required to report all sea lice treatments to DFO. Reporting requirements include types of treatment and the number of viable sea lice pre- and post-treatment.

There are three Atlantic salmon farming companies (Cermaq Canada, Grieg Seafood BC and Mowi Canada West) that use well boat treatments to treat sea lice. Well boats use either freshwater or hydrogen peroxide baths.

An analysis of freshwater bath treatments was conducted and submitted by Mowi Canada West because they are the only company on the coast that owns and operates technology for freshwater treatments. The results of the analyses is that there was a high rate of mortality of sea lice following low-salinity (or freshwater) bath treatments.

The hydrogen peroxide exposure studies were conducted through an ACRDP partnership between DFO Science (Simon Jones) and the BC Salmon Farmer's Association. The results of these studies agree with existing scientific literature that sea lice are immobilized for several hours after treatment with hydrogen peroxide. The studies also suggested reattachment is unlikely, but the results were inconclusive. Finally, the viability of eggs and naupliar stages is greatly reduced but not completely eliminated. This ACRDP research project has not yet been finalized or published.

Most of the vessels that conduct well boat treatments in BC have filtration technology in place. DFO staff conducted target inspections of filtration systems, and concluded that the screening of sea lice through these systems is effective in capturing almost all of the dislodged sea lice. Any dislodged sea lice that have been treated by hydrogen peroxide baths are unlikely to reattach to fish.

Finfish aquaculture licences were renewed on July 1, 2022 (except for Discovery Islands), with no changes to conditions of licence regarding requirements for bath treatments. Aquaculture Management is reviewing the results of the scientific analysis to determine if the conditions should be updated. This information, along with the results of a recent Canadian Science Advisory Secretariat review analysis of sea lice, will be considered in this review.

Media interest is expected. An ATIP has been filed.

Anticipatory Media lines:

1. The health of Pacific salmon stocks is of critical concern to the Government of Canada. This is why the Government has proposed new investments of more than $647 million over five years, starting in 2021, to stabilize and conserve wild Pacific

salmon populations. **(MINO approved)**

1. On June 1, 2022, marine Atlantic salmon aquaculture licence holders that use well boat treatments (freshwater and hydrogen peroxide baths) submitted scientific analyses of the viability of sea lice before, during, and after treatment, as required by the conditions of licence. **(New for approval)**

1. The results of the analyses of well boat treatments indicate that freshwater baths are effective at killing sea lice. Hydrogen peroxide baths successfully remove sea lice and reduce the viability of the parasite and its eggs, but are less effective at killing sea lice. **(New for approval)**

1. A review of the results of these studies is currently underway by DFO's Aquaculture Management Division. All well boat vessels are being inspected to ensure compliance with licence conditions. (**New for approval)**

2. As new research is completed, the Department will continue to review and incorporate the information as part of its risk-based, science-informed adaptive management process. **(MINO approved)**

If Pressed on Conditions of Licence

1. In 2019, Fisheries and Oceans Canada (DFO) consulted with First Nations, non-government environmental groups, industry and stakeholders who contributed ideas toward improving sea lice licence conditions. Effective March 1, 2020, DFO made changes to the conditions of marine finfish aquaculture licences to better protect wild salmon. **(MINO approved)**

1. The licence changes focused on improved protection and enforceability of licence conditions around sea lice management during the Pacific salmon smolt out-migration period (March 1 to June 30). This is when wild salmon are most vulnerable. **(MINO approved)**

1. The conditions of licence require that sea lice numbers are below the precautionary regulatory threshold of 3.0 motile sea lice per fish during the first sea lice count of the out-migration period at Atlantic salmon farms. This count must occur in the first week of March. **(RDG approved)**

1. The regulatory threshold of 3.0 motile sea lice per fish is a precautionary trigger for industry to take action in managing farmed sea lice abundance and potential impacts on wild fish during the out-migration period. **(New for approval)**

1. As part of their conditions of licence, Atlantic salmon aquaculture facilities must report all sea lice treatments to DFO and are required to collect and report sea lice count information before and after treatments. **(MINO approved)**

If pressed on effectiveness of well boat treatments on sea lice:

1. The analysis established that sea lice removed and treated using hydrogen

peroxide baths have a reduced viability and a reduced ability to reattach to salmon. **(New for approval)**

2. When utilized, filtration systems on well boats capture the vast majority, if not all, of the dislodged sea lice. All the water that is brought onto the vessels containing sea lice and fish is screened before being discharged back to the ocean. **(New for approval)**

1. All well boats have either been or will be inspected to ensure compliance with licence conditions. **(New for approval)**

Program Contact:
Brenda McCorquodale, Director, Aquaculture Management

Communications Contact:
Jennifer Young, Communications Advisor

Approved by:
Derek Price, Epidemiologist - approved
Laura Sitter, Veterinarian - approved
Alexandria Oswell, Veterinarian - approved
Brenda McCorquodale, Director, Aquaculture Management - approved
Lauren Girdler, Acting Director of Communications Pacific, Acting Associate Regional Director General - approved
Jon Chamberlain, A/Division Manager - approved
Andrew Thomson, Regional Director - approved
Neil Davis, Assistant RD – approved
Jody Proctor, Acting Associate Regional Director General - pending
David Didluck, Acting RDG - approved

From: Young, Jennifer A
Sent: Tuesday, October 25, 2022 2:28 PM
To: Prince, Hilary
Cc: Davies, Leri; Girdler, Lauren; Geiger, Karen; Seguin, Natalie
Subject: RE: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study

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

From: Prince, Hilary <Hilary.Prince@DFO-MPO.GC.CA>
Sent: Tuesday, October 25, 2022 11:27 AM
To: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Cc: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>; Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>; Geiger, Karen <Karen.Geiger@dfo-mpo.gc.ca>; Seguin, Natalie <Natalie.Seguin@dfo-mpo.gc.ca>
Subject: RE: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study

Thanks, Jennifer. I will send these back to Jay Parsons for his approval.

Hilary

From: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Sent: Tuesday, October 25, 2022 1:38 PM
To: Prince, Hilary <Hilary.Prince@DFO-MPO.GC.CA>
Cc: Davies, Leri <Leri.Davies@dfo-mpo.gc.ca>; Girdler, Lauren <Lauren.Girdler@dfo-mpo.gc.ca>; Geiger, Karen <Karen.Geiger@dfo-mpo.gc.ca>; Seguin, Natalie <Natalie.Seguin@dfo-mpo.gc.ca>
Subject: RE: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study

Good morning Hilary.

These have now been approved by Regional Science.

Note that Science asked for significant changes in the background section – tracked here – but only a couple of changes in the media lines. I renamed the document as REWRITE.

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: Prince, Hilary <Hilary.Prince@DFO-MPO.GC.CA>
Sent: Friday, October 21, 2022 1:15 PM

To: Young, Jennifer A <Jennifer.Young2@dfo-mpo.gc.ca>
Subject: Fwd: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study

Hi, Jennifer

Were these lines approved by the RDS?

Hilary

Sent from my iPhone

Begin forwarded message:

> **From:** "Parsons, Jay" <Jay.Parsons@dfo-mpo.gc.ca>
> **Date:** October 21, 2022 at 3:59:05 PM EDT
> **To:** "Prince, Hilary" <Hilary.Prince@dfo-mpo.gc.ca>
> **Cc:** "Mcgrath, Cheryl" <Cheryl.Mcgrath@dfo-mpo.gc.ca>, "Lee, Rebecca" <Rebecca.Lee@dfo-mpo.gc.ca>, "Seguin, Natalie" <Natalie.Seguin@dfo-mpo.gc.ca>
> **Subject: RE: FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study**
>
> Hi Hillary,
>
> Please see attached with my comments. In addition, did Pac Sci review and approve? And will these be going to David and Arran?
>
> The ATIP package also includes draft CSAS documents related to future sea lice CSAS meetings. We (science) were recommended against releasing these documents. This should be flagged to Arran that they will be released. And this might invite other questions related to these documents and upcoming processes for DFO Science CSAS advise on sea lice that we might also want to address in the ML.
>
> Thanks, Jay
>
> ---
>
> **From:** Prince, Hilary <Hilary.Prince@DFO-MPO.GC.CA>
> **Sent:** Thursday, October 20, 2022 6:24 PM
> **To:** Parsons, Jay <Jay.Parsons@dfo-mpo.gc.ca>
> **Cc:** Mcgrath, Cheryl <Cheryl.Mcgrath@dfo-mpo.gc.ca>; Lee, Rebecca <Rebecca.Lee@dfo-mpo.gc.ca>; Seguin, Natalie <Natalie.Seguin@dfo-mpo.gc.ca>
> **Subject:** FOR APPROVAL | MEDIALINES-INFOCAPSULES | ML_Hydrogen_Peroxide_Sea_Lice_Study
>
> Hi, Jay
>
> Here are Media Lines from PAC region for your approval. These were drafted in response to an ATIP request (A-2022-00376-DSP Salmon aquaculture) and focus on a sea lice study conducted by Simon Jones.
>
> For your reference I have also attached the ATIP package, which includes:
>
> - Emails to and from Simon Jones

From: Sitter, Laura
Sent: Monday, November 14, 2022 4:52 PM
To: Paylor, Adrienne; Oswell, Alexandria
Cc: Price, Derek; Young, Jennifer A
Subject: RE: Results vs Conclusions H202 sea lice treatment
Attachments: 2020col_viability_studies_report- LS.docx

Hi Adrienne,

We've been working on anticipatory media lines for the viability studies since we received the reports in June. Jennifer Young and the comms team probably have the most recent versions of the media lines (draft found here). Here are the most recent short-form bullets we've seen (Derek edited at the end of October after review by Jon Chamberlain):

- In March 2020, a new condition of licence was added to marine finfish aquaculture licences requiring that licence holders complete a scientific analysis of the viability of sea lice before, during, and after well boat treatments (freshwater baths and hydrogen peroxide baths). This analysis was required to be submitted by June 1, 2022. All three Atlantic salmon farming companies in BC completed and submitted these analyses to AMD before the required deadline.
- The hydrogen peroxide exposure studies were conducted through an ACRDP partnership between DFO Science (Simon Jones) and the BC Salmon Farmer's Association. The results of these studies agree with existing scientific literature that sea lice are immobilized for several hours after treatment with hydrogen peroxide. The studies also suggested reattachment is unlikely, but the results were inconclusive. Finally, the viability of eggs and naupliar stages is greatly reduced but not completely eliminated.

The lines need further updating re: the results of our review. Derek has finished an analysis paper summarizing our findings. I will summarise below and send you the report.

- AMD performed an independent analysis of the two studies that were submitted.
- In conclusion, these studies showed that at the appropriate dose, both hydrogen peroxide and low-salinity water are effective at immobilizing pre-adult and adult lice, and severely compromise the hatching ability of exposed eggs. Additionally, low-salinity water treatments are lethal to motile stages.
- AMD is considering the results of these studies as part of its risk-based, science-informed adaptive management process. The results suggest that filtration should be considered as a mitigation on vessels performing hydrogen peroxide treatments as a precautionary approach, while filtration is likely not needed on freshwater treatment vessels.

Laura

From: Paylor, Adrienne <Adrienne.Paylor@dfo-mpo.gc.ca>
Sent: Thursday, November 10, 2022 2:27 PM
To: Sitter, Laura <Laura.Sitter@dfo-mpo.gc.ca>; Oswell, Alexandria <Alexandria.Oswell@dfo-mpo.gc.ca>
Subject: FW: Results vs Conclusions H202 sea lice treatment

Hi Both,
Brenda will be looking for lines on this next week.
Thx Adrienne

From: McCorquodale, Brenda <Brenda.McCorquodale@dfo-mpo.gc.ca>