

## **Farm salmon at Dixon Point infected with mystery pathogen approved for transfer into other farms - 2019**

Synopsis: Below are emails sent in 2019 between DFO staff regarding Cermaq's application to transfer 650,000 farm fish from Dixon Point to two other sites, Binns and Bawden. The Dixon Point fish were dying at a slightly higher-than-normal rate triggering a health assessment.

Samples were sent to the BC provincial government lab in January 2019. The lab reported the Dixon Point fish had been treated with 6 rounds of antibiotics for mouthrot and that there were also lesions not caused by mouthrot. The lab suggested an unknown infectious bacteria may be present and recommended follow-up. No followup is in the record. A federal DFO lab which received samples, suggested testing the Dixon Point fish for a new "Hepavirus". No results are provided.

The transfer committee was not told about the lab concerns and were informed by DFO staff that the fish were dying of algae, runoff and mouthrot and they approved the licence. The fish that were transferred to Binns, Bawden as well as those remaining at Dixon Point kept dying.

The documents below are from a 4,957 page Access to Information request on high mortality at Cermaq fish farms in Clayoquot Sound (A-2019-01138). The documents quoted below are included at the end of this report. They are in order as presented, not by page number. It is unknown who originally requested this document, but it is available on the Access to Information website<sup>1</sup>.

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Documents: Cermaq wanted to transfer 650,000 Atlantic salmon from its Dixon Point site to its farms Bawden and Binns in early January 2019. The fish were dying at a slight, but persistent level that was high enough that it triggered a diagnosis before a transfer licence could be issued. On January 3, 2019, the provincial Animal Health Centre (AHC) lab examined the Dixon Point farm fish for Cermaq. The lab report states these fish had been treated 6 times with antibiotics for mouthrot, (a common farm salmon disease that DFO scientists testified impacts wild salmon populations<sup>2</sup>).

The lab report also states, "*something other than mouthrot is affecting these fish*". (See page 3796)

Further tests on January 30, 2019 by the same AHC lab reports, "*Necrotizing bacterial enteritis is considered to be rare in fish*" adding "*Given the abundance of bacteria in the intestinal tract,*

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<sup>1</sup> <https://open.canada.ca/en/search/ati>

<sup>2</sup> <https://www.ourcommons.ca/DocumentViewer/en/43-2/FOPO/meeting-26/evidence> DFO scientists testified to the Fisheries Standing Committee on the risk of the bacteria *Tenacibaculum maritimus* (mouthrot), to sockeye and Chinook populations, other species not tested yet.

*it was likely shed in high numbers...it would be worth collecting samples... if we could identify the etiology we could get a better understanding of the disease and learn how to manage it."* (See page 3781)

On Feb 13, DFO staff filed a review of the records on the Dixon Point fish as part of the transfer application (ITC). They acknowledge the AHC report was done (3869), but don't mention the recommendation to follow-up to identify a bacteria abundant in these fish. They state the fish at Dixon Point were dying of algae, freshwater runoff and mouthrot (3870).

Feb 22 DFO biologist Howie Manchester writes to Cermaq, *"I'm just working on the ITC application for Ross and Dixon and noted that a large number of the causes of mortality are due to 'Environmental Challenges (algae, run off), do you have histology or other lab results that specifically address this mortality cause."* (3801).

Nothing is provided from Cermaq to confirm its fish were dying of algae and runoff, i.e. no plankton counts, no reports on the condition of the gills due to the plankton.

On March 7, 2019, Zac Waddington, DFO lead aquaculture veterinarian, writes, *"I have reviewed all information available to me pertaining to the application by Cermaq to transfer adult Salmon salar from Dixon Point... and there is no evidence of infectious disease that would pose a risk..."* (3872). He does not mention the BC provincial lab concerns regarding the unidentified and infectious bacteria was through to be released by these fish, nor the unusual lesions reported.

Meanwhile, on Feb 26 DFO biologist Howie Manchester, reports pale gills in the Atlantic salmon in the Ross Pass farm. He said it looked like VHS virus but notes these fish tested negative for VHS (3725). So, he takes samples for the federal DFO virus lab at the Pacific Biological Station in Nanaimo. Virologist Dr. Mark Polinski in that lab suggests they will test for "Amy's new Hepavirus". (3724)

Three months later after the transfer occurred on May 30, 2019, DFO staff are still trying to figure out the cause of the continued higher than usual daily mortality in the Dixon Point, Ross, Bawden and Binns farms. Howi Manchester writes *"We sent samples to Mark Polinski... have you ever heard back from him?"* (3694)

There is no answer in the record.

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Summary: In 2019, a provincial government lab reports the fish at Dixon Point might have been infected with an unknown bacteria that was being released at high levels into the marine environment and recommends follow up. A federal DFO lab said it would test the Dixon Point fish for a newly discovered virus. The Dixon Point fish were fed 6 rounds of antibiotics, but the mortality rate remained high. When Cermaq wanted to transfer these fish to other farms in

Clayoquot Sound, DFO listed algae blooms and freshwater run off as the reason these fish were dying. No supporting evidence for this was supplied from Cermaq, no plankton counts, no examination of the gills for damage due to the plankton. The lab reports were ignored, the fish were approved for transfer, they continued dying after the transfer and no one knew why.



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## Animal Health Centre

AAVLD - Accredited Laboratory

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Abbotsford BC V3G 2M3  
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Facsimile : (604) 556-3010  
Toll-Free : 1-800-661-9903

### Final Report AHC Case: 19-26

Last Updated: 01/04/19 3:29 PM

Case Coordinator: Gary D. Marty

Received Date: 01/03/19

Collected Date:

Client Ref No: 18-12-28DB/PO31218

Veterinarian:

Clinic:

Phone:

Fax:

Submitter: [REDACTED] - Cermaq Canada

Phone: (250) 286-0022

Owner: Cermaq Canada

Phone:

Premise ID: Dixon

#### Animal Data

Species: Atlantic Salmon

Breed:

Sex:

Age:

Animal ID:

#### Case History

Received fixed tissues for Histopathology (3): full histo.

History: Increased mortality, high levels aluminum in water, Mouth Rot diagnostic (6 treatments antibiotics until now), anemic liver. High priority.

Saltwater.

**\*All histories are copied verbatim from the submission form**

### Final Diagnosis

For details of microscopic findings, see the e-mailed spreadsheet

Filename: 2019-0026APHistoCermaq18-12-28DB\_3SWfish.xlsx

**Final Comment:** All three fish have lesions of sufficient severity to have contributed to significant morbidity or death. Consistent with the clinical history of mouthrot, fish # 2 has what is essentially a form of mouthrot: ulcerative branchitis affecting the tips of gill filaments, with intralesional filamentous bacteria. Filamentous bacteria sometimes occur on the gills of debilitated salmonids. Affected fish often have a history of some type of stress (e.g., crowding, suboptimal water quality, or handling). Although PCR (or bacterial culture using special media that is not available for routine diagnostics at the Animal Health Centre) is required to identify the species of bacteria, in marine waters *Tenacibaculum maritimum* (one cause of necrotizing branchitis) is most common.

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Fish #s 2 and 3 have significant renal interstitial cell hydropic degeneration. Hydropic degeneration of renal interstitial cells (especially endothelial cells) is a reversible change resulting from acute cellular damage. Cytoplasm of affected cells is expanded by fine to large foamy vacuoles that provide evidence that the kidney was being exposed to toxins. Potential sources of the inciting toxins include the water (e.g., toxic algae or nephrotoxic chemical), feed, a bacterial infection, or circulating oxygen radicals following a period of hypoxia. After hydropic degeneration can no longer be reversed, affected cells die and become necrotic. This lesion is not common with mouthrot, and in this case is evidence that something other than mouthrot is affecting these fish.

Fish #1 has significant brain hemorrhage. The most common cause of brain hemorrhage is trauma. If the affected fish was killed by a blow to the head, then that is the probable cause. If the affected fish was chemically euthanized or already dead when sampled, consider other types of trauma: fish running into something, including into other fish, and

increased activity from any cause, including external parasite infestation, avoidance of predators, stray voltage, toxin exposure, and capture for sampling. The sections contain no external parasites. Brain hemorrhage is the most commonly diagnosed cause of death among Atlantic salmon sampled as part of DFO's BC Fish Health Auditing and Surveillance Program, in 2015 killing 16% of the 759 sampled fish.

General comments on all scored lesions are included in the "Abbreviations" worksheet of the spreadsheet.

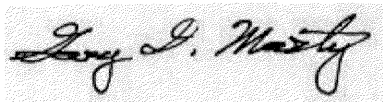
## Histopathology

Formalin-fixed tissues from three fish were received in three bags labelled "Dixon Dec. 28, 2018" and sequentially Fish 1 – Fish 3; nine cassettes were received for histopathology (3 per fish) in three small bags. Cassettes containing gill and skin were immersed ~2 hours in Protocol Decalcifier B (10% hydrochloric acid solution), and then rinsed in water before being processed into paraffin with the other cassettes. Slides are numbered the same as cassette labels Dixon 1A through Dixon 3C.

For histopathology, I used the histopathology template slightly modified from the one that is used for the DFO Auditing and Surveillance Program. Microscopic findings are scored as none (0), mild/small amounts (1), moderate (2), or severe/abundant (3).

**Quality Control:** Liver autolysis is none for all fish. Tissues have no postfixation dehydration or acid hematin deposits.

**Measure of Physiologic Condition:** All of the fish have adequate energy stores (i.e. abundant mesenteric fat).



Gary D. Marty  
D.V.M., Ph.D., Diplomate A.C.V.P.

These results relate only to the animals or items tested.

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**END OF REPORT**



## RT-qPCR Results Report

Garnet Martens  
871A Island Highway,  
Campbell River, BC V9W 0B7  
Phone: 250 286 6102

Email: labmanager@cahs-bc.ca

Cermaq Canada Ltd.

#203 - 919 Island Highway Sampling Date: December 28, 2018, 2018

Campbell River, V9W 2C2 Receiving Date: January 2, 2019

SHIPPED BY Report Date: January 16, 2019

X	OWNER DROPPED
	AIR EXPRESS
	EXPRESS MAIL
	OTHER
	DRY ICE
	ICE
X	ICE PACKS
	OTHER

Comment: Four (4) Atlantic salmon tissue pools collected from Cermaq's Dixon were screened for IHNV, VHSV, P. sal without elongation factor.

Client Case #	CAHS Case #	Purchase order #
18-12-28DB	R0003	31219

Description	IHNV	VHSV	P. sal
1 Kidney poo#1	U, U	U, U	U, U
2 Kidney poo#2	U, U	U, U	U, U
3 Gill pool#1	U, U	U, U	U, U
4 Gill pool#2	U, U	U, U	U, U
Negative Control	U	U	U
Positive Control	33.21	28.22	29.18

IHNV: Infectious Hematopoietic Necrosis virus

Cut-off (Ct value) = 37

VHSV: Viral Hemorrhagic Septicemia virus

Cut-off (Ct value) = 38

P. sal: Piscirickettsia salmonis

Cut-off (Ct value) = 36

Report Prepared By:

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## Final Report AHC Case: 19-507

Last Updated: 01/30/19 12:05 PM  
Case Coordinator: Michael Pawlik  
Received Date: 01/24/19  
Collected Date:  
Client Ref No: 19-01-18DB /PO311230

Veterinarian: [REDACTED]  
Clinic: **Cermaq Canada**  
Phone: (250) 286-0022  
Fax: (250) 286-0042

Submitter: [REDACTED] - **Cermaq**  
Phone: (250) 286-0022

Owner: **Cermaq Canada**  
Phone:  
Premise ID: Dixon Bay

**Animal Data**  
Species: Atlantic Salmon  
Breed:  
Sex:  
Age:  
Animal ID:

### Case History

Received fixed tissues for Histopathology (10): 10 full histology.

History: 10 fish full histology- pre split/transfer samples.

Saltwater. Euthanized: no. Number in group: 10. Insurance/legal: no. Prior submission: no.

**\*All histories are copied verbatim from the submission form**

## Final Diagnosis

For details of microscopic findings, see the e-mailed spreadsheet <2019-0507APHistoCermaq#19-01-18DB\_10SWfish.xlsx>.

**Final Comment:** Four of the 10 fish were diagnosed with bacterial enteritis. In cases of bacterial enteritis, the affected segment of intestine is characterized by intraluminal accumulations of necrotic debris and inflammatory exudates admixed with bacteria. The associated inflammatory response can be local or systemic. The number of bacteria can be variable and disproportionate to the severity of the lesion. This is likely dependent on the species of bacteria and the virulence of the strain (e.g. capacity for toxin production). Normally, routine preparations of the fish intestine are devoid of bacteria. The presence of bacteria in the intestinal lumen is evidence of bacterial overgrowth which can be a cause or consequence of decreased intestinal motility and poor digestion. It could also be a consequence of food contamination. However, given the stomach was not included in the submission we cannot prove or refute this supposition. Sufficient damage to the intestinal mucosa can also serve as a port of entry, resulting in a systemic bacterial infection, as was the case in Fish #9. The production of bacterial toxins can adversely affect fish health in addition to causing direct damage to the intestinal epithelium (e.g. systemic absorption resulting in nephrotoxicity or hepatotoxicity).

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Necrotizing bacterial enteritis is considered to be rare in fish. However, according to the literature and my own personal experience it is becoming more common in aquariums and aquaculture. Unfortunately, the disease is still poorly understood. In this particular case, the etiology and the underlying cause are unclear. Given that four fish were affected the infection may have come from a common source (e.g. food contamination). Alternatively, the species of bacteria may be infectious. Given the abundance of bacteria in the intestinal tract, it was likely shed in high numbers. It can be difficult to identify affected individuals on gross examination. However, if you find any evidence of bacterial enteritis (e.g. red discolouration of the intestine, necrotic casts, etc.), or if the disease occurs with some regularity, it would be worth collecting samples of the intestine for bacterial culture. If we could identify the etiology we could get a better understanding of the disease and learn how to manage it as there is very little information on bacterial enteritis in the

literature.

Thrombosis is evidence of increased coagulability. Hypercoagulable states can occur as a result of endothelial damage, inflammation, hemodynamic alteration (e.g. stagnation of blood), etc. Differentials include physical trauma, toxin exposure, or viral, bacterial, or parasitic infection. Some of the affected fish (e.g. #2, #8) have concurrent bacterial enteritis, which is a likely cause of systemic inflammation and endothelial injury. In Fish #10, thrombosis in the gills is associated with truncation of the gill filaments, so it is likely the result of trauma.

Hepatocellular necrosis can occur as a result of inadequate vascular perfusion (e.g. as occurs with harmful algal blooms or hypoxia), viral or bacterial infection (e.g. viral haemorrhagic septicaemia virus, *Renibacterium salmoninarum*, or *Piscirickettsia salmonis*), or exposure to bacterial or environmental toxins. In the present case, there are no obvious organisms in section. Lack of proliferative lesions in the biliary system is evidence against chronic toxin exposure as a cause of hepatic necrosis. Given the zonal pattern of distribution, hypoxia, toxin exposure, and/or oxidative injury are likely differentials.

Fish #3 and #7 were diagnosed with systemic fungal infections involving non-pigmented and pigmented species of fungi, respectively. Pigmented fungi are common in the environment. Infections involving pigmented fungi tend to be associated with deep wounds and the systemic spread of the infection is likely a consequence of immunosuppression. Thus, it is unlikely that pigmented fungi would pose a significant infectious threat to other fish on the farm. Examples of pigmented fungi that have been reported in Atlantic salmon include *Exophiala salmonis*, which is characterized by a low prevalence and low morbidity. However, higher rates of mortality can occur in farmed fish. Non-pigmented fungi are less commonly reported so the significance of the infection in the present case is unclear. Because several species of fungus have similar hyphal morphology, fungal culture or PCR is required for species identification.

Differentials for hematopoietic necrosis include viral infection (e.g. VHSV or IHNV), bacterial infection (e.g. *Yersinia ruckeri*), oxidative injury and toxin exposure. Given its high mitotic rate, hematopoietic tissue is particularly susceptible to toxins that cause damage to genetic material (e.g. cross-linking of DNA).

Epicarditis and endocarditis are evidence of chronic immune stimulation. The cause is usually not determined. Differentials include viral or bacterial infection, or vaccine reaction.

Endocardial cell hypertrophy is nonspecific evidence of systemic disease. Differentials include a viral or bacterial infection, oomycete infection, toxin exposure, or vaccine reaction. The cause is usually not determined.

In fish #4 and #8, the tips of filaments are necrotic and covered by large numbers of rod shaped bacteria. It is unclear whether the bacteria are the cause of tissue injury or whether they are growing opportunistically in the devitalized tissue (or a combination of the two). Degeneration or necrosis of the tips of gill filaments can occur as a result of ischemic injury (e.g. thrombosis and vascular occlusion) or exposure to harmful algae (evidence of adverse environmental conditions). It is possible that the bacteria affecting the gills are the same species as the bacteria affecting the intestine. If that were the case, perhaps the gill infection was the result of fouling of the environment (i.e. fish with intestinal lesions were shedding the bacteria in high numbers). This could explain why the lesions are confined to the tips of the gill filaments which are more prone to injury and exposure to environmental contaminants. PCR or bacterial culture would be required to identify the species of bacteria.

General comments on all scored lesions are included in the "Abbreviations" worksheet of the spreadsheet.

## Histopathology

Formalin-fixed tissues from 10 Atlantic salmon were received in 30 cassettes for histopathology. Cassettes with gill and skin were immersed for ~2 hours in Protocol Decalcifier B (10% hydrochloric acid solution), and then rinsed in water before being processed into paraffin. Slide numbers are the same as client cassette numbers (i.e. 1-10; A-C).

For histopathology, I used a slightly modified version of the histopathology template that I use for the DFO Auditing and Surveillance Program. Microscopic findings were scored as none (0), mild/small amounts (1), moderate (2), or severe/abundant (3).

**Quality Control:** Liver autolysis is mild to severe. Some large foci of erythrocytes (e.g. spleen on slide 9A) have precipitates of acid hematin. Acid hematin accumulates as brown birefringent deposits when tissues are not fixed in neutral buffered formalin and when tissues become acidic before or during fixation (as can happen with thick bloody pieces of tissue or with acid decalcification). Tissues have no post-fixation dehydration.

**Measure of Physiologic Condition:** All of the fish have adequate energy stores (i.e. abundant mesenteric fat).



Michael Pawlik  
D.V.M., MVSc., Diplomate, A.C.V.P.

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**END OF REPORT**

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## Marine Fish Health Records Review For ITC Transfer

Review Date: February 13, 2019

Application #: S250

DFO Audit Date: November 20/18

Review conducted by DFO staff: MDiamond/ HManchester / SMcConnachie

AQ Licence #: 115204

Company Name: Cermaq Canada Ltd.

Source: Dixon Point Reference #: 234 Destinations: Bawden & Binns Transfer Inv. 650,000

Origin of site: Boot Lagoon number of fish: [redacted] SW entry date: Sept 2018  
Oceans number of fish: [redacted] SW entry date: Sept 2018

DFO staff reviewing comment:

Cermaq Canada Ltd. (Cermaq) proposes to transfer [redacted] fish from its Dixon Point facility located in Shelter Inlet (zone 2.3) to its Bawden Point and Binns Island facilities, both located in Herbert Inlet (zone 2.3). Average weight, reported on last Fish Health Event notification for January 12, 2019 is [redacted] grams.

**Health Attestations can be viewed [here](#) and company submitted pre-transfer test results can be viewed [here](#).**

- PCR results for IHNv, VHSV and Psal was undetectable for these pathogens.
- Please see Histology results.
- Cermaq submitted samples both to CAHS and AHC in response to high suspected environmental mortalities. Samples were collected in late December and were submitted to CAHS for IHNv, VHSV and Psal PCR and 3 fish were submitted to AHC for histology. Please review results at: [Lab results\Lab results for mortality issues](#)

**Previous transfers from this facility: No**

### **Mortality Review:**

- Mortality by cause reports for quarter 4, 2018 indicate that mortality rate has increased over this time and were primarily classified as Environmental, fresh (silver), old or poor performers; with the average monthly mortality rate for quarter 4 at ~1.3%. No mortality events have been reported from Dixon Point in 2018 – to date.
- Mortality by Cause for December 2018 indicates that the primary classification for mort's is environmental, fresh (silver), old and poor performers:

s.20(1)(b)



	Fresh	Handling	Mature	Old	Poor Performers	Enviro	Predator	Total
October								
November								
December								

- The Fish health attestation (FHA) indicates that these fish have experienced greater than 0.05% mortality per day/ pen for four consecutive days in the last 30 days. The FHA indicates that the cause is due to 'environmental challenges (algae, run off), mouthrot'. Histopathology and qPCR tests all negative with management decision to continue 'environmental monitoring, antibiotic treatments, bubble curtain management, feed management (probiotics)'.
- DFO requested Cermaq submit an up-to-date mortality report for this group of fish. A mortality report for January 15 – February 15, 2019 was provided and indicated a mortality rate of 4.61 % over this period of which the majority of mortalities are due to the continued environmental challenges, mouthrot and poor performers. This report can be viewed Dixon Mortality Data Jan15-Feb15.xls
- Environmental data provided by Cermaq indicated that some harmful plankton was noted at Dixon between October 2018 and February 2019. Chrysochromulina sp. was noted in discreet samples between October 2018 and early February 2019 and Chaetoceros convolutes and concavicornes have been present in tows and occasionally in discreets from the middle of February to February 23. Please see the data provided: Plankton Data - Dixon & Ross.xlsx

#### Sea Lice:

- Industry submitted sea lice abundance report for January 2019 shows zero sea lice currently observed on fish sampled for this production cycle currently at Dixon Point (1 caligus found in 60 fish sampled).

s.20(1)(b)

#### DFO Audits:


A DFO fish health audit was conducted on November 20, 2018. Sampling results were negative for any bacteria and qPCR negative (for PS, VHS, SAV, ISAV, IHNV, IPNV). Some mouthrot was observed in the 30 mortalities that were collected on the day of the audit. **Histology results can be viewed here with the DFO review notes** 2019-160 DFO audit - Nov 20 2018



All documents related to this transfer can be found in the following folder: ..S250 -  
Dixon to Bawden and Binns

No information has been removed or severed from this page

Thanks,

From: "Manchester, Howie" <Howie.Manchester@dfo-mpo.gc.ca>  
To: "  
Cc: "McConnachie, Sarah" <Sarah.Mcconnachie@dfo-mpo.gc.ca>  
Date: 02/22/2019 04:21 PM  
Subject: RE: ITC Application for Ross and Dixon



---

Hi 

I'm just working on the ITC application for Ross and Dixon and noted that a large number of the causes of mortality are due to 'Environmental Challenges ( algae, run off)' , do you have histology or other lab results that specifically address this mortality cause?

Thanks

Howie

**From:**   
**Sent:** February-15-19 12:27 PM  
**To:** Diamond, Maria  
**Cc:** Manchester, Howie;   
**Subject:** Re: ITC Application for Ross and Dixon

Hi Maria,

Please find attached the mortality by category data for the last 30 days for each site, as well as the pre-transfer diagnostics tests performed. Please let me know if there are any questions or concerns.

Regards,

s.19(1)

**Wilkinson, Davida**

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**From:** Waddington, Zac  
**Sent:** Thursday, March 7, 2019 3:11 PM  
**To:** salmonITC / CITsaumon (DFO/MPO)  
**Cc:** McConnachie, Sarah; Manchester, Howie  
**Subject:** s250

I have reviewed all information available to me pertaining to the application by Cermaq Canada to transfer up to [REDACTED] adult *Salmo salar* from Dixon Point, Facility #234 to both Bawden Point, Facility #227 and Binns Island, Facility #1148. I have spoken to the attending veterinarian regarding the health status of these fish and there is no evidence of infectious disease which would pose a risk to wild or cultured fish as a result of this transfer. These transfers are in close proximity to the source facility and the reduction in densities is vital to ensure health and welfare. I recommend that a transfer licence be issued at your earliest convenience,

Dr. Zac Waddington DVM, B.Env.Sc.(Hons)  
Lead Veterinarian - Pacific Region  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Aquaculture Environmental Operations - Fish Health  
Courtenay, British Columbia  
Telephone | Téléphone: 250-703-0902  
Fax | Télécopieur: 250-703-0921  
[Zac.Waddington@dfo-mpo.gc.ca](mailto:Zac.Waddington@dfo-mpo.gc.ca)

s.20(1)(b)



## Wilkinson, Davida

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**From:** Polinski, Mark  
**Sent:** Wednesday, February 27, 2019 6:44 PM  
**To:** Manchester, Howie  
**Subject:** RE: Ross pass and north site sampling

Ok, sounds good. Thanks Howe,

Mark

---

**From:** Manchester, Howie  
**Sent:** Wednesday, February 27, 2019 5:14 PM  
**To:** Polinski, Mark; Waddington, Zac; McConnachie, Sarah; Richard, Jon  
**Cc:** Garver, Kyle; Long, Amy K  
**Subject:** RE: Ross pass and north site sampling

Hi Mark,

Yes, I will get the samples to you this Friday, [REDACTED] will drop them off, she works at PBS.

The samples are not frozen since historically tissues we have submitted for cell culture were preferred kept cold but not frozen, but will freeze as per your instructions. Unfortunately I don't have any -80 C ice paks as we are in Tofino but will use -20 C ice paks.

The samples:

- gills and arch were collected from 20 fish, they are in individual whirl-paks. ( # 1 - 20)
- Kidney and spleen were collected from 5 fish ( #11 - 15), these are combined but separate from the gill tissue.
- all fish sampled showed pale gills and were off feed with digesta in the lower GI. Some fish had some damage to gill filaments but not widespread.

We should be able to get the information to you by 9:30 ish on Friday.

Thanks

Howie

s.19(1)

-----Original Message-----

**From:** Polinski, Mark  
**Sent:** February-27-19 1:09 PM  
**To:** Waddington, Zac; McConnachie, Sarah; Manchester, Howie; Richard, Jon  
**Cc:** Garver, Kyle; Long, Amy K  
**Subject:** RE: Ross pass and north site sampling

Zac, Sarah and Howie,

Kyle will have the final word when he returns, but I'm confident that we'd be interested in looking for virus in these fish. From the email chain below it appears that you're collecting gill, kidney and spleen, and that they have already been collected? If you haven't collected them yet, please keep the gill separate from the kidney and spleen, and please freeze

all tissues as soon as possible. Sample sizes of at least a couple grams would be preferred in case we want to do multiple screening tests. If you've already collected them, hopefully they are now frozen but if not please freeze them now.

Let us (specifically Me and Jon Richard) if you are going to bring them down on Friday this week so we can coordinate transfer. Transporting samples frozen would be best (i.e. on freezer blocks charged at -80).

Jon, we can talk about this tomorrow if you are in, but I think we'll need CHSE and EPC lines to put some homogenate on next week, presumably to target for the new Hepavirus of Amy's but it'd be good not to rule out other potentials.

Mark

-----Original Message-----

From: Waddington, Zac <Zac.Waddington@dfo-mpo.gc.ca>

Sent: Wednesday, February 27, 2019 11:06 AM

To: McConnachie, Sarah <Sarah.Mcconnachie@dfo-mpo.gc.ca>; Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca>

Cc: Polinski, Mark <Mark.Polinski@dfo-mpo.gc.ca>

Subject: RE: Ross pass and north site sampling

Thanks so much for getting that Howie. And yes we will need to get those to PBS to get those onto cells. Sarah- the virology guy in Kyle's lab is John Richard ( I believe), would you please be able to see if you can track him down and see what he needs from us to get these samples processed? You could try getting a hold of Mark.Polinski@dfo-mpo.gc.ca who works with Kyle and would know who to contact. He might also know what happened with the sample from last year.

Zac

-----Original Message-----

From: McConnachie, Sarah

Sent: February-26-19 7:44 PM

To: Manchester, Howie

Cc: Waddington, Zac

Subject: Re: Ross pass and north site sampling

Thanks for sending Howie - and good call on the sampling. Would be good to have backups there for further diagnostics if needed. Kyle G is off until March 5th as per his email notification, but we should be able to coordinate something!

Sent from my iPhone

> On Feb 26, 2019, at 7:26 PM, Manchester, Howie <Howie.Manchester@dfo-mpo.gc.ca> wrote:

>

> Sorry should have cc'd you on the message below.

>

> Howie

>

> -----Original Message-----

> From: Manchester, Howie

> Sent: February-26-19 7:26 PM

> To: Waddington, Zac

> Subject: Ross pass and north site sampling

>

> Okay, we will work on getting the SL numbers for the sites that are over, I believe Bare Bluff, Bedwell and Plover. I will see if we can get the information on what is their mitigation plan for each site.

>

> On another note we have collected gill ( second and third gill arch) samples from 20 fish at Ross Pass into individual Whirl-paks,, all samples ( as with most of the mortalities) appear to have pale gills with slight to no damage as well as they are off feed ( digesta in the intestine) and gall bladders are enlarged ( probably since they are off feed?). I also collected from 5 of these fish into individual whirl-paks head and trunk kidney as well as spleen in case we wanted to run some tissue cultures on these as well. The reason I collected the kidney and spleen tissues for possible cell culture is that some of the gills and no feed reminded me of VHSV infections (although no internal hemorrhaging), also the time of year is right and there were many herring and pilchard in the pens, only thing though is that samples from this site have been tested by PCR for VHSV and come back negative.

>

> Records at Millar indicated that there was a Chrysochromulina bloom around mid January, this plankton has been thought to cause gill damage which does not translate to mortalities about a month later. Millar mortalities look the same as Ross Pass.

>

> Were you thinking of getting these samples to Kyle Garver? I can get [REDACTED] to drop these off to his lab on Friday if that's what you have planned, let me know.

>

> Thanks

>

> Howie

>

> -----Original Message-----

> From: Waddington, Zac

> Sent: February-26-19 12:37 PM

> To: Manchester, Howie

> Subject: RE: Live

>

> No worries if it can't work. Getting the latest sea lice counts would be most important. And any mitigation/harvest plans for the sites that are over.

>

> Zac

>

> -----Original Message-----

> From: Manchester, Howie

> Sent: February-26-19 12:27 PM

> To: Waddington, Zac

> Subject: Re: Live

>

> Okay, will do, not sure if we can sample Bare Bluff sin E they are into full harvest.

>

> Howie

>

> Sent from my BlackBerry 10 smartphone on the Bell network.

> Original Message

> From: Waddington, Zac

> Sent: Tuesday, February 26, 2019 09:18

> To: Manchester, Howie; Barry, Melanie

> Subject: FW: Live

>

>

s.19(1)

## Wilkinson, Davida

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**From:** Manchester, Howie  
**Sent:** Thursday, May 30, 2019 11:23 AM  
**To:** McConnachie, Sarah; Sandberg, Krista  
**Subject:** RE: 2019Q1 Mortality by Category report ready for your review  
**Attachments:** S249- AEO Summary of review -Ross to Bawden and Binns.doc; S250- AEO Summary of review -Dixon to Bawden and Binns.doc

**Follow Up Flag:** Follow up  
**Flag Status:** Completed

Hi Sarah,

We will definitely look at the mortality by cause for these sites when in Tofino, although I don't believe they have ever reached the ME threshold of 2% in one day or 5% over 5 days . These fish have been experiencing elevated mortality due to environmental issues, some low level Chaetoceros and Chrysochomilina and possibly other unknown enviro causes and have been having continuous daily higher mortality ( at least up until our audit date at Ross – Feb 26<sup>th</sup>). We have reviewed both Dixon and Ross recently for transfer applications, and had Cermaq submit environmental data as well as lab results for the fish mortalities they are attributing to environmental cause. Please see:

\\Dcbcvanna01b\VAN\_RHQ\_4\Aqua\AEO\Courtenay\FH\ITC - Marine Source Facility Transfer Information\Cermag\S249-Ross to Bawden & Binns and  
\\Dcbcvanna01b\VAN\_RHQ\_4\Aqua\AEO\Courtenay\FH\ITC - Marine Source Facility Transfer Information\Cermag\S250 - Dixon to Bawden and Binns

I've attached the summary I wrote for each of these transfers.

We also sent samples to Mark Polinski ( 20 gills and 5 kidney, spleen tissues ) for tissue culture from fish that were classified as environmental during our Feb. 26<sup>th</sup> audit at Ross, have you ever heard back from him? Do you want me to contact Mark?

Howie

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**From:** McConnachie, Sarah  
**Sent:** May-29-19 2:21 PM  
**To:** Sandberg, Krista  
**Cc:** Manchester, Howie  
**Subject:** RE: 2019Q1 Mortality by Category report ready for your review

Approved – we will follow-up with Cermaq at our next audit to assess the daily mortality at Ross, Dixon, and Millar during Q1.

Howie – see the attached graph and we will discuss our need for a record review at these sites during next week's audits.

**Dr. Sarah McConnachie MSc, PhD, DVM**  
Field Operations Veterinarian - Pacific Region  
Fisheries and Oceans Canada | Pêches et Océans Canada  
Aquaculture Environmental Operations - Fish Health