

Scottish Salmon Watch, 5 June 2019

Virus-Laden Farmed Salmon

- FOI reveals over half of samples test positive for Piscine Reovirus



A FOI reply by the Scottish Government [published online yesterday](#) reveals that over half of all farmed salmon from Scotland (and other unnamed countries) tested positive for Piscine Reovirus (PRV) during 2018 and 2019. In advance of [today's Ministerial Statement on 'sustainable aquaculture' in the Scottish Parliament \(1.30pm\)](#), campaigners are challenging Scottish Ministers to test all salmon farms and are calling on supermarkets to inform shoppers what infectious diseases, pathogens and viruses are hiding in 'healthy' Scottish salmon.

"Unsuspecting shoppers are getting more than they bargain for when buying farmed salmon," said Don Staniford, [Director of Scottish Salmon Watch](#) and author of ['The State of Scottish Salmon Farming'](#). "Hidden extras lurking in Scottish salmon include Piscine Reovirus, Cardiomyopathy Syndrome, Amoebic Gill Disease, Infectious Pancreatic Necrosis and a host of nasty viruses, pathogens and diseases. If consumers realised that over half of all farmed salmon tested was laden with Piscine Reovirus they would avoid it like the plague. Far from being 'healthy', Scottish salmon is a [battery farmed](#), [virus-ridden](#), [disease hell](#)."

Data disclosed via [FOI/19/00882](#) reveals that during 2018 and 2019 there were 399 positive samples out of 774 samples tested (i.e. 52% of farmed salmon samples tested positive for PRV) [1] - including 63 tests out of 113 with 100% positive results:

Date of Testing	Pathogen	Test	Result (Positive)
27/02/2018	PRV	QPCR	10 of 10
18/09/2018	PRV	QPCR	10 of 10
19/12/2018	PRV	QPCR	10 of 10
29/11/2018	PRV	QPCR	13 of 13
29/11/2018	PRV	QPCR	19 of 19
08/01/2019	PRV	QPCR	6 of 6
22/01/2019	PRV	QPCR	6 of 6
05/02/2019	PRV	QPCR	5 of 5
12/02/2019	PRV	QPCR	5 of 6
12/02/2019	PRV	QPCR	6 of 6
19/02/2019	PRV	QPCR	10 of 10
16/04/2019	PRV	QPCR	5 of 9
25/04/2019	PRV	QPCR	5 of 5
25/04/2019	PRV	QPCR	6 of 7
21/05/2019	PRV	QPCR	6 of 6
21/05/2019	PRV	QPCR	9 of 9

According to the Scottish Government's [FOI reply to Scottish Salmon Watch dated 3 June](#), the results relate to Marine Scotland Science's "commercial testing service on behalf of third parties" and "the sources of these samples will relate to aquaculture sites both within and out with Scotland" but "from the records held by Marine Scotland Science they cannot be linked to any particular source." Scottish Salmon Watch today filed a further FOI request for more specific details.

PRV is [highly contagious, causes fatal heart and skeletal muscle inflammation in salmon and a scientific study published in 2018 linked it to an equally deadly type of anemia in at least one species of wild salmon](#).

Shamefully, [Scotland's Aquatic Animal Health surveillance programme](#) does not routinely test for Piscine Reovirus (also called [Piscine orthoreovirus](#)) and Heart & Skeletal Muscle Inflammation (HSMI). "Sampling for PRV is restricted to those inspections involving diagnostic investigations and only in such cases where histopathological analysis is indicative of pathology associated with PRV infection," [explained the Scottish Government in a letter dated 3 June](#).

An analysis of the '[Case Information](#)' published by the Scottish Government (data is available from [2013](#) through to [March 2019](#)) details numerous positive tests for PRV and HSMI ([the causative agent of PRV](#)). In April 2019, Scottish Salmon Watch detailed the following case in a [letter to Scottish Ministers](#):



Scottish Ministers
St. Andrew's House
Regent Road
Edinburgh
EH1 3DG
scottish.ministers@gov.scot

5 April 2019

Dear Scottish Ministers,

Surveillance of Salmon Farms, Hatcheries & Ova to Minimise Disease Risks

Will Scottish Ministers commit to a program of increased testing and sampling of farmed salmon (including smolts and ova in hatcheries as well as in sea cages and processing plants) for infectious diseases, pathogens, bacteria, parasites and viruses?

In order to safeguard the health of wild fish (as well as farmed salmon), Scottish Salmon Watch challenges the Scottish Government to establish a strict surveillance regime which would test and report publicly on infectious diseases, pathogens, bacteria, parasites and viruses in the following:

- a) Ova imports
- b) Smolts in the hatchery prior to transfer to sea-cages
- c) Harvest-ready farmed salmon immediately prior to slaughter
- d) Market-ready farmed salmon in the processing plant

Scottish Salmon Watch is seriously concerned at the lack of monitoring and sampling of salmon farms, hatcheries and ova imports. The surveillance of [emerging viruses](#) and [emerging diseases](#) such as Piscine Orthoreovirus (Heart & Skeletal Muscle Inflammation), Amoebic Gill Disease and Pasteurella skyensis appears woefully inadequate and even the surveillance of [more established 'Notifiable Diseases'](#) is seriously lacking.

For example, [Case # 2018-0078](#) (The Scottish Salmon Company's Tarbert South site in Loch Fyne) tested five samples for PRV in addition to other diseases and viruses:

Case No:	2018-0078	Date of visit:	21/03/2018						
Site No:	FS0767	Inspector:	JET						
Results Summary	Freq.	Date of Notification							
		Database	Insp	Phone	Insp	Writing	Insp	2 nd Insp	
MG_IHN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW	
MG_IPN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW	
MG_ISA	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW	
MG_SAV	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW	
MG_VHS	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW	
MG_PMV	0/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
MG_PRV	1/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
HIST_PRV	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
HIST_SULC	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
HIST_SKIN	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
HIST_HPAT	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
HIST_ADHE	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
HIST_PMCH	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
HIST_LPAT	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
BACT_VVIS	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	
BACT_VSPE	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW	

The [March 2019 report](#) cited:

- "Haemorrhagic necrosis of skeletal muscle", "marked red skeletal muscle degeneration" and lesions on the flank including "a lesion on the ventral surface through which the heart was exposed" reported at The Scottish Salmon Company's Tarbert South site in Loch Fyne in March 2018 (positive tests reported for PRV, Moritella vicosa/Winter Ulcer disease and Vibrio).



Further information on the 'Risks of Piscine Reovirus' were detailed in Scottish Salmon Watch's [letter to Scottish Ministers in April 2019](#) [2].

Other PRV cases were cited in Scottish Salmon Watch's FOI request dated 24 March 2019 including Scottish Sea Farms (Nevis C in Loch Nevis) in October 2018 and The Scottish Salmon Company (Ardcastle Bay in Loch Fyne) in May 2018 [3].

Cases of HSMI [reported via the Scottish Government's Fisheries Health Inspectorate](#) include [Cooke Aquaculture's Lyrawa Bay farm in Scapa Flaw, Orkney, in 2019](#):

Case No:	2019-0121	Date of visit:	19/03/2019			
Time spent on site:	4 hours	Main Inspector:				
Site No:	FS0054	Site Name:	Lyrawa Bay			
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd			
Case Types:	1 ECI	2 CNI	3 SLI	4 VMD	5 DIA	6
Water Temp (°C):	7.3	Thermometer No:	T147	FHI 045 completed		
Observations:	Region:	OR	Water type:	S	CoGP MA	O-3
Dead/weak/abnormally behaving fish present?	<input type="checkbox"/>	If yes, see additional information/clinical score sheet.				
Clinical signs of disease observed?	<input type="checkbox"/>	If yes, see additional information/clinical score sheet.				
Gross pathology observed?	<input type="checkbox"/>	If yes, see additional information/clinical score sheet.				
Diagnostic samples taken?	<input type="checkbox"/>					

Additional Case Information:

Lesions observed on fish during December - January, attributed to winter sores, predominantly affecting undersized fish/failed smolts. Lesions no longer observed on fish, but grumbling mortality attributed to PD/HSMI has been ongoing since start of year.

Results of Surveillance	
1. Has any animal health surveillance been carried out by, or on behalf of, the business?	<input type="checkbox"/>
2. If yes, are results available for inspection?	<input type="checkbox"/>
3. Any significant results?	<input type="checkbox"/>
If yes, detail (if not detailed under recent disease problems).	HSMI and PD detected
Records checked between:	31/05/2017 - 19/03/2019

Cooke Aquaculture has [experienced serious problems with PRV at their salmon farms in Washington](#) (linked to infected eggs imported from Icelandic company StofnFiskur – a subsidiary of Benchmark Genetics) in the [United States](#), leading to 800,000 infected fish being slaughtered in December 2018 and a [ban on re-stocking PRV-infected farmed salmon](#).

Menu **The Seattle Times** Environment

Fish farmer destroys 800,000 juvenile Atlantic salmon due to disease; second purge in past year

Originally published December 18, 2018 at 7:11 pm | Updated December 18, 2018 at 7:38 pm

The Washington Department of Fish and Wildlife considers the exotic strain of PRV to be an unacceptable risk to native stocks of Pacific salmon. Under the conditions of its permit, Cooke Aquaculture Pacific was required to destroy the fish.

By [Lynda V. Mapes](#)
Seattle Times environment reporter

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For the second time, Cooke Aquaculture Pacific has destroyed 800,000 juvenile Atlantic salmon after testing required by the Washington Department of Fish and Wildlife (WDFW) determined the fish were infected with an exotic strain of Piscine Orthoreovirus (PRV.)

In Scotland, there is still no statutory sampling of salmon farming wastes via either farms or processing plants for PRV or other diseases, pathogens and viruses ([despite salmon farms increasing in size](#)). "Sampling undertaken for aquatic animal disease analysis relates to fish and shellfish and does not presently include samples from seawater or sampling associated with processing plants," [explained the Scottish Government in a letter dated 3 June 2019](#).

In Canada, however, [testing has detected PRV in salmon farming effluents](#) with the Canadian Government [forced by a court order in February 2019](#) to test for PRV in farmed salmon before transfer to sea cages (although [earlier this week a four-month extension was granted by a judge](#)). PRV was [detected in farmed salmon on sale in supermarkets in Canada back in 2012](#).



Supermarket salmon test positive for virus found in Europe



MARK HUME >

VANCOUVER

PUBLISHED APRIL 17, 2012

UPDATED MAY 8, 2018

Fish-farm critic and independent researcher Alexandra Morton has opened another debate about salmon diseases in British Columbia.

Ms. Morton says samples taken from salmon purchased in four Vancouver supermarkets have tested positive for a virus that is suspected of being the "causative agent" of a disease killing Atlantic salmon in European aquaculture operations.

The detection of the piscine reovirus (PRV), which researchers have associated with heart and skeletal muscle inflammation (HSMI) in fish, raises concerns that the disease could be in B.C waters, where it would be a threat to both farmed Atlantic salmon and wild Pacific salmon.

In May 2018, Scottish Salmon Watch [wrote to Scottish Ministers](#) calling on the Scottish Government to test salmon farming effluents for infectious diseases, pathogens and viruses (including PRV and HSMI).

[Cabinet Secretary for Environment, Climate Change and Land Reform](#)
[Cabinet Secretary for Rural Economy & Connectivity](#)
 The Scottish Government
 St. Andrew's House
 Regent Road
 Edinburgh
 EH1 3DG

8 May 2018

Dear Cabinet Secretaries,

Slipping Through the Net: Infectious Diseases, Viruses, Pathogens & Bacteria in Salmon Farm & Processing Plant Effluents

Further to previous correspondence (see Appendix 1), could you please explain why the Scottish Government does not test salmon farm and processing plant effluents for infectious diseases, viruses, pathogens, bacteria and contaminants?

In view of the [problems plaguing Scottish salmon farming](#) and [positive tests for viruses in processing plant effluents in Canada](#) the lack of Scottish Government testing is a serious oversight which must be corrected as a matter of urgency.

Data obtained via Freedom of Information from the Scottish Government has revealed that Scottish salmon farms during 2017 were not only [riddled with lice](#) but also [disease-ridden](#).



A [petition organised by SumOfUs signed by over 43,000 people](#) called on the Scottish Government to "start routinely testing effluent from salmon farms and processing plants for deadly viruses that threaten wild salmon".



Scottish Salmon Watch [revealed in May 2018](#) how Scottish salmon was being [fast-tracked and harvested out early](#) due to disease problems (including PRV and HSMI).

In February 2018, the Global Alliance Against Industrial Aquaculture (GAAIA) [wrote to the Cabinet Secretary for the Environment, Climate Change and Land Reform](#) calling for testing of processing plant effluents following [positive PRV tests in Canada](#).



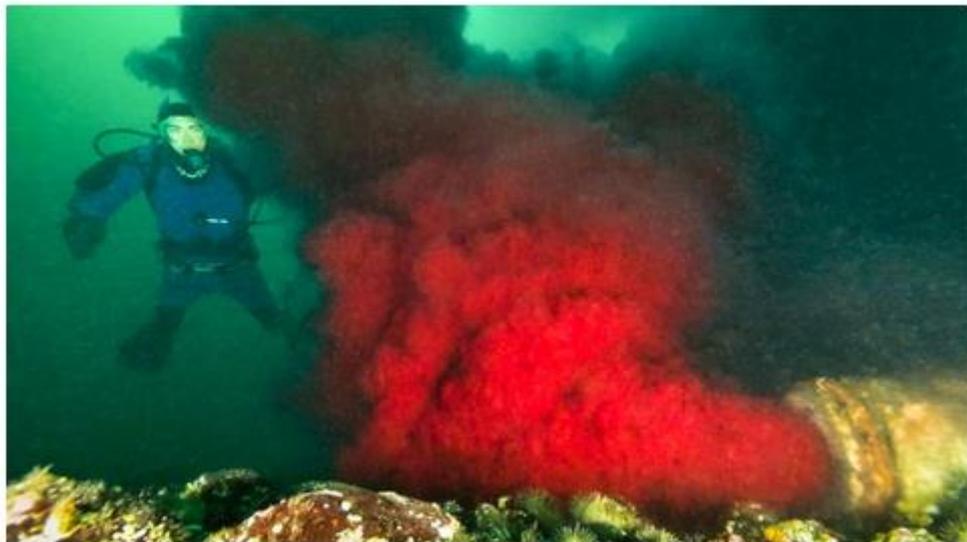
British Columbia

Bloody effluent still spewing from B.C. fish processing plant, photographer finds



Samples reveal PRV virus is still in discharged waste, says Tavish Campbell, more than year after initial find

[Megan Thomas](#) · CBC News · Posted: Dec 20, 2018 11:17 AM PT | Last Updated: December 20, 2018



B.C. photographer Tavish Campbell initially performed dives off the B.C. coast in 2017 and found effluent contaminated with piscine reovirus released into the ocean. (Tavish Campbell)

GAAIA [cited](#) a report - "[Piscine Reovirus \(PRV\): An Underestimated Pathogen in the Scottish Salmon Industry?](#)" - published by The Fish Site in 2015:

Current Piscine Reovirus Status of Scottish Salmon

HSMI has been observed across all farming regions of Scotland, however published information regarding the occurrence of HSMI on Scottish farms is limited to a single report on a suspected outbreak in 2004 and a recent report on HSMI outbreaks in the Shetland Isles from 2005 - 2012.

In the Shetland Isles, the number of HSMI cases from 2005 - 2012 varied between zero and two annually, with resultant mortality reaching 35% during an outbreak on one site. Since testing for this virus became available, some producers have reported up to 95% of their sites consistently testing positive for PRV.

It is believed this virus is fairly ubiquitous across Scottish farms as is the case in Norway. The prevalence of PRV in wild fish populations in Scotland and Ireland remains to be elucidated.

"In the context of PRV being detected in salmon processing plant effluent in British Columbia, GAAIA also calls on the Scottish Government to test salmon processing plant effluent in Scotland (not just for PRV but other infectious diseases and viruses)," [urged GAAIA to the Cabinet Secretary for the Environment, Climate Change and Land Reform in February 2018](#).

Read news on PRV via:

[Fish-farm fight ends with mandated testing for highly contagious virus](#)

[Ottawa spent \\$2.26 million fighting B.C. biologist and First Nation in court over fish farm virus](#)

[DFO v Wild Salmon – Will a Second Court Win Make Any Difference?](#)

[Federal court rules not screening B.C. farmed salmon for virus is unlawful](#)

[Federal Court orders DFO to make new farmed salmon transfer policy - DFO policy was to skip testing for PRV virus when issuing licence for farmed fish transfers, releases](#)

[PRV testing to be included in Canadian DFO policy](#)

[Bloody effluent still spewing from B.C. fish processing plant, photographer finds - samples reveal PRV virus is still in discharged waste, says Tavish Campbell, more than year after initial find](#)

[Protecting wild salmon from piscine reovirus](#)

[Unmasking a salmon virus](#)

[Something in the water: New salmon virus study stresses need to get fish farms out of ocean 'Bloodwater' Released into B.C.'s Coastal Water Contains Deadly Fish Virus, Government Tests Confirm](#)

[Scottish waters flooded with salmon blood after food plant leaks](#)

[Bloody sewage from Canada fish plant 'threatens' wild salmon](#)

[New Viruses to British Columbia's Coast: Piscine Reovirus](#)

[Piscine Reovirus in Puget Sound](#)

[Piscine Reovirus \(PRV\): An Underestimated Pathogen in the Scottish Salmon Industry?](#)

Read more on the science of PRV and HSMI via:

[Studies shed light on impact of PRV virus on farmed Atlantic salmon in B.C.](#)
[Piscine orthoreovirus demonstrates high infectivity but low virulence in Atlantic salmon of Pacific Canada](#)

[High-Load Reovirus Infections Do Not Imply Physiological Impairment in Salmon](#)

[Detection of piscine orthoreoviruses \(PRV-1 and PRV-3\) in Atlantic salmon and rainbow trout farmed in Germany](#)

[The same strain of Piscine orthoreovirus \(PRV-1\) is involved in the development of different, but related, diseases in Atlantic and Pacific Salmon in British Columbia](#)

[PRV virus may cause disease in Chinook salmon](#)

[Infection with purified Piscine orthoreovirus demonstrates a causal relationship with heart and skeletal muscle inflammation in Atlantic salmon](#)

[The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada](#)

[Piscine orthoreovirus \(PRV\) infects Atlantic salmon erythrocytes](#)

"Disease-ridden Scottish salmon is slipping through the net and into the supermarket shopping basket," concluded [Don Staniford](#). "Scottish salmon is [inherently unsustainable](#), [irresponsibly sourced](#) and is [riddled with parasites, infectious diseases, pathogens, bacteria and viruses](#). Shame on the Scottish Ministers for failing to test farmed salmon and for failing to curb the expansion of [toxic salmon farming](#)."



Contact:

Don Staniford: 07771 541826 (salmonfarmingkills@gmail.com)

Diary of Disease Disaster:

June 2018 - Gruesome photos of disease-ridden Scottish salmon ([sourced from Scottish Government inspections of salmon farms](#)) were [published by The Ferret](#) and [Scottish Salmon Watch](#).



August 2018 - It was revealed that lawyers acting on behalf of The Scottish Salmon Company and Scottish Sea Farms [threatened legal action](#) if the Scottish Government disclosed damning photos of disease-ridden farmed salmon. Scottish Salmon Watch [published further damning photos](#).



September 2018 - Scottish Salmon Watch [published secret video footage of diseased and deformed farmed salmon \(and cleaner fish\).](#)



Stomach-churning [video footage](#) of [maggot-infested](#) and [diseased salmon](#) was [published](#).



The Ferret [published](#) scarred, frayed and lice-infested salmon caught on film by Corin Smith and [broadcast by the BBC's 'One Show'](#).



November 2018 - The Sunday Mail [reported on the "disease hell" of Scottish salmon farms](#) followed up by French and Latvian TV.



March 2019 - Scottish Salmon Watch published a report - '[The State of Scottish Salmon Farming](#)' - cataloguing the disease nightmare on Scottish salmon farms including sites operated by [The Scottish Salmon Company](#) and [Mowi \(formerly Marine Harvest\)](#).



May 2019 - BBC Panorama [exposed the dirty secrets of salmon farming in Scotland.](#)



Read more via:

- [BBC Panorama: "Salmon Farming Exposed" \(20 May\)](#)
- [Herald: "Polluting Lochaber salmon hatchery 'should close' after sewage leak endangers pearls"](#)
- [Salmon Eggsclusive: Scotland's 'King of Fish' is Now Viking Not Scottish!](#)
- [The Ferret: "Mass deaths: nine million fish killed by diseases at Scottish salmon farms"](#)
- [Easter Egg Ban for 'Scottish' Salmon?](#)
- [Loch Duart drops "sustainable" claim after advertising ruling](#)
- [Disease-Ridden Scottish Salmon](#)
- [Mail On Sunday: "Sir David: Fish farms may kill all wild salmon"](#)
- [Mowi's Disease-Ridden Mortalities - 1.6 million+ in 101 incidents \(2017-2018\)](#)
- ["The Sorry State of Scottish Salmon Farming in 2018"](#)

Watch video reports online here



Secret Filming Inside Scottish Salmon Farms - Diseased & Def...
Don Staniford | 12.2K plays



Undercover reporters shine light on mortalities at Marine Harv...
Don Staniford | 255 plays



Scottish Scamon: Don Staniford Lifts the Lid!
Don Staniford | 624 plays



Lifting the Lid on Diseased & Deformed Scottish Salmon
Don Staniford | 1,022 plays

Notes to Editors:

[1] FOI reply from the Scottish Government dated 4 June 2019 ([FOI/19/00882](#)):



Scottish Government
Riaghaltas na h-Alba
gov.scot

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PUBLICATION - FOI/EIR RELEASE

Testing for Piscine Reovirus (PRV)/Heart & Skeletal Muscle Inflammation (HSMI): EIR release

Published: **4 Jun 2019**

Directorate: [Marine Scotland Directorate](#)

Part of: [Environment and climate change](#),

[Marine and fisheries](#), [Public sector](#)

Information request and response under the Environmental Information (Scotland) Regulations 2004.

FOI reference: FOI/19/00882

Date received: 24 Mar 2019

Date responded: 4 Jun 2019

The [FOI letter from the Scottish Government dated 3 June 2019](#) included:

T: +44 (0)131 244 2500 F: +44 (0)1224 295511
marinescotland@gov.scot

Don Staniford by email
Scottish Salmon Watch

Our ref: Fol/19/00882

3 June 2019

Dear Mr Staniford

Thank you for your request dated 24 March 2019 under the Environmental Information (Scotland) Regulations 2004 (the EIRs).

Your request

You asked for information on Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI) since 1 January 2018, to include:

- Data on sampling and testing for Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI) in farmed salmon, seawater and processing plant effluent (and any other sampling and testing).
- How many samples of farmed salmon and water samples have been tested for Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI).
- Any photos, emails, letters, copies of scientific papers and other information to and from the Marine Laboratory, salmon farming companies, veterinarians (e.g. Fish Vet Group), other Governments and other parties in relation to Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI).

And:

Response to your request

Sampling and testing is undertaken as part of Scotland's Aquatic Animal Health surveillance programme in line with the current regulations concerning aquatic animal health in Scotland. The results and outcomes of this surveillance is made publicly available through an active publication plan:-

<https://www2.gov.scot/Topics/marine/Fish-Shellfish/FHI/CaseInformation>.

In accordance with the current programme, sampling undertaken for aquatic animal disease analysis relates to fish and shellfish and does not presently include samples from seawater or sampling associated with processing plants.

In addition to results relating to statutory surveillance, Marine Scotland Science also performs a commercial testing service on behalf of third parties. The results of this testing are provided to you in Annex 1 of this reply and must be considered in association with the following context:

Commercial testing results relate to samples submitted from third parties and from the records held by Marine Scotland Science they cannot be linked to any particular source. The sources of these samples will relate to aquaculture sites both within and out with Scotland. The results will also include samples from transmission trials concerning experimental animals and facilities. Therefore, there are severe limitations with this data in terms of how it can be interpreted and portrayed. In summary the commercial testing data represents a number of test results from a number of samples which relate to a multitude of unidentifiable sources all of which have been submitted by third parties.

You also asked 'How many samples of farmed salmon and water samples have been tested for Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI)'. As explained above, Marine Scotland does not analyse water samples for aquatic animal pathogens as part of our statutory sampling programme. You can find details on the number of fish sampled as part of the statutory surveillance programme within the case information released through our active publication plan. For your information, sampling for PRV is restricted to those inspections involving diagnostic investigations and only in such cases where histopathological analysis is indicative of pathology associated with PRV infection. In those circumstances further screening using the molecular genetics method RT-PCR is undertaken. In general, tissues from several fish (usually between 1-5 animals) are pooled together for testing. You can calculate the number of fish sampled by analysing the sample sheet associated with the case which will detail the number of fish per pool and the tests associated with those samples taken.

Read the letter in full [online here](#)

An [Excel spreadsheet](#) disclosed with the FOI reply (Appendix 1) detailed 67 positive test results and 38 negative test results for PRV during 2018. Of the 67 positive test results 41 tested 100% positive for PRV during 2018.

Date of Testing	Pathogen	Test	Result (Positive)
27/02/2018	PRV	QPCR	10 of 10
18/09/2018	PRV	QPCR	10 of 10
19/12/2018	PRV	QPCR	10 of 10
29/11/2018	PRV	QPCR	13 of 13
29/11/2018	PRV	QPCR	19 of 19
06/04/2018	PRV	QPCR	4 of 4
19/07/2018	PRV	QPCR	4 of 4
31/10/2018	PRV	QPCR	4 of 4
10/04/2018	PRV	QPCR	5 of 5
19/07/2018	PRV	QPCR	5 of 5
18/12/2018	PRV	QPCR	5 of 5
25/04/2018	PRV	QPCR	6 of 6
10/08/2018	PRV	QPCR	6 of 6
24/08/2018	PRV	QPCR	6 of 6
29/08/2018	PRV	QPCR	6 of 6
11/10/2018	PRV	QPCR	6 of 6
13/11/2018	PRV	QPCR	6 of 6
29/11/2018	PRV	QPCR	6 of 6
10/04/2018	PRV	QPCR	7 of 7
13/07/2018	PRV	QPCR	7 of 7
18/09/2018	PRV	QPCR	7 of 7

In total in 2018, there were 265 positive samples out of 479 samples tested (i.e. 55% of samples tested positive for PRV).

In 2019 (up to 22 May) there were 22 negative test results and 36 positive test results for PRV. Of the 36 positive test results 22 tested 100% positive for PRV during 2019.

Date of Testing	Pathogen	Test	Result (Positive)
19/02/2019	PRV	QPCR	10 of 10
11/01/2019	PRV	QPCR	4 of 4
12/02/2019	PRV	QPCR	4 of 4
03/04/2019	PRV	QPCR	4 of 4
03/05/2019	PRV	QPCR	4 of 4
01/05/2019	PRV	QPCR	4 of 5
05/02/2019	PRV	QPCR	5 of 5
25/04/2019	PRV	QPCR	5 of 5
12/02/2019	PRV	QPCR	5 of 6
16/04/2019	PRV	QPCR	5 of 9
08/01/2019	PRV	QPCR	6 of 6
22/01/2019	PRV	QPCR	6 of 6
12/02/2019	PRV	QPCR	6 of 6
21/05/2019	PRV	QPCR	6 of 6
25/04/2019	PRV	QPCR	6 of 7
21/05/2019	PRV	QPCR	9 of 9

In total in 2019, there were 134 positive samples out of 295 samples tested (i.e. 45% of samples tested positive for PRV).

In total during 2018 and 2019 (up to 22 May) there were 399 positive samples out of 774 samples tested (i.e. 52% of samples tested positive for PRV).

Download Excel spreadsheet [online here](#)

[2] Excerpt from Scottish Salmon Watch's [letter to Scottish Ministers dated 5 April 2019](#):

Risks of Piscine Reovirus

Vertical transmission of PRV (Piscine Reovirus) via infected eggs also appears a distinct possibility. Scottish Salmon Watch [Tweeted in December 2018](#):



Don Staniford

@TheGAAIA

Replying to @wheelsmithUK

Piscine Reovirus is already here infecting Scottish farmed salmon - officially reported by @marinescotland via Fish Health Inspectorate case information bit.ly/2GwbxWx bit.ly/2A0hVQ3 @MHScotland

12:32 PM - 19 Dec 2018

A [FHI Fish Visit report dated November 2017](#) for Marine Harvest's salmon farm at Caolas A Deas in Loch Shell detailed disease problems including PGD (Proliferative Gill Disease), CMS (Cardiomyopathy Syndrome), PRV (Piscine Reovirus) and PD (Pancreas Disease).

FHI 059, Version 11

Issued by: FHI

Date of issue: 12/09/2017

Additional Case Information:

Due to finish harvest in a couple of weeks. Will then restock after 4 week fallow with ~450,000 part grown stock from Seaforth for approx 6 months. Next input after that will be late Q3/Q4s smolts in 2018.

CMS, PRV and PD have been confirmed on site. PGD is main cause of mortalities, particularly during treatments. Recent tests for AGD have been negative.

A [FHI Fish Visit report dated November 2017](#) detailed disease problems at Marine Harvest's salmon farm at Ardintoul in Loch Alsh ([a Special Area of Conservation protected via the EC Habitats Directive](#)) - including CMS, PRV, AGD, Branchiomonas, Paranucleospora theridion and salmon gill poxvirus.

FHI 059, Version 11

Issued by: FHI

Date of issue: 12/09/2017

Additional Case Information:

Report received from company of increased mortality with observed anaemia. Details recorded on mortality events sheet. Increase in mortality observed following decrease in appetite 5 weeks ago. Daily feed dropped from 16 tonnes per day to 8 tonnes per day. Fish feeding deep in cages.

Regular samples have shown a decrease in packed cell volume in sampled fish. In August samples were 20% of fish at 1-20% PCV, 5% at 21-30% PCV, 45% at 31-40% PCV, 20% at 41-50% PCV and 10% at 50+% PCV. In September samples were 25% at 1-20% PCV, 25% at 21-30% PCV and 50% at 31-40% PCV. In October samples were 55% at 1-20% PCV, 20% at 21-30% PCV and 25% at 31-40% PCV.

Samples have tested positive for CMS, PRV, AGD, Branchiomonas, Paranucleospora theridion and salmon gill poxvirus, but negative for PD and piscichlamydia.

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██████████

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0095	DATE OF VISIT	28/06/2016
SITE NO	FS0802	SITE NAME	Kirkabister
INSPECTOR	Svenja Elwenn & David Bradley	CASE NO	20160263

Section 1: Summary

Five moribund and lethargic fish were removed for diagnostic sampling. Histopathological examination revealed evidence of cardiomyopathy syndrome (CMS), which was confirmed by QPCR. This is thought to be the primary cause of morbidity.

Samples were also positive for infectious pancreatic necrosis virus by virology and piscine reovirus by QPCR, these are the causative agents of infectious pancreatic necrosis (IPN) and heart and skeletal muscle inflammation (HSMI) respectively. Two unidentified species of bacteria

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0095	DATE OF VISIT	21/07/2016
SITE NO	FS0656	SITE NAME	Djubawick
INSPECTOR	Andrea Warwick	CASE NO	20160322

Section 1: Summary

Three lethargic fish were removed for diagnostic sampling. Histopathological examination revealed evidence of cardiomyopathy syndrome (CMS) and chronic pancreatic diseases, which were confirmed by QPCR and PCR respectively. Samples were positive for infectious pancreatic necrosis virus by virology and piscine reovirus by QPCR, but no corresponding pathology was observed. These are the causative agents of infectious pancreatic necrosis (IPN) and heart and skeletal muscle inflammation (HSMI) respectively.

This FHI Case Information was summarized in a Scottish Salmon Watch report - "[Hard Evidence: Fast-Tracking Disease-Ridden Scottish Salmon](#)" - published in May 2018. The report also included:

PRV (Piscine Reovirus) - which is linked to Heart & Skeletal Muscle Inflammation (HSMI) - has attracted significant media attention in Canada following the discovery in both wild and farmed salmon.

"The disease Heart and Skeletal Muscle Inflammation (HSMI) is causing substantial economic losses to the Norwegian salmon farming industry where the causative agent, piscine orthoreovirus (PRV), is reportedly spreading from farmed to wild Atlantic salmon (*Salmo salar*) with as yet undetermined impacts," [reported a scientific paper published by PLOS in December 2017](#). "These results suggest that PRV transfer is occurring from farmed Atlantic salmon to wild Pacific salmon, that infection in farmed salmon may be influencing infection rates in wild salmon, and that this may pose a risk of reduced fitness in wild salmon impacting their survival and reproduction."

PRV has affected salmon farms in Norway, Chile, Ireland, Canada, United States and Scotland.

Read more via:

["Piscine Reovirus \(PRV\): An Underestimated Pathogen in the Scottish Salmon Industry?"](#)

["The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada"](#)

["Piscine Orthoreovirus \(PRV\) and Heart and Skeletal Muscle Inflammation \(HSMI\)"](#)

["A novel Totivirus and Piscine Reovirus \(PRV\) in Atlantic Salmon \(*Salmo salar*\) with Cardiomyopathy Syndrome \(CMS\)"](#)

["First description of clinical presentation of piscine orthoreovirus \(PRV\) infections in salmonid aquaculture in Chile and identification of a second genotype \(Genotype II\) of PRV"](#)

["An outbreak of disease resembling Heart and Skeletal Muscle Inflammation in Scottish farmed salmon, *Salmo salar* L., with observations on myocardial regeneration"](#)

["Piscine orthoreovirus \(PRV\) infects Atlantic salmon erythrocytes"](#)

["Piscine reovirus \(PRV\) in wild Atlantic salmon, *Salmo salar* L., and sea-trout, *Salmo trutta* L., in Norway"](#)

The Fish Site [reported in 2015](#):

Current Piscine Reovirus Status of Scottish Salmon

HSMI has been observed across all farming regions of Scotland, however published information regarding the occurrence of HSMI on Scottish farms is limited to a single report on a suspected outbreak in 2004 and a recent report on HSMI outbreaks in the Shetland Isles from 2005 - 2012.

In the Shetland Isles, the number of HSMI cases from 2005 - 2012 varied between zero and two annually, with resultant mortality reaching 35% during an outbreak on one site. Since testing for this virus became available, some producers have reported up to 95% of their sites consistently testing positive for PRV.

It is believed this virus is fairly ubiquitous across Scottish farms as is the case in Norway. The prevalence of PRV in wild fish populations in Scotland and Ireland remains to be elucidated.

There have been reports of increased downgrades due to discoloured fillet marks in batches of fish subsequent to elevated serum levels of the enzyme creatine kinase (CK). This enzyme can indicate muscle damage and is known to increase during HSMI infection. It is suspected that PRV infection may have been responsible for these elevated CK levels and fillet discolouration however this has not been conclusively established.

Scottish Ministers should be aware of reports of PRV in infected eggs imported from Iceland to the United States. Salmon Business [reported in December 2018](#):

"What about PRV in eggs?"

"That's a good question and we have been arguing about true vertical transfer we think when it's inside the egg - not necessarily in the genome but at least inside the egg and more like the contamination problem carrying the virus with a shipment - not necessarily within the fish at all but the materials in the packaging might get contaminated - this is maybe a very prevalent virus. And we need to state that it has been infected before shipping that's also very difficult," Dale says and adds:

"We should be careful - you need a real good sequence data on that whole genome and need to have enough to compare with - and probably they don't have either. To unravel where a virus comes from is a major job to do."

This followed a [news report in The Seattle Times](#):

Fish farmer destroys 800,000 juvenile Atlantic salmon due to disease; second purge in past year

Originally published December 18, 2018 at 7:11 pm | Updated December 18, 2018 at 7:38 pm

The Washington Department of Fish and Wildlife considers the exotic strain of PRV to be an unacceptable risk to native stocks of Pacific salmon. Under the conditions of its permit, Cooke Aquaculture Pacific was required to destroy the fish.

By Lynda V. Mapes 

Seattle Times environment reporter

For the second time, Cooke Aquaculture Pacific has destroyed 800,000 juvenile Atlantic salmon after testing required by the Washington Department of Fish and Wildlife (WDFW) determined the fish were infected with an exotic strain of Piscine Orthoreovirus (PRV.)

The strain is essentially the same strain of virus found at the Iceland hatchery from which Cooke receives Atlantic salmon eggs.

Cooke had a similar problem last May. Tests on the most current batch recently came back, said Amy Windrope, Region 4 director for WDFW. Two of Cooke's last three batches of Atlantic salmon in the past year have tested positive for PRV, Windrope said. The third was clean.

Salmon Business [reported on 20 December 2018](#):

Egg supplier responds to Washington PRV salmon cull

News by Owen Evans - 20 December 2018

Benchmark Genetics, which supplies eggs to Cooke Aquaculture Pacific, has responded to reports a US salmon cull was due to an 'exotic' strain of Piscine Orthoreovirus (PRV).

As reported on [SalmonBusiness](#) yesterday, the salmon farmer Cooke Aquaculture Pacific had to cull 800,000 fish.

The Icelandic company StofnFiskur – a subsidiary of Benchmark Genetics – supplied the eggs to Cooke.

Divisional marketing director Birgitte Sørheim wrote in an email to [SalmonBusiness](#) that: "PRV is not a classified disease but a virus commonly found in Atlantic salmon. Fish that carry the virus are not sick but can, under certain circumstances (weak health status/gill status and other factors) develop heart and skeletal muscle inflammation and will then be diagnosed as sick. This was not the case with the juveniles that had to be destroyed in the US. These fish were healthy but were required to be destroyed by the WDFW."

Cooke's hatchery near Rochester tested positive for a form of the fish PRV *piscine orthoreovirus* virus that [the WDFW \(The Washington Department of Fish and Wildlife\)](#) classifies it as "exotic."

Sørheim added that "the total number of fish destroyed was 800,000. PRV was detected by routine sampling in April, and the entire batch of fish was required to be culled."

"The PRV at Cooke may have originated from the ova delivered from Iceland. We have, however, an optional service of screening against PRV that our customers may choose as an extra risk measure to avoid vertical transmission."

"PRV is found in both farmed and wild salmon and is not described as exotic in Europe. The virus is also not listed by OIE or European authorities," she wrote.

The Seattle Times [reported in May 2018](#):

Washington state finds virus in Cooke Atlantic salmon, plans expanded testing

Originally published May 19, 2018 at 6:00 am | Updated May 19, 2018 at 12:22 pm

Washington state tested smolt in a Cooke Aquaculture incubator and found the Atlantic salmon had a strain of Icelandic virus. The state denied permission for the company to move the 800,000 fish to an open-water net pen.

By Lynda V. Mapes 

Seattle Times environment reporter

After identifying an exotic virus in fish raised by Cooke Aquaculture, Washington state is planning to test at other sites where the pathogen from Atlantic salmon may have been spread.

The virus detected in Cooke's fish is a strain of piscine orthoreovirus (PRV) from the northern Atlantic. Cooke hatched the fish from eggs the company imported from its supplier in Iceland. Those eggs are presumed to be the source of the virus, Warheit said.

In 2018, Wild Fish Conservancy and a coalition of other members of the Our Sound, Our Salmon coalition [wrote to the Washington Department of Fish and Wildlife regarding the testing of salmon smolts](#):

Dear WDFW Acting Director Joe Stohr,

We, as members and partners of a coalition of businesses, organizations, commercial and recreational fishermen, and individuals under the name of Our Sound, Our Salmon, write to respectfully urge the Washington Department of Fish and Wildlife (WDFW) to reconsider the means by which farmed Atlantic salmon and ready-to-transport Atlantic salmon smolts in Washington state hatcheries are to be tested for Piscine Reovirus (PRV).

In the aftermath of the Cypress Island escape last August, PRV was found in every fish that was tested for the virus. Even more shocking were the results of the genetic sequencing, which revealed the origin of the virus to be sub-genotype 1a, or of Norwegian origin, and clustered tightly with a PRV-isolate from Iceland.

This is the first time the Icelandic PRV-isolate has been found in Pacific waters, but it raises a critical question— if the eggs used in Cooke Aquaculture's Atlantic salmon hatchery in Rochester, WA come from Norwegian-born fish raised in Iceland, has the industry been allowed to import PRV-infected eggs and consequently plant infected fish into Washington's public waters?



According to [data disclosed via FOI by the Scottish Government](#) in September 2018, Scottish salmon farmers imported at least 16.5 million salmon eggs from Stofnfiskur in Iceland between January 2017 and July 2018 (information relating to Scottish Sea Farms was redacted leading to an appeal to the Scottish Information Commissioner in March 2019).

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Species	Stage	Number	Source Country	Source Company
11/01/2017	Tulloch Hatchery	The Scottish Salmon Company		Salmon	Ova	1,176,000	Iceland	Stofnfiskur
15/02/2017	Geocrab Hatchery	The Scottish Salmon Company		Salmon	Ova	876,000	Iceland	Stofnfiskur
23/02/2017	Geocrab Hatchery	The Scottish Salmon Company		Salmon	Ova	55,000	Iceland	Stofnfiskur
04/04/2017	Furnace Hatchery	Cooke Aquaculture (Freshwater) Ltd		Salmon	Ova	1,000,000	Iceland	Stofnfiskur
23/08/2017	Inst of Medical Sciences	University of Aberdeen		Salmon	Ova	3,000	Iceland	Stofnfiskur
04/10/2017	Girlsta Hatchery	Grieg Seafood Shetland Ltd (Hatchery)		Salmon	Ova	1,500,000	Iceland	Stofnfiskur
08/11/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater Ltd	Salmon	Ova	2,500,000	Iceland	Stofnfiskur
09/11/2017	Tulloch Hatchery	The Scottish Salmon Company		Salmon	Ova	2,714,250	Iceland	Stofnfiskur
22/11/2017	Kinlochmoidart Hatchery	The Scottish Salmon Company		Salmon	Ova	1,522,500	Iceland	Stofnfiskur
15/11/2017	Barvas Hatchery	The Scottish Salmon Company		Salmon	Ova	172,000	Iceland	Stofnfiskur
15/11/2017	Mingarry Hatchery	Hebridean Smolts Ltd	The Scottish Salmon Company	Salmon	Ova	918,750	Iceland	Stofnfiskur
01/02/2018	Tulloch Hatchery	The Scottish Salmon Company		Salmon	Ova	1,360,000	Iceland	Stofnfiskur
01/03/2018	Kinlochmoidart Hatchery	The Scottish Salmon Company		Salmon	Ova	615,000	Iceland	Stofnfiskur
01/03/2018	Ormsary Hatchery	Landcatch Natural Selection Ltd	The Scottish Salmon Company	Salmon	Ova	575,000	Iceland	Stofnfiskur
12/04/2018	The Roslin Institute	the Roslin Institute		Salmon	Ova	3,200	Iceland	Stofnfiskur
08/06/2018	Girlsta Hatchery	Grieg Seafood Shetland Ltd (Hatchery)		Salmon	Ova	1,500,000	Iceland	Stofnfiskur

Between January 2017 and March 2018, The Scottish Salmon Company imported 10.3 million ova from Iceland and Norway (including [ISA-infected AquaGen](#) and [PRV-infected Stofnfiskur](#)):

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Number	Source Country	Source Company
01/03/2017	Geocrab Hatchery	The Scottish Salmon Company		396,000	Norway	AquaGen AS
23/02/2017	Geocrab Hatchery	The Scottish Salmon Company		55,000	Iceland	Stofnfiskur
09/11/2017	Tulich Hatchery	The Scottish Salmon Company		2,714,250	Iceland	Stofnfiskur
22/11/2017	Kinlochmoidart Hatchery	The Scottish Salmon Company		1,522,500	Iceland	Stofnfiskur
15/11/2017	Barvas Hatchery	The Scottish Salmon Company		172,000	Iceland	Stofnfiskur
15/11/2017	Mingarry Hatchery	Hebridean Smolts Ltd	The Scottish Salmon Company	918,750	Iceland	Stofnfiskur
01/02/2018	Tulich Hatchery	The Scottish Salmon Company		1,360,000	Iceland	Stofnfiskur
30/01/2018	Barvas Hatchery	The Scottish Salmon Company		1,047,500	Norway	Salmobreed
30/01/2018	Amhuinnsuidhe Hatchery	The Scottish Salmon Company		400,000	Norway	Salmobreed
01/03/2018	Kinlochmoidart Hatchery	The Scottish Salmon Company		615,000	Iceland	Stofnfiskur
01/03/2018	Ormsary Hatchery	Landcatch Natural Selection Ltd	The Scottish Salmon Company	575,000	Iceland	Stofnfiskur
27/02/2018	Geocrab Hatchery	The Scottish Salmon Company		508,000	Norway	Salmobreed

Between January 2017 and February 2018, Cooke Aquaculture imported 7.6 million ova from Iceland, Ireland and Norway (including [ISA-infected AquaGen](#) and [PRV-infected Stofnfiskur](#)):

Date	Site of destination	Operator	Consignee on certificate (if different from operator)	Number	Source Country	Source Company
16/02/2017	Ardtaraig Hatchery	Cooke Aquaculture (Freshwater) Ltd		400,000	Norway	AquaGen AS
16/02/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater	1,400,000	Rep of Ireland	Marine Harvest Ireland
09/03/2017	Rysa Incubation Unit	Rysa Salmon Farm	Cooke Aquaculture Freshwater	170,000	Norway	AquaGen AS
04/04/2017	Furnace Hatchery	Cooke Aquaculture (Freshwater) Ltd		1,000,000	Iceland	Stofnfiskur
08/11/2017	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater	2,500,000	Iceland	Stofnfiskur
14/02/2018	Wester Fearn	Highland Salmon Company Ltd	Cooke Aquaculture Freshwater	700,000	Rep of Ireland	Marine Harvest Ireland
21/02/2018	Cairndow Hatchery	Lakeland (Cairndow) Ltd	Cooke Aquaculture Freshwater	1,100,000	Rep of Ireland	Marine Harvest Ireland
27/02/2018	Ardtaraig Hatchery	Cooke Aquaculture (Freshwater) Ltd		350,000	Norway	Marine Harvest Norway

How many salmon eggs imported into Scotland were tested for PRV and other viruses, pathogens and infectious diseases such as ISA?



[3]

From: Don Staniford [mailto:salmonfarmingkills@gmail.com]
Sent: 24 March 2019 07:22
To: 'ceu@scotland.gsi.gov.uk'
Cc: 'Neil.Purvis@gov.scot'; 'Helen.McGregor@gov.scot'
Subject: FOI re. PRV/HSMI testing, sampling & data since 1 January 2018

Please provide information on Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI) since 1 January 2018.

Please include data on sampling and testing for Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI) in farmed salmon, seawater and processing plant effluent (and any other sampling and testing).

Please specify how many samples of farmed salmon and water samples have been tested for Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI).

Please include any photos, emails, letters, copies of scientific papers and other information to and from the Marine Laboratory, salmon farming companies, veterinarians (e.g. Fish Vet Group), other Governments and other parties in relation to Piscine Reovirus (PRV) and Heart & Skeletal Muscle Inflammation (HSMI).

As context, please find enclosed below five cases where Piscine Reovirus (PRV) and/or Heart & Skeletal Muscle Inflammation (HSMI) were cited in the Scottish Government's [2018 FHI Case Information](#) (it seems that PRV was tested for in Case # 2018-0078 - The Scottish Salmon Company at Tarbert South - but may not have been tested for in all other cases):

1) [October to December 2018: Cases 20180392-20180509](#) (PDF [online here](#))

Scottish Sea Farms at Nevis C

Case No:	2018-0507	Date of visit:	11/10/2018			
Time spent on site:	8 Hrs	Main Inspector:	WJM			
Site No:	FS0546	Site Name:	Nevis C (Ardintigh)			
Business No:	FB0125	Business Name:	Scottish Sea Farms Ltd			
Case Types:	1 REP	2 DIA	3	4	5	6
Water Temp (°C):	12.9	Thermometer No:	Site	FHI 045 completed		
Observations:	Region:	HI	Water type:	S	CoGP MA	M-23
Dead/weak/abnormally behaving fish present?	<input checked="" type="checkbox"/>	If yes, see additional information/clinical score sheet.				
Clinical signs of disease observed?	<input checked="" type="checkbox"/>	If yes, see additional information/clinical score sheet.				
Gross pathology observed?	<input type="checkbox"/>	If yes, see additional information/clinical score sheet.				
Diagnostic samples taken?	<input checked="" type="checkbox"/>					

Additional Case Information:

FHI notified of mortality on site post H2O2 treatment. There had been a drop in feed activity and gill scores between 2-3 so decision was made to carry out H2O2 treatment.

Site mortalities for weeks 35 - 39 averaged 0.37 for whole site per week. Pens 4, 9, 10, 11 & 12 treated on 05/10/2018. Pens 2, 6 & 8 treated on 06/10/2018. Pen 1 treated on 10/10/2018 and remaining 2 pens (3 & 5) treated on 11/10/2018.

Mortalities for each pen from 05/10 - 11/10/2018 as follows:

1 - 1375, 2 - 102, 3 - 90, 4 - 56, 5 - 38, 6 - 14,892, 8 - 12,713, 9 - 18,920, 10 - 1675, 11 - 8081, 12 - 1139.

Site confused why only certain pens showed such a jump in mortalities post treatment while others didn't. Fish on site appeared in good health and feeding well on inspection. A few fish appeared slightly lethargic in pen 1 but had just been treated 24 hrs earlier. No external damage and no internal signs of disease. Gills on fish 1 slightly pale. Sea lice levels at 0.03/fish of all stages.

Histo samples taken on 27/09/2018 by FVG. Report noted variable gill disease ranging from mild to severe, suggesting previous AGD. Heart disease of an inflammatory nature from fish from pen 1. low grade HSMI possible. PCR samples collected 10/10/2018 by FVG.

2 batches of H2O2 used on 05/10/2018. Company having it checked for any potential issues.

Recent (last 4 wks) disease problems?	Y
If yes, detail:	AGD/ gill issues present.

Mortality Records	
1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Incinerated - on site
If other detail:	
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	Weeks 38 - 41: 0.08%, 0.31%, 10.45%, 11.14%
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	Pens 6 (14,892), 8 (12,713), 9 (18,920) & 11 (8,081) post H2O2 treatment 05/10 - 11/10/2018
6. Any other peaks in mortality during period checked?	N
If yes, detail:	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	FHI notified, site inspected.
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Case No: 2018-0507 Date of visit: 11/10/2018

Site No: FS0546 Inspector: WJM

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2 nd Insp
MG_IPN	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_VHS	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_IHN	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_ISA	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
MG_SAV	0/1	18/10/2018	WJM	22/10/2018	ALW	02/11/2018	WJM	SAE
AGD QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
P theridion QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
Salmon gill pox QPCR	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
Complex gill disease histo	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
AGD histo	1/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
gill pathology	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
post mortem changes	2/2	22/10/2018	ALW	22/10/2018	ALW	02/11/2018	WJM	SAE
PSFL	1/2	30/10/2018	WJM	31/10/2018	WJM	02/11/2018	WJM	SAE

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS No	FB0125	DATE OF VISIT	11/10/2018
SITE No	FS0546	SITE NAME	Nevis C (Ardintigh)
INSPECTOR	Warren Murray	CASE No	20180507

Section 1: Summary

The above site was inspected following a report from Scottish Sea Farms of a recent increase in mortalities. On inspection of the site, a small number of fish appeared lethargic. Two lethargic fish were removed for examination and subsequent diagnostic sampling.

Histopathology examination revealed mild to moderate complex gill pathology with mild to moderate proliferative gill hyperplasia along with evidence of amoebic cells (the causative agent of amoebic gill disease) and samples tested positive for *Paranucleospora theridion* (syn, *Desmozoon lepeophtherii*) by qPCR.

Due to the gill health issues reported on site, samples were screened for salmon gill poxvirus and *Paranucleospora theridion* (syn, *Desmozoon lepeophtherii*). Samples tested positive for all two pathogens.

Pseudomonas fluorescens was isolated. The light growth would not suggest bacteria to be the primary source of morbidity.

Section 2: Case Detail

Observations

The site was stocked with 237,723 2018 S1 Atlantic salmon at an average weight of 1.04 kg. Mortality rate had jumped from 0.31% in week 39 to 10.45% in week 40. The increase in mortality occurred post treatment but was confined to only four of the pens treated. Samples had been taken prior to the event with gill disease being confirmed.

R09

Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
Tel - 0131 244 3498 Fax - 0131 244 0944 Email - ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

During the inspection a number of lethargic Atlantic salmon were observed. Two lethargic fish were removed from the pens for further examination and subsequent diagnostic sampling. The gills of fish 1 and 2 were pale.

Bacteriology: Kidney and gill material from fish 1 and 2 were inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated :

- *Pseudomonas fluorescens* (F1 gills)

Virology: Tissue samples were tested for segments of nucleic acid indicative of the presence of the pathogens specified below using real-time PCR (QPCR).

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.36	35.02	34.47	34.76	Positive
F2	22.14	28.83	28.89	28.78	Positive

The samples tested negative for infectious haematopoietic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), infectious salmon anaemia virus (ISAV), salmonid alphavirus (SAV) and viral haemorrhagic septicaemia virus (VHSV).

Parasitology: Tissue samples were tested for segments of nucleic acid indicative of the presence of the parasites specified below using real-time PCR (QPCR).

Neoparamoeba perurans (AGD)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.36	35.26	35.34	35.84	Positive
F2	22.14	30.29	30.18	30.09	Positive

Paranucleospora theridion (syn, *Desmozoon lepeophtherii*)

R09

Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
 Tel - 0131 244 3498 Fax - 0131 244 0944 Email - ms.fishhealth@gov.scot
 Website - www.gov.scot/Topics/marine/science

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	21.36	30.02	30.66	30.61	Positive
F2	22.14	29.61	29.37	29.32	Positive

Histology: Tissue samples of gill, skin and skeletal muscle, heart, pyloric caeca, pancreas, hind gut, liver, spleen and kidney were taken from fish 1 and 2. The tissue samples were fixed in 10% neutral buffered formalin.

Histopathological examination revealed the following:

Gill: Mild to moderate multifocal interlamellar hyperplasia with spaces (lacunae) occasionally filled with cell debris (F1-F2), few lamellar thrombi, prominent goblet cells noted in all fish, small foci of cell necrosis on the hyperplastic plaques noted in F1 and several amoebic cells resembling *Neoparamoeba perurans* were noted in F2. Generalized epithelial lifting likely associated with post-mortem artefact.

2) [July to September 2018: Cases 20180276-20180338](#) (PDF [online here](#))

Scottish Sea Farms at Lismore North

Case No:	2018-0289	Date of visit:	11/09/2018
Time spent on site:	6 hours	Main Inspector:	AJW
Site No:	FS0745	Site Name:	Lismore North
Business No:	FB0125	Business Name:	Scottish Sea Farms Ltd
Case Types:	1 ECI	2 CNI	3 SLI
	4 VMD	5 DIA	6
Water Temp (°C):	13.8	Thermometer No:	T146
		FHI 045 completed	
Observations:	Region: ST	Water type: S	CoGP MA M-36
Dead/weak/abnormally behaving fish present?	<input checked="" type="checkbox"/>	If yes, see additional information/clinical score sheet.	
Clinical signs of disease observed?	<input checked="" type="checkbox"/>	If yes, see additional information/clinical score sheet.	
Gross pathology observed?	<input checked="" type="checkbox"/>	If yes, see additional information/clinical score sheet.	
Diagnostic samples taken?	<input checked="" type="checkbox"/>		

Additional Case Information:

Cleaner fish on site; Baleen wrasse from Otterferry and Machrihanish. Vaccination ridgeway biological

Morts generally incinerated on site but recent increase in morts has required collection by Billy Bowie for disposal.

Peak in morts; 5/9/18 - 1421 morts for day/site - wb/3/9/18 - 6904 morts/week - 3.08%

Cages 10, 12 and 14 worst effected by morts and loss of apatite. Over summer morts for site had been about 200/site/week. Increased; 3/9/18;739, 4/9;882, 5/9; 1421, 6/9;1341, 7/9;1267, 8/9;1047, 9/9 946 10/9; 1047

Gill scores have been high but are improving. - increase thought to be in part due to net cleaning. Currently scores are 1 or 2. vet report;AGD, Branchiomonas, Paranucleospora theridion, salmon gill pox; complex gill pathology

moritella toxemia - report 4/9/18 Piscine reovirus (HSMI) in report 4/9/18 - CMS negative - SAV negative - IPN negative; results from MS via fish vet group.

SLICE for caligus, finished 2 days ago. 31/8-8/9. 500 degree day withdrawal.

Previous crop had issues with lice. This crop wrasse on site. 4 slice treatments since input and lice skirts. Getting more wrasse from Machrihanish this month. Lice levels current 1.4 adult female. Just treated with slice. Caligus 1.83 average. 10/9/18.

Results of Surveillance	
1. Has any animal health surveillance been carried out by, or on behalf of, the business?	<input type="checkbox"/> Y
2. If yes, are results available for inspection?	<input type="checkbox"/> Y
3. Any significant results?	<input type="checkbox"/> Y
If yes, detail (if not detailed under recent disease problems).	
complex gill issues and HSMI	
Records checked between:	29/11/16- 11/9/18

3) [April - June 2018: Cases 20180166-20180240](#) (PDF [online here](#) - p60)

The Scottish Salmon Company at Ardcastle Bay

Case No:	2018-0193	Date of visit:	23/05/2018
Time spent on site:	5 hrs	Main Inspector:	WJM
Site No:	FS0818	Site Name:	Ardcastle Bay
Business No:	FB0169	Business Name:	The Scottish Salmon Company
Case Types:	1 <input type="checkbox"/> ECI	2 <input type="checkbox"/> CNI	3 <input type="checkbox"/> SLI
	4 <input type="checkbox"/> VMD	5 <input type="checkbox"/>	6 <input type="checkbox"/>
Water Temp (°C):	9.9	Thermometer No:	Site
		FHI 045 completed	<input type="checkbox"/>
Observations:	Region: ST	Water type: S	CoGP MA: M-42
Dead/weak/abnormally behaving fish present?	<input type="checkbox"/> Y	If yes, see additional information/clinical score sheet.	
Clinical signs of disease observed?	<input type="checkbox"/> N	If yes, see additional information/clinical score sheet.	
Gross pathology observed?	<input type="checkbox"/> N	If yes, see additional information/clinical score sheet.	
Diagnostic samples taken?	<input type="checkbox"/> N		

Additional Case Information:

Site stocked September 2017 from Russel Burn. Mortalities staying below 0.05%/week for whole site. Slight increase in mortalities during weeks 13 & 14 2018, this was down to increased seal activity. Extra anti-predator measures deployed and numbers quickly reduced. Sea lice levels have been below CoGP criteria since input. Lumpfish to be put onto site June 2018.

Recent veterinary reports suggest signs of pancreas disease and pcr results positive for piscine reovirus but no increase in mortalities. Fish sampled for VMD looked healthy.

Results of Surveillance	
1. Has any animal health surveillance been carried out by, or on behalf of, the business?	<input type="checkbox"/> Y
2. If yes, are results available for inspection?	<input type="checkbox"/> Y
3. Any significant results?	<input type="checkbox"/> Y
If yes, detail (if not detailed under recent disease problems).	
Symptoms suggestive of chronic pancreas disease. PCR positive for PRV	
Records checked between:	29/01/2015 - 23/05/2018

4) [April - June 2018: Cases 20180166-20180240](#) (PDF [online here](#))

Loch Duart at Lochmaddy:

Case No:	2018-0219		Date of visit:	06/06/2018	
Time spent on site:	4 hours		Main Inspector:	JET	
Site No:	FS0853	Site Name:	Lochmaddy		
Business No:	FB0398	Business Name:	Loch Duart Ltd		
Case Types:	1 REP	2 DIA	3	4	5
Water Temp (°C):	10	Thermometer No:	T147	FHI 045 completed	
Observations:	Region:	WI	Water type:	S	CoGP MA W-12
Dead/weak/abnormally behaving fish present?	<input checked="" type="checkbox"/>	Y If yes, see additional information/clinical score sheet.			
Clinical signs of disease observed?	<input checked="" type="checkbox"/>	Y If yes, see additional information/clinical score sheet.			
Gross pathology observed?	<input checked="" type="checkbox"/>	Y If yes, see additional information/clinical score sheet.			
Diagnostic samples taken?	<input checked="" type="checkbox"/>	Y			

Additional Case Information:

Locally caught wild wrasse on site
 No movements on or off site since last inspection.
 Fish graded 31/05 and 01/06. No increased mortality following grade.
 During inspection a number of lethargic fish were observed, 5 fish were removed for diagnostic sampling.
 Fish sampled for VMD appeared healthy.

Recent (last 4 wks) disease problems?	<input checked="" type="checkbox"/>
If yes, detail:	PD (SAV 4) - first confirmed on site February 2018

Mortality Records	
1. Mortality records available for inspection?	<input checked="" type="checkbox"/> Y
2. How are mortalities disposed of?	Other (detail)
If other detail:	White shore cockles
3. Mortality records complete and correctly entered?	<input checked="" type="checkbox"/> Y
4. Recent mortality (last 4 wks):	w/b 07/05 - 6707 (1.76%), w/b 14/05 - 2056 (0.58%), w/b 21/05 - 3664 (1.09%), w/b 28/05 - 932 (0.32%)
5. Evidence of recent increased/atypical mortalities?	<input checked="" type="checkbox"/> Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	See above details. PD thought to be main cause of increased mortality.
6. Any other peaks in mortality during period checked?	<input type="checkbox"/> N
If yes, detail:	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	<input checked="" type="checkbox"/> Y
If yes, detail action:	FVG visited site and took samples
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	<input checked="" type="checkbox"/> Y

Results of Surveillance	
1. Has any animal health surveillance been carried out by, or on behalf of, the business?	<input type="checkbox"/> Y
2. If yes, are results available for inspection?	<input type="checkbox"/> Y
3. Any significant results?	<input type="checkbox"/> Y
If yes, detail (if not detailed under recent disease problems)	PD (SAV 4) confirmed on site, HSMI was also identified via histology in March 2018, but hasn't been observed since.
Records checked between:	31/08/2017 - 06/06/2018

5) [January to March 2018: Cases 20180064-20180100](#) (PDF [online here](#) - p98-117)

The Scottish Salmon Company at Tarbert South

Case No:	2018-0078	Date of visit:	21/03/2018			
Time spent on site:	6 hours	Main Inspector:	JET			
Site No:	FS0767	Site Name:	Tarbert South			
Business No:	FB0169	Business Name:	The Scottish Salmon Company			
Case Types:	1 <input type="checkbox"/> ECI	2 <input type="checkbox"/> CNI	3 <input type="checkbox"/> SLI	4 <input type="checkbox"/> VMD	5 <input type="checkbox"/> DIA	6 <input type="checkbox"/>
Water Temp (°C):	10	Thermometer No:	T147	FHI 045 completed	<input type="checkbox"/>	
Observations:	Region:	ST	Water type:	S	CoGP MA	M-42
Dead/weak/abnormally behaving fish present?	<input checked="" type="checkbox"/> Y	If yes, see additional information/clinical score sheet.				
Clinical signs of disease observed?	<input checked="" type="checkbox"/> Y	If yes, see additional information/clinical score sheet.				
Gross pathology observed?	<input checked="" type="checkbox"/> Y	If yes, see additional information/clinical score sheet.				
Diagnostic samples taken?	<input type="checkbox"/> Y					

Additional Case Information:

Harvesting strategy - live haul to Ardyne harvest station, then dead haul to Cairndow processing plant.
 Adult female sea lice numbers below suggested criteria for treatment throughout this production cycle, prophylactic slice treatments carried out 04/12/2017 and 05/02/2018.
 Input of wild caught wrasse due in April 2018.
 Several moribund fish with lesions on flank observed during inspection of cages. 5 fish removed and diagnostic samples taken.
 Fish sampled for VMD appeared healthy.

Additional comments:

F3 - anterior ventral lesion through which the heart was exposed. F4 - Heart was not identified within cavity, no heart sample taken. Enlarged gall bladder observed underneath liver, see attached photos.

Photos [online here](#) - including:



F1-3. F3 had anterior ventral lesion through which the heart was exposed.



Read more via "[EXPOSED: Gruesome Photos of Deformed & Diseased Scottish Salmon](#)"

Case No: 2018-0078 Date of visit: 21/03/2018
 Site No: FS0767 Inspector: JET

Results Summary	Freq.	Date of Notification						
		Database	Insp.	Phone	Insp.	Writing	Insp.	2 nd Insp.
MG IHN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG IPN	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG ISA	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG SAV	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG VHS	0/1	28/03/2018	JET	28/03/2018	JET	11/04/2018	JET	ALW
MG PMV	0/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
MG PRV	1/1	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST PRV	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_SULC	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_SKIN	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST HPAT	1/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST ADHE	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST_PMCH	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
HIST LPAT	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
BACT_VVIS	5/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW
BACT_VSPE	4/5	06/04/2018	JET	06/04/2018	JET	11/04/2018	JET	ALW

marine scotland
science



Scottish Government
Riaghaltas na h-Alba
gov.scot

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 The Scottish Salmon Company
 1 Smithy Lane
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 PA31 8TA
 ██████████

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	DATE OF VISIT	21/03/2018
SITE NO	FS0767	SITE NAME	Tarbert South
INSPECTOR	Joe Triscott	CASE NO	20180078

Section 1: Summary

During a routine inspection of the above site, several moribund fish were observed. Five fish were removed for further examination and subsequent diagnostic sampling.

Histopathology examination revealed dermatitis, ulcers, marked presence of bacteria and skeletal muscle haemorrhagic necrosis (likely associated with *Moritella* sp.). *Moritella viscosa* was isolated by bacteriology testing from kidney and gill material of 5/5 fish and lesion material of 3/4 fish. *Moritella viscosa* is a known fish pathogen and the level and purity of growth, along with the histopathology observations would suggest that it is implicated in fish morbidity.

Fish 5 also showed marked myocarditis and red skeletal myositis resembling heart and skeletal muscle inflammation (HSMI) and the presence of the causative agent, piscine reovirus (PRV), was confirmed by real-time PCR (QPCR). Mild hepatic degeneration and necrosis also noted. Fish were generally poor doing.

Section 2: Case Detail

Observations

During a routine inspection, several lethargic and moribund fish were observed across all stocked cages. The majority of these fish also had visible lesions. Five moribund fish were removed for further examination and subsequent diagnostic sampling.

There had been no recent significant or unexplained mortality recorded at the site, inspection of the site mortality records showed 0.2% mortality for the previous four weeks. Those mortalities had been attributed to poor doing fish.

R09

Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
Tel - 0131 244 3498 Fax - 01224 295620 Email - ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

External examination of the fish showed lesions on the flanks of fish 1, 3 and 4. Fish 3 also had a lesion on the ventral surface through which the heart was exposed. Fish 5 had a lesion on the head. The eyes of fish 2 were exophthalmic.

Internal examination showed clear ascites present in fish 1. Petechial haemorrhaging of the liver was observed in fish 2 and 4, moderate liver tissue breakdown was apparent in fish 3 and 4. The kidney tissue of fish 2 and 5 appeared slightly liquefied. The gall bladder of fish 4 was enlarged.

Results

Bacteriology: Kidney and gill material from fish 1-5 and lesion material from fish 1, 3, 4 and 5 were inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated:

Moritella viscosa (gill and kidney of fish 1-5, lesion of fish 3-5)

Vibrio sp. (gill of fish 1 and 2, kidney of fish 1-3, lesion of fish 1 and 4)

From the tests conducted, we do not have evidence of resistance to amoxicillin, oxytetracycline, cotrimoxazole or florfenicol for *Moritella viscosa*.

Virology: Tissue samples were tested for segments of nucleic acid indicative of the presence of the pathogens specified below using real-time PCR (QPCR).

Piscine reovirus (PRV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	18.18	26.13	25.93	26.06	Positive

Histology: Tissue samples of gill, skin and skeletal muscle, heart, pyloric caeca, pancreas, hind gut, liver, spleen and kidney were taken from fish 1-5. The tissue samples were fixed in 10% neutral buffered formalin.

Histopathological examination revealed the following:

Gill: Some lamellar congestion and lamellar epithelial hypertrophy (F1 and F4), mild to moderate, focal to diffuse presence of aneurysmal dilation/telangiectasia (F1-F5) and generalized epithelial lifting (likely post mortem artefact).

Skin & Muscle: Partial to absence of epidermal and dermal layer (F1, F3-F5), mild dermal oedema with mild leucocyte infiltration and presence of mixed bacteria that stained gram negative (F1, F3-F5), haemorrhagic necrosis of skeletal muscle (F1, F3-F5). F5 also showed marked red skeletal muscle degeneration and infiltration of inflammatory cells (myositis).

Heart: Moderate pericarditis (F5) and marked myocardial degeneration and cell infiltration of the compact and spongy layer of ventricle (F5).

Gut and pyloric caeca: Adipose tissue showed fibrous adhesions likely associated with vaccine administration (F1-F5), mild to moderate cell sloughing (F1-F5) (likely post mortem artefact).

Pancreas: Fibrous adhesions associated with peripancreatic tissue (likely vaccine administration).

Liver: Mild to moderate multifocal sinusoidal congestion (F2, F4 and F5) surrounded by some melanin deposits (F2), one small foci of hepatocyte necrosis (F4) and marked presence of hepatic apoptotic cells and pyknotic nuclei noted in F5.

Kidney: Slight increase of melanomacrophages aggregates (MMA) (F1), few renal tubules with dilated lumen and few shrunken glomeruli (F1).

Spleen: Slightly congested (F1, F3 and F5).

Signed:



Date: 12/04/2018

Please consider this a request for information under the relevant Freedom of Information and Environmental Information Regulations including both the Freedom of Information (Scotland) Act 2002 and the Environmental Information (Scotland) Regulations 2004 (as well as any other new or other regulations which may be appropriate).

Please provide this information electronically via email.

Please acknowledge receipt of this FOI request.

Many thanks and I look forward to a response shortly.

Best fishes,

Don

Don Staniford

Director, Scottish Salmon Watch: <https://scottishsalmonwatch.org/>

Scottish Scamon: <https://scottishscamon.co.uk/>

Read my blog via <http://donstaniford.typepad.com/my-blog>

Please donate via <https://scottishsalmonwatch.org/donate>

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