Scottish Salmon Watch, 30 September 2019

Sick Scottish Salmon
- Are Farms Spreading Infectious Diseases, Pathogens & Viruses to Wild Fish?

SCOTTISH SALMON WATCH DISEASES

Sickening photographs slipped out by the Scottish Government's Fish Health Inspectorate in August & September show wild salmon caught in rivers across Scotland infected with diseases, pathogens, fungus, bacteria and viruses.

In June, the Scottish Government's Fish Health Inspectorate reported that it was "responding to reports of wild adult salmon displaying skin damage such as reddening (petechial haemorrhaging) around the fins and belly (ventral surface), inflamed (swollen/red) vent and associated fungal infection".

Photos published online reveal wild salmon caught on the Rivers Dee, Forss, Garry, Conon, Cassley and Helmsdale with Salmon Gill Poxvirus, *Yersinia ruckeri* (Enteric Redmouth) *Flavobacterium psychrophilium*, *Aeromonas sp*. (Furunculosis), *Candidatus branchiomonas cysticola*, haemorrhaging, lesions, fungus, anaemia and cardiomyopathy (see Appendix).

The killer question is whether the infectious diseases, pathogens and viruses in wild salmon are being spread by Scotland's salmon farms (where similar diseases have been reported and where 2018 production is predicted to fall 21% due to diseases problems)?

Scottish Salmon Watch has written today (30 September 2019) to Scottish Ministers and Dr. John Goodlad (as Chair of the Scottish Government's 'Salmon Interactions' Working Group) calling for an urgent investigation into diseases spread by salmon farms to wild fish populations as well as immediate testing of salmon farming effluents for infectious diseases, pathogens, bacteria and viruses (as follow up to a letter to Scottish Ministers in April 2019 and a letter to Scottish Ministers in May 2018).

"Scotland's factory salmon farms are incubators for a host of deadly diseases, parasites, pathogens, bacteria and viruses," said Don Staniford, Director of Scottish Salmon Watch. "The latest Fish Health Inspectorate data is damning with Pancreas Disease, Amoebic Gill Disease, Cardiomyopathy Syndrome, Salmon Gill Poxvirus and Anaemia decimating salmon farms. Photographic evidence and post-mortem reports now reveal some of the same pathogens, viruses, diseases and haemorrhaging in wild salmon caught in rivers across Scotland. Scottish salmon farming is far from the picture of health portrayed in glossy marketing and is instead jeopardising the health of wild fish. When will the Scottish Government stop protecting the Norwegian-owned salmon farming industry from public scrutiny and start protecting Scotland's iconic wild salmon?"

Read Scottish Salmon Watch's letter to Scottish Ministers (30 September) online here

Rivers of Diseased Wild Salmon (Forss, Garry, Dee, Conon, Cassley & Helmsdale)

Wild salmon caught displaying heavy fungal-growth on the River Forss in Highland region near Caithness in July 2019 tested positive for *Candidatus branchiomonas cysticola*, Salmon Gill Poxvirus, *Aeromonas spp*., *Pseudomonas florescence and Saprolegnia sp*.

Wild salmon caught on the River Garry in Tayside in June 2019 displayed "lesions/ulcers across approximately 20% of its body" with parisitology revealed "a heavy infestation of *Anisakis simplex*". A Fish Health Inspectorate report dated 13 August 2019 stated that the wild salmon "was displaying similar clinical signs of disease that had been reported in other rivers across Scotland". "External haemorrhaging and lesions were observed on the throat, ventrum, base of fins and flank of the fish," continued the report. "Internally, the heart appeared anaemic."

A wild salmon caught on the River Dee near Potarch in Grampian in June 2019 showed "haemorrhaging on the ventral surface". "Histopathology examination revealed mild mytosis and mild cardiomyopathy," stated the Fish Health Inspectorate report dated 2 August 2019. "The kidney showed come cysts-like structures. Parasites collected from the body cavity included *Anisakis sp*. and *Diphyllobothrium latum*. The vent showed heavy infestation of *Anisakis simplex*."

"Due to recent concerns regarding wild Atlantic salmon displaying similar clinical signs the decision was taken to collect samples," continued the FHI report. Externally the fish showed haemorrhaging on the ventral surface and had a small area of possible physical damage on the flank with what looked to be the early stages of a developing lesion."

A wild salmon caught in the River Conon in Highland region near Inverness in June 2019 showed "lesions and ulcers on the ventral surface".

"This was the first fish caught with signs of disease on the river and no mortalities have been reported prior to this inspection," stated the Fish Health Inspectorate report dated 1 August 2019. "External examination showed there to be slight haemorrhaging on the ventral surface and gills were slightly pale but no other visible signs. Internally, pectechial haemorrhaging was noted of the liver and lack of fat in the pyloric caeca. Haemorrhaging was also noted of the body wall and swim bladder."

A wild salmon caught on the River Cassley in the Kyle of Sutherland in June 2019 showed "severe lesions, haemorrhaging" and was "covered in patches of fungus".

The Fish Health Inspectorate reported dated 1 August 2019 detailed positive tests for cutaneous saprolegniasis and Salmon Gill Poxvirus. "*Yersinia ruckeri*, *Flavobacterium psychrophilium* and *Aeromonas sp*. were isolated," stated the report. "*Yersinia ruckeri* and *Flavobacterium psychrophilium* are known to be the causative agents of enteric redmouth disease (ERDM) and rainbow trout fry syndrome (RTFS). *Aeromonas sp*. and *Saprolegnia sp*. are more commonly known as opportunity pathogens."

Fish 1 tested positive by PCR (QPCR) for the following:

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	24.86	36.76	36.12	37.66	Positive

Bailiffs recovered 50-60 dead and moribund wild salmon on the River Helmsdale in Highland region in June 2019 "with evidence of a fungus-like infection and haemorrhaging/physical damage on the belly".

Histopathology revealed mild myositis, nephritis, marked bacterial necrotising splenitis and minimal myocarditis. "Parasitology examination identified the presence of cestode postlarvae of the species *Hepatoxylon squali*," stated the Fish Health Inspectorate report dated 18 July 2019. "*Yersinia ruckeri, Aeromonas spp., Pseudomonas fluorescens* and *Saprolegnia sp*. were all identified."

Fisheries Management Scotland [report on their web-site]:

Fisheries Management Scotland

ABOUT POLICY EVENTS PUBLICATIONS CAREERS NEWS Home / Reports of skin damage in wild Atlantic salmon

Reports of skin damage in wild Atlantic salmon

There are reports of small numbers of fish exhibiting signs of bleeding and/or ulceration being caught in Norway, Ireland and Scotland. These symptoms have been reported as being mainly along the area on the belly of the fish between the head and the tail. At the moment what is causing this trauma is unknown. Fisheries Management Scotland are liaising closely with Marine Scotland and samples have now been taken by the Fish Health Inspectorate. If you encounter a fish exhibiting these symptoms please contact the Fish Health Inspectorate immediately – see details below. If possible, the fish should be kept alive until the duty inspector has provided advice as to the appropriate course of action.

Please read the latest advice on the Fish Health Inspectorate web page.

Example of a fish caught in Norway

The Scottish Government [reported in June 2019]():

Scottish Government
Riaghaltas na h-Alba
gov.scot

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Reporting Skin Damage in Wild Atlantic Salmon - 17 June 2019

Scottish Government's Fish Health Inspectorate (FHI) has been responding to reports of wild adult salmon displaying skin damage such as reddening (petechial haemorrhaging) around the fins and belly (ventral surface), inflamed (swollen/red) vent and associated fungal infection

Further information will be provided when the laboratory results are available from fish sampled across a number of Scottish rivers.

In the meantime, observations of adult salmon demonstrating clinical signs of infection or damage should be notified to the local District Salmon Fishery Board (DSFB) and the FHI.

The Spey Fishery Board [reported in June 2019]():

HOME | SPEY FISHERY BOARD | SPEY FOUNDATION | THE RIVER | MANAGING THE RIVER

Salmon skin damage and disease 2019

Posted on June 10, 2019 by Brian Shaw

Over the last week or two many reports of disease in wild adult salmon populations have been reported. These reports have been widespread ranging from Scotland to Scandinavian. The common factor is death through fungal infection (Saprolegnia). Nothing new there you may say but the difference this year is the focus of the fungal infection along the underside of the fish. There is evidence from northern Scottish rivers that the fungal infection is preceded by what looks like a rash on the underside of the fish with associated haemorrhaging. In the rivers with the worst incidences there have been large losses from fungal infection, whilst in others there is no fungal infection, yet.

Fresh run salmon appear to be entering rivers carrying rash like marks on their underside, leaving them susceptible to fungal infection. If fish with this skin damage become infected with fungus death occurs quickly. It also looks as if only the recent arrivals have been affected with the no sign of it in the older fish.

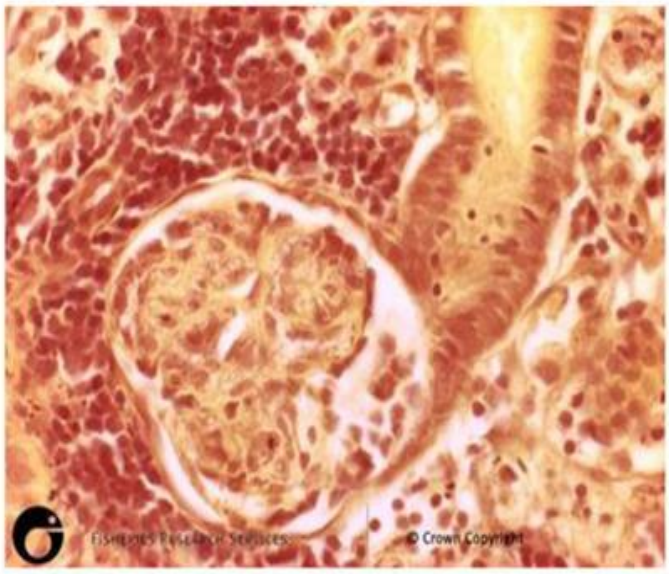
Helmsdale fish with fungal infection along the underside

Here's wild salmon from Norway riddled with disease [reported in June 2019]():

Diseases, Parasites & Viruses in Wild Salmon in Scotland - Similar to Farmed Salmon?

Enteric Redmouth (Yersinosis) is in the same family as the Black Death plague and has plagued salmon farms and hatcheries in Scotland. A report - 'The State of Scottish Salmon Farming in 2018' - sourced from the Scottish Government's Fish Health Inspectorate's 'Case Information' detailed problems with Enteric Redmouth (Yersinosis) at The Scottish Salmon Company's hatchery in Kinlochmoidart (a facility exposed as causing fungus problems downstream in the River Moidart).

- 140,000+ morts due to Enteric Redmouth (Yersinosis) at The Scottish Salmon Company's Kinlochmoidart Hatchery in June and July 2018 and 22,000 morts in September and October 2018 with "Formalin flushed through a number of tanks for Costia"



- Enteric Redmouth Disease (Yersinosis) diagnosed at The Scottish Salmon Company's site at Gob a Bharra in Loch Fyne in October 2017 leading to "increased grumbling morts on input" with up to 3,900 morts per week for 10 weeks post input (sourced from The Scottish Salmon Company's Kinlochmoidart Hatchery)

Yersinia ruckeri was also reported in 2010 at freshwater facilities operated by Mowi (then called Marine Harvest).

Business	Site	Result
Marine Harvest (Scotland) Ltd	Loch Lochy	Yersinia ruckeri
Marine Harvest (Scotland) Ltd	Loch Lochy	Saprolegnia species

Business	Site	Result
Marine Harvest (Scotland) Ltd	Glenfinnan	Yersinia ruckeri
Marine Harvest (Scotland) Ltd	Glenfinnan	Epitheliocystis

An analysis of diseases reported on Scottish salmon farms between 1980 and 2006 revealed that Yersinia ruckeri was one of the most common disease agents on Scottish salmon farms along with Aeromonas salmonicida (Furunculosis):

Types of Disease Identified on Scottish Salmon Farms 1980 - 2006

Over 70 different diseases and disease agents were reported on Scottish salmon farms

The top 5 (by # of occurrence) since 1980 are:

- Vibrio spp (occurred in 21 years)
- Pseudomonas spp (19 years)
- Aeromonas salmoncida (17 years)
- Infectious Pancreatic Necrosis (17 years)
- Yersinia ruckeri (12 years)

Aeromonas salmonicida (Furunculosis) induces septicaemia followed in chronic cases, by the appearance of boil like inflammatory lesions (or furuncles) and death. It was imported into Norway in 1985 via infected smolts from a salmon farm in Scotland infecting over 500 salmon farms and rivers in Norway.

Download data on diseases on Scottish salmon farms obtained via FOI online here and online here

Cardiomyopathy Syndrome was reported on Scottish salmon farms for the first time in 2000 with mass mortalities on salmon farms continuing throughout 2019 according to the latest data from the Scottish Government's Fish Health Inspectorate.

Candidatus Branchiomonas cysticola is a common agent of Ephitheliocystis (caused by Chlamydia) and Proliferative Gill Inflammation which has plagued salmon farms in Scotland and in Norway.

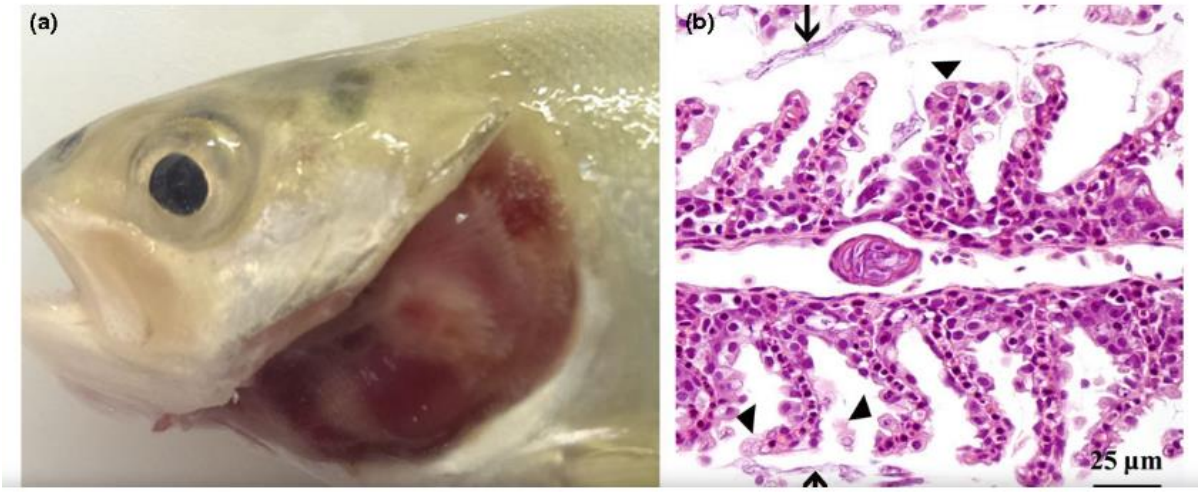


Figure 2 Gills of Atlantic salmon from farm C all infected with salmon gill poxvirus in addition to Ca. Branchiomonas cysticola, Saprolegnia spp. and 'Costia'. Sections of gills (b-g) and spleen (h). (a) The operculum… Continue Reading

Published in Journal of fish diseases 2017

Salmon gill poxvirus, a recently characterized infectious agent of multifactorial gill disease in freshwater- and seawater-reared Atlantic salmon.

Mona C Gjessing, Even Thoen, Torstein Tengs, Svenn Amund Skotheim, O B Dale

Salmon Gill Poxvirus (SPGV) "can be a common denominator in widely different multifactorial gill diseases" and " is more widespread than previously reported". According to the University of Stirling, there is a "widespread prevalence of SGPV in farmed salmon" and "SGPV has been detected by PCR in fish of hatcheries on the Scottish West Coast". A report - 'The State of Scottish Salmon Farming in 2018' - sourced from the Scottish Government's Fish Health Inspectorate's 'Case Information' detailed problems with SGPV at various salmon farms in 2018:

- 46,000 morts at The Scottish Salmon Company's site at Vuia Mor in Loch Roag in July and August 2018 due to anaemia and "high lice load" (Salmonid Alphavirus, Anaemia, Infectious Pancreatic Necrosis Virus, Amoebic Gill Disease and Salmon Gill Poxvirus were all reported along with "cranial lice damage")

- 50,000+ morts at the Scottish Sea Farms Loch Nevis salmon farm in October and November 2018 due to Salmon Gill Poxvirus and "complex gill pathology" ("Heart disease of an inflammatory nature from fish pen 1. low grade Heart & Skeletal Muscle Inflammation possible")

- 10,000+ morts at The Scottish Salmon Company's site in Outer Eport in July 2018 following a Hydrogen Peroxide treatment and "high lice load" (Salmonid Alphavirus, Amoebic Gill Disease and Salmon Gill Poxvirus were all reported along with fish with "damaged/missing eyes" and "all fish had very high Caligus numbers")

- 27,000 morts (46.7% of stock) at the Wester Ross Fisheries site at Ardessie A in Little Loch Broom in August 2018 due to Amoebic Gill Disease, Salmonid Alphavirus (Pancreas Disease) and Salmon Gill Poxvirus

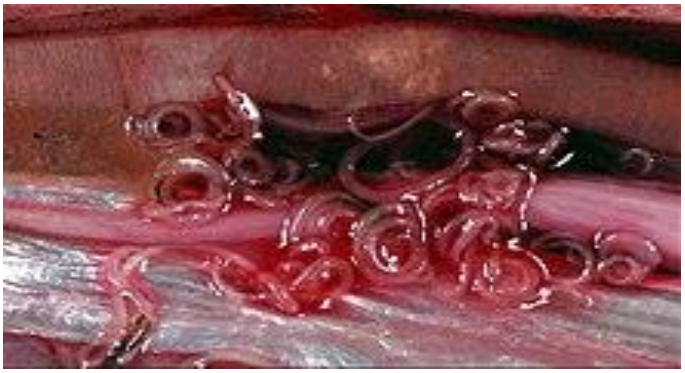
- 37,000 morts (39.2% of stock) at the Wester Ross Fisheries site at Ardessie B in Little Loch Broom in August 2018 due to Amoebic Gill Disease, Salmonid Alphavirus (Pancreas Disease) and Salmon Gill Poxvirus

- 15,000+ morts at The Scottish Salmon Company's Vacasay site in Loch Roag in August 2018 due to high lice loads, Amoebic Gill Disease, Infectious Pancreatic Necrosis virus, Salmon Gill Poxvirus and Epitheliocystis ("all fish had lice damage to the head area" stated the report)

- 36,000+ morts at Grieg Seafood's Linga (Setterness) site in August and September 2018 due to Cardiomyopathy Syndrome, Gill Anaemia, Salmon Gill Poxvirus, Vibrio and Infectious Pancreatic Necrosis virus and Paranucleospora

- 13,699 morts at Marine Harvest's Grey Horse Channel site between December 2017 and March 2018 due to Pasteurella skyensis and Amoebic Gill Disease (Candidatus Branchimonas cysticola, Candidatus Syngnamydia salmonis, Salmon Gill Poxvirus, Paranucleospora theridon, Vibrio and Moritella viscoca also reported)

A briefing on Anisakis was issued by the Scottish Salmon Producers Organisation in 2017 claimed that "research by the Food Standards Agency shows there is no risk of parasites from farmed salmon".



Hard Evidence: Disease-Ridden Scottish Salmon Farms

Information - including photos obtained via Freedom of Information from the Scottish Government - on infectious diseases, pathogens, bacteria and viruses in Scottish farmed salmon has been reported extensively.

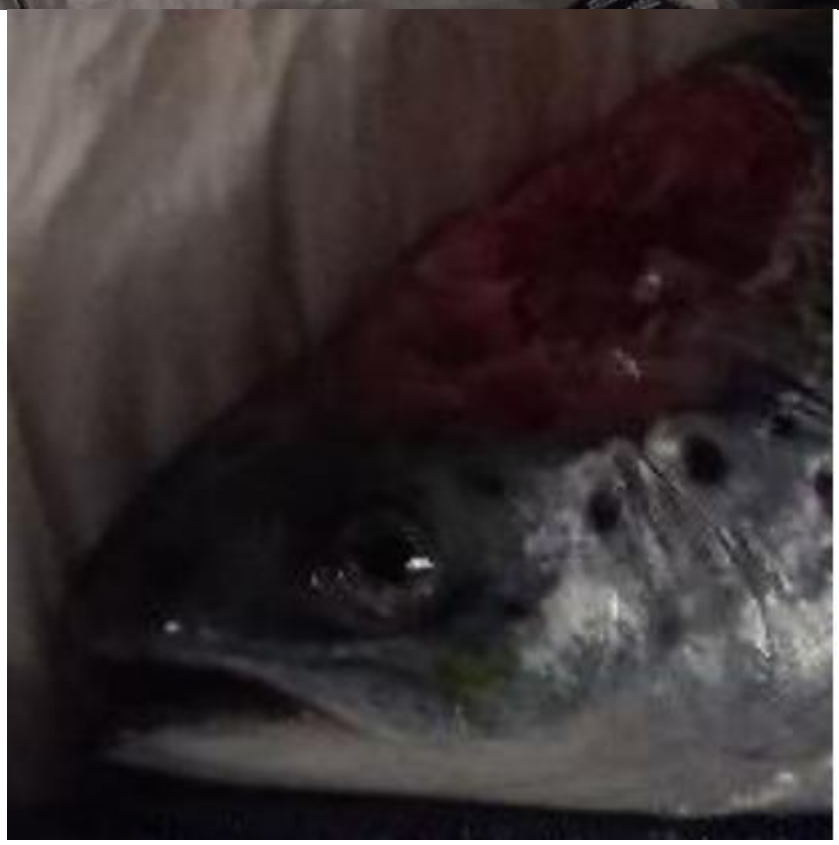
Read more details via:
Press Release: "New report set to reveal drastic fall in salmon farming production in Scotland"
Video Nasty: Mowi's Dead Salmon at 'Bay of the Dead Heads'
Mass Mortalities & Disease Ravage Scottish Salmon Farms (& It's Going to Get Worse!)
Welfare Abuse at Scottish Salmon Farms - Why No Legal Enforcement Or Prosecutions?

The Severely Damaged Scottish Salmon Company - For Sale Now!
Meet Pop-Eye the Scottish Salmon - Tortured by an Optilicer!
Cardiac Disease Arrests Mowi in Kingairloch
Mowi's Welfare Nightmare on Rum - "blind", "physical damage", "anorexic" & over 40,000 dead fish!
Scottish Salmon's Mort Mountain Piles Ever Higher in 2019
Mmmm Blind Scottish Salmon with Boils, Anyone?
Unnecessary Suffering & Cruel Operations at Mowi's at Bagh Dail nan Ceann salmon farm (Sound of Jura)
Shocking Video Footage from Mowi's 'Bay of the Dead Heads' (Bagh Dail nan Ceann)
'Sick' salmon film prompts government probe into Scottish fish farm
Frankenfish Video - The Ugly Face of Lousy Scottish Salmon
Mass deaths: nine million fish killed by diseases at Scottish salmon farms
Disease-ridden Scottish Salmon
Mowi's Disease-Ridden Mortalities - 1.6 million+ in 101 incidents (2017-2018)
New Report - "The State of Scottish Salmon Farming in 2018"
Sick salmon at Scottish fish farm revealed on film
Salmon firms bid to block diseased photos
Hard Evidence: Photos of Diseased & Deformed Scottish Salmon
Legal Complaint Vs Breaches of Animal Health & Welfare (Scotland) Act
Horror photos of farmed salmon spark legal threat
EXPOSED: Gruesome Photos of Deformed & Diseased Scottish Salmon
EXPOSED: Early Harvesting at Scottish Salmon Farms Due to Disease & Mortalities
Hard Evidence: Dossier of Data on Lice, Diseases & Mortalities at Scottish Salmon Farms

A report - "The State of Scottish Salmon Farming in 2018" - published in March 2019 collated 'Case Information' published by the Scottish Government's Fish Health Inspectorate:

The following were reported on Scottish salmon farms during 2018: Piscine reovirus (Heart & Skeletal Muscle Inflammation), Salmon gill poxvirus, Piscine myocarditis virus (Cardiomyopathy Syndrome), Neoparamoeba perurans (Amoebic Gill Disease), Epitheliocystis, Proliferative Gill Disease, Enteric Redmouth (Yersinosis), Paranucleospora theridon, Infectious Pancreatic Necrosis virus, Salmonid Alphavirus (Pancreas Disease), Candidatus Branchiomonas cysticola, Candidatus Piscichlamydia salmonis, Candidatus Syngnamydia salmonis, Candidatus Clavochlamydia Salmonicola, Vibrio, Pasteurella skyensis, Moritella toxaemia (Winter Ulcer Disease), Aeromonas salmonicida (Furunculosis), Anaemia, Fungus and Lice **[1]**.

Disease problems on Scottish salmon farms have continued unabated during 2019. Here's photos from a Fish Health Inspectorate visit to The Scottish Salmon Company's salmon farm at Portree in February 2019 - including "visible damage to the heads of fish", skeletal muscle necrosis, dermatitis, lesions "likely associated with mechanical damage", anorexia, bilateral exopthalmia, petechial haemorrhaging, salmon gill poxvirus, *Neoparamoeba perurans* (the causative agent of Amoebic Gill Disease), *Paranculeospora theridon*, *Vibrio spp*, *Photobacterium sp* and Infectious Pancreatic Necrosis virus:



Here's the Fish Health Inspectorate's 'Case Information' report for Grieg Seafood's North Papa inspection dated 28 March 2019 which detailed positive tests for Infectious Pancreatic Necrosis virus, *Aeromonas salmonicida* and *Paranucleospora theridon* as well as Exophthalmia.

2019-0135 Fish 1 Bilateral Exophthalmia

2019-0135 North Papa – Fish 2 exophthalmia

Exophthalmia is referred to as pop-eye and is a condition linked to Cardiomyopathy Syndrome.

Figure 1 Open in figure viewer | PowerPoint

Gross pathological conditions in farmed salmon diagnosed with CMS. (a) Salmon showing exophthalmia, ventral skin haemorrhages and raised scales due to oedema. Photograph: Per Anton Sæther, MarinHelse AS. (b) Salmon at autopsy showing ascites, blood clot in the pericardial cavity and discoloured liver with fibrinous casts. Photograph: Brit Tørud, Norwegian Veterinary Institute

The Scottish Government's Fish Health Inspectorate slipped out a report in August 2019 detailing an inspection of Mowi's salmon farm at Kingairloch in April 2019 - including Cardiomyopathy Syndrome (CMS), Pasteurella skyensis, multifocal hepatic necrosis, Salmonid Alphavirus, anorexia, lesions, haemorrhaging and deformed hearts.

Here's more [photos of Mowi's disease-ridden salmon obtained via Freedom Information in 2018]:

Fish Farm: Groatay, Sound of Harris

Company: Marine Harvest
Problems: unknown
Fish heath inspection: unknown (report due July 2018)
Case number: 2018-0111

The Ferret

Fish Farm: Raineach, East Loch Tarbert, Harris

Company: Marine Harvest
Problems: amoebic gill disease, lice
Fish heath inspection: five fish sampled on 4 October 2016
Case number: 2016-0449

The Ferret

Fish 6 lesion

Positive test for salmonid alphavirus (pool 2), the causative agent of Pancreas Disease (PD) with evidence of heart pathology, skin lesions with bacterial infection. Moritella viscosa (causative agent of Winter ulcer) was identified from the lesions and gills and a Vibrio species was identified.

Fish 6 – lice and skin loss on head

Scattered aneurysms and basal hyperplasia; lamellae fusion in the gills; haemorrhage in skeletal muscle; adhesions in all fish and pericaditis, cell infiltration in the ventricle and some myofiber degeneratuin in the atrium (heart).

In June 2019, a FOI reply by the Scottish Government revealed that over half of all farmed salmon tested positive for Piscine Reovirus (PRV).

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

Scottish Salmon Watch reported in June 2019:

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.

A letter to Scottish Ministers in April 2019 cited the Fish Health Inspectorate's Case # 0078 in March 2018:

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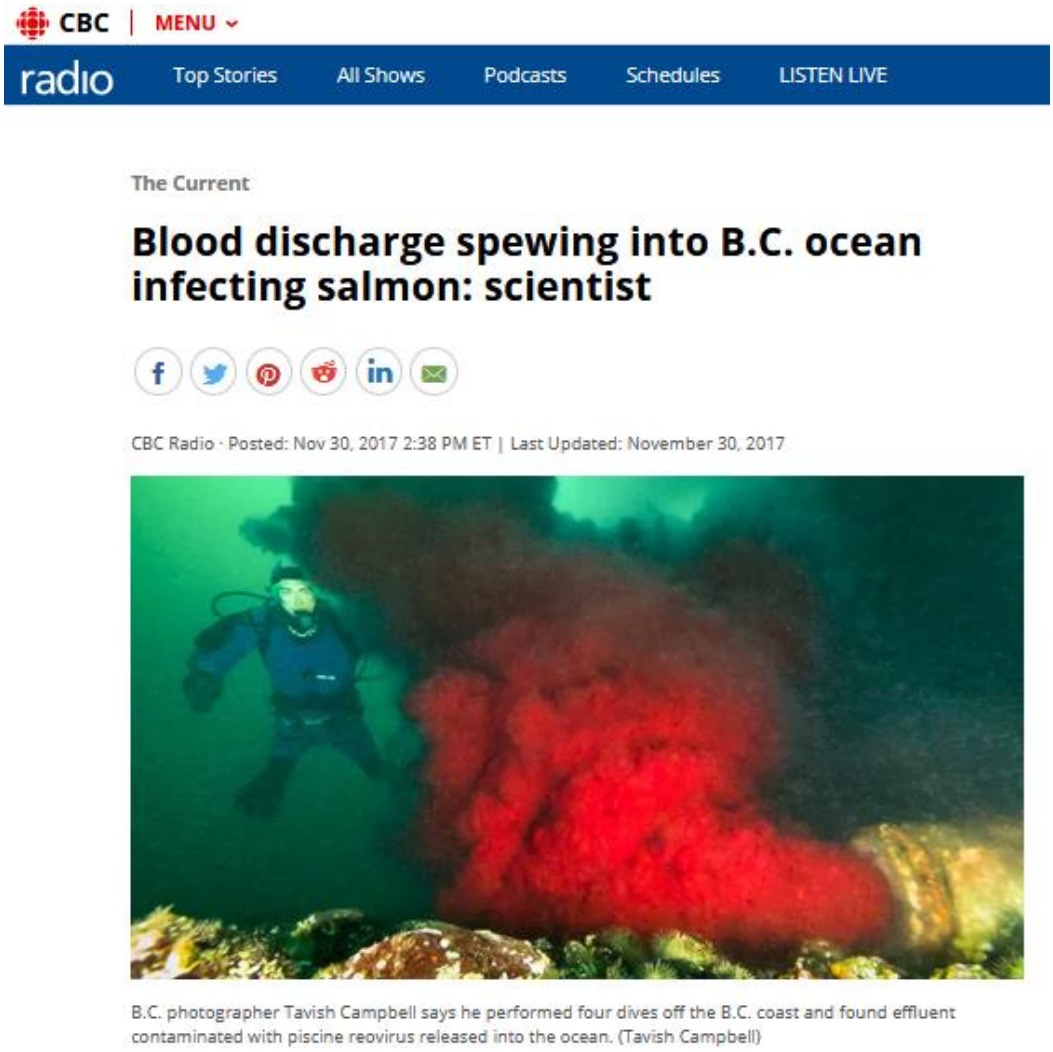
- "Haemorrhagic necrosis of skeletal muscle", "marked red skeletal muscle degeneration" and lesions on the flank including "a lesion on the ventral surface through which the heart was exposed" reported at The Scottish Salmon Company's Tarbert South site in Loch Fyne in March 2018 (positive tests reported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

A scientific paper - "The effect of exposure to farmed salmon on piscine orthoreovirus infection and fitness in wild Pacific salmon in British Columbia, Canada" - published in December 2017 reported that:

"PRV was detected in: 95% of farmed Atlantic salmon, 37–45% of wild salmon from regions highly exposed to salmon farms and 5% of wild salmon from the regions furthest from salmon farms."

> The science on the infection dynamics of PRV in wild fish populations is still emerging. Garseth et al. [5] provide molecular-based evidence that salmon farms play a significant role in the long-distance transport and transmission of PRV in Norway, speculating that pathogen exchange solely between wild salmon during the at-sea migration phase likely plays a minor role in PRV dispersal. While PRV infection in Norwegian sea trout (*Salmo trutta*) is low (1.9–3.0%), the species' persistence in the nearshore environment elevates exposure to salmon aquaculture. This heightens the possibility that sea trout could serve as an intermediary host for aquaculture-source PRV through habitat overlap with salmon during the freshwater spawning and juvenile rearing phases [26]. While no evidence of HSMI was detected in Norwegian wild salmonids [26], the researchers postulated that the impact of severe heart and skeletal muscle damage on a salmon's cardiovascular capacity could decrease the likelihood of an infected fish entering the riverine habitat where sampling was conducted. It is widely observed that diseased wild fish are typically difficult to sample because they are preferentially removed from the population by predators [27].

In 2017, bloodwater effluent spewed by a salmon farming processing plant tested positive for PRV.



In January 2018, BBC News reported how Cooke Aquaculture's processing plant was caught by the Scottish Environment Protection Agency discharging bloodwater effluent into Shetland waters (a key migration route for wild salmon).

Dearth of Research on Impacts of Diseased Farmed Salmon on Wild Fish

Despite the plethora of infectious diseases, pathogens, bacteria and viruses on Scottish salmon farms the salmon farming industry and the Scottish Government have failed to address the impacts on wild fish.

For example, Marine Scotland Science's report - 'Scotland 10 Year Farmed Fish Health Framework' - published in May 2018 completely disregards impacts on wild fisheries.

Work Stream 2: Gill Health

Gill health has emerged as the key challenge to the farmed fish industry in the marine environment and is the most significant contributor to increasing marine mortality.

Activities

- Establish a clearer understanding of the underlying environmental factors and increase awareness of key factors which contribute to gill health challenges.
- Support research to better define interactions between farms environmental characteristics, gill health and risk of losses.
- Better define best gill health surveillance practice and establish good practice on gill health for Scottish fin fish aquaculture.
- Formulate a long-term approach to minimise losses from gill diseases
- Convene appropriate best-practice events and workshops (e.g. on availability and use of anti-fouling solutions to reduce net cleaning requirements).

In March 2018, the Scottish Parliament's Environment, Climate Change and Land Reform Committee's 'Report on the Environmental Impacts of Salmon Farming' stressed the need for a monitoring strategy for wild salmonoids and the protection and health of wild fish:

91. The Committee is concerned that there appears to be no locus in the agencies for the protection and health of wild fish. While Marine Scotland suggested where disease is found they look at the effect on wild fish and the interaction with the farm, that responsibility does not extend to wild fish. The Committee is firmly of the view there should be a competent regulatory body charged with the protection and health of wild salmon and trout.

92. The Committee is of the view that a more integrated marine planning of salmon farming is required, including a monitoring strategy for wild salmonoids, which addresses cumulative impacts. The body responsible for protecting and promoting the health of wild salmonoids should progress this as a matter of urgency.

The Environment, Climate Change and Land Reform Committee's 'Report on the Environmental Impacts of Salmon Farming' (March 2018) included:

SRSL Report Summary: Diseases

Diseases of farmed fish might spread to other animals, especially wild salmon

Diagnosis

63. *Salmon can be infected by a range of pathogens and parasites, some of which may cause significant losses of farmed fish. About a dozen pathogens and parasites are economically important for salmon farming in Scotland. These infections, and their prevention or treatment, have been much studied in cultivated salmon; less is known about their incidence in wild salmon. The presence of large numbers of fish living close together in a farm provides a favourable habitat for the growth and spread of populations of pathogens and parasites. Depending upon the mode of infection, water currents can spread pathogens between farms and potential between wild and farmed salmon populations. Prevention and treatment measures include biosecurity, fish vaccination, and the use of a range of chemotherapeutants and small amounts of antibiotics. Serious fish or shellfish diseases are called 'notifiable' because farmers must immediately report that they suspect or know about the disease to the Fish Health Inspectorate. There are currently eight notifiable diseases of fish in the UK of which six may be found in salmonids. Suspicion of notifiable diseases will result in movement restrictions and may require the eradication of the infected farm stock. There is some evidence that some disease is transmitted between farmed and wild fish by direct infection, by escapees, or by infection from wild to farmed fish. There are few data allowing the risk of disease transfer between wild and farmed populations to be reliably estimated.*

Prognosis

64. *Increased numbers and sizes of farms could lead to increased risk of infection of wild fish unless improvements in farm biosecurity and disease prevention outpace the expansion of production.*

And:

Evidence

67. There is evidence that some disease is transmitted between farmed and wild fish by direct infection, by escapees, or by infection from wild to farmed fish. There is little data enabling the risk of disease transfer between wild and farmed populations to be reliably estimated. The report states that the lack of knowledge about the disease interactions between farmed salmon and wild populations is of concern.

In May 2018, a petition co-ordinated by SumOfUs signed by over 43,000 people called on the Scottish Government and the Scottish Environment Protection Agency to "start routinely testing effluent from salmon farms and processing plants for deadly viruses that threaten wild 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.

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

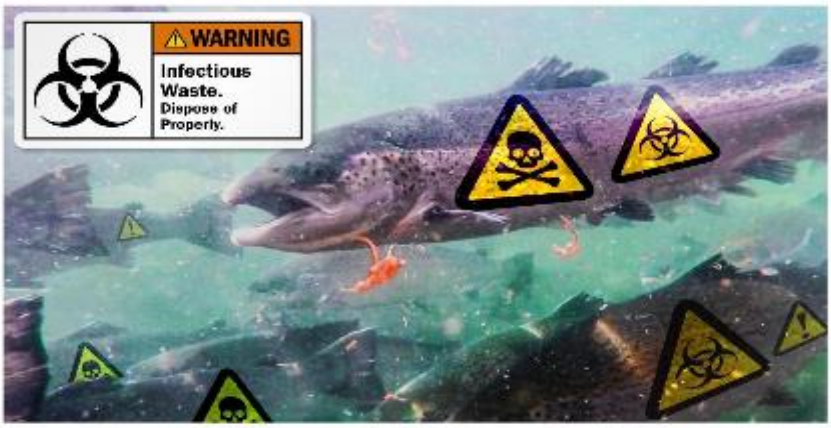
Dear Cabinet Secretaries,

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.



In February 2018, the Global Alliance Against Industrial Aquaculture published site specific disease data (obtained via FOI from the Scottish Government) for salmon farms operated by Scotland's three largest companies (Marine Harvest, Scottish Sea Farms & the Scottish Salmon Company).

Salmon Gill poxvirus, Paranucleospora theridion, gill pathology, complex gill issues, Vibrio anguillarum, Proliferative Gill Disease, Amoebic Gill Disease, Pancreas Disease, fungus, Sardiomyopathy Syndrome, Haemorrhagic Smolt Syndrome, Heart & Skeletal Muscle Inflammation, Enteric Redmouth Disease and Anaemia were reported during 2017.

HEALTHY SCOTTISH SALMON!?

⚠ WARNING

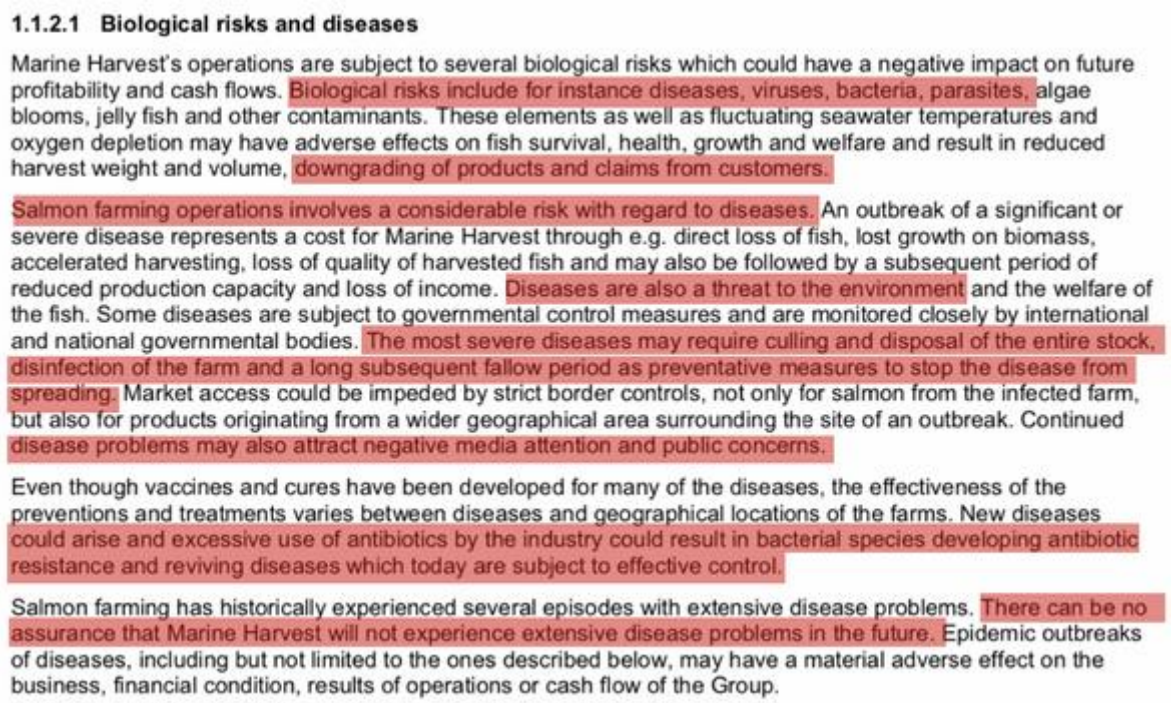
Diseases
Viruses
Lice Infestations
Bacteria

Amoebic Gill Disease
Anaemia
Bacterial Kidney Disease
Bacterial Skin Ulceration
Cardiomyopathy Syndrome
Chlamydia
Complex Gill Issues
Dermaocystidium spp.
Enteric Redmouth Disease
Epitheliocystis
Exophiala
Fungus
Lesions
Lice Infestation
Flavibacterium psychrophila
Gyrodactylus derjavini
Haemorrhagic Smolt Syndrome
Heart & Skeletal Muscle Inflammation
Ichthyobodo spp.
Infectious Pancreatic Necrosis
Moritella viscosa
Myxosporean spp.
Nephrocalcinosis
Pancreas Disease
Paranucleospora theridion
Pasteurella skyensis
Piscirickettsia salmonis
Proliferative Gill Inflammation
Salmon Gill Poxvirus
Vibrio anguillarum
Yersinua ruckeri

WHAT HIDDEN EXTRAS ARE LURKING IN YOUR SCOTTISH SALMON?

Industry Admissions of Disease Risks

In 2013, Mowi (then named Marine Harvest) admitted in a report to investors:



1.1.2.1 Biological risks and diseases

Marine Harvest's operations are subject to several biological risks which could have a negative impact on future profitability and cash flows. Biological risks include for instance diseases, viruses, bacteria, parasites, algae blooms, jelly fish and other contaminants. These elements as well as fluctuating seawater temperatures and oxygen depletion may have adverse effects on fish survival, health, growth and welfare and result in reduced harvest weight and volume, downgrading of products and claims from customers.

Salmon farming operations involves a considerable risk with regard to diseases. An outbreak of a significant or severe disease represents a cost for Marine Harvest through e.g. direct loss of fish, lost growth on biomass, accelerated harvesting, loss of quality of harvested fish and may also be followed by a subsequent period of reduced production capacity and loss of income. Diseases are also a threat to the environment and the welfare of the fish. Some diseases are subject to governmental control measures and are monitored closely by international and national governmental bodies. The most severe diseases may require culling and disposal of the entire stock, disinfection of the farm and a long subsequent fallow period as preventative measures to stop the disease from spreading. Market access could be impeded by strict border controls, not only for salmon from the infected farm, but also for products originating from a wider geographical area surrounding the site of an outbreak. Continued disease problems may also attract negative media attention and public concerns.

Even though vaccines and cures have been developed for many of the diseases, the effectiveness of the preventions and treatments varies between diseases and geographical locations of the farms. New diseases could arise and excessive use of antibiotics by the industry could result in bacterial species developing antibiotic resistance and reviving diseases which today are subject to effective control.

Salmon farming has historically experienced several episodes with extensive disease problems. There can be no assurance that Marine Harvest will not experience extensive disease problems in the future. Epidemic outbreaks of diseases, including but not limited to the ones described below, may have a material adverse effect on the business, financial condition, results of operations or cash flow of the Group.

The report - archived with the US Securities and Exchange Commission - also details under "Risk Factors':

PD (Pancreas Disease)

PD (Pancreas Disease) is an infectious viral disease caused by a salmonid alphavirus (SAV) and is frequently diagnosed in Norway, and more recently to a lesser extent in Scotland and Ireland. The disease attacks the pancreatic tissue, heart and skeletal muscles of the fish and results in lack of appetite, lethargy, reduced health and increased mortality. Chronic outbreaks could last several months and accumulated mortality could be high, normally in the range from 0 per cent to 20 per cent. More important is however the chronic damage that can occur to the survivors in terms of reduced growth capacity and scars in skeletal muscle. The scars can appear as patches of decolourisation or melanisation (black pigmentation) and cause downgrading and make the product unsuitable for smokehouses. There is no medical treatment to PD. Approved vaccines exist, but the effectiveness is variable when infection pressure is high. PD is subject to governmental control measures.

HSMI (Heart and skeletal muscle inflammation)

HSMI (Heart and skeletal muscle inflammation) is another infectious disease which in recent years has become very widespread in Norway and Scotland. The disease affects the fish's heart and skeletal musculature, normally in the first half of the seawater phase, with increased mortality, reduced health and periods of reduced growth being the most important loss factors. Mortality normally varies from 0 per cent to 20 per cent. As HSMI often occurs or intensifies following grading, movement and other management events which may stress the fish, the disease leads to challenges in relation to sea lice treatments and other events

necessitating the fish to be moved. HSMI is assumed to be a viral disease, but the exact cause of the disease is not yet fully understood. Vaccines are under development, but are currently not in use in the industry.

CMS (Cardiomyopathy syndrome)

CMS (Cardiomyopathy syndrome), also known as heart rupture, is a disease primarily affecting the heart with secondary circulation failure and liver damage. The disease has been observed in Scotland, Canada and the Faroe Island, and has been increasingly diagnosed in Norway the recent years. CMS affects farmed salmon in the seawater phase and in connection with transport to the slaughter houses. Occasionally mortality may reach 30 per cent, but it is usually much lower. Because the disease normally attaches the fish at the end of the production cycle when the fish is ready for harvest, the economic losses can be more substantial even though the cumulative mortality is not high. There is no medical treatment or vaccine available for the disease.

IPN (Infectious pancreatic necrosis)

IPN (Infectious pancreatic necrosis) is an infectious viral disease caused by a Birnavirus found throughout the world in a number of wild fish species both in freshwater and in seawater. IPN is very prevalent in Norway, but is also found in Scotland and Chile. The disease is highly contagious, attacks the pancreas and causes swelling, lack of appetite, abnormal swimming and darkening of the skin of the fish. Juveniles and seawater phase smolt are more vulnerable to the disease and mortality could reach 40 per cent in these phases. Outbreaks may necessitate a greater degree of handling (grading) resulting in extra stress which may lead to increased mortality in already weakened fish. Surviving fish may develop a lifelong persistent infection. IPN is a significant cause of loss in Norway. There is no treatment for the disease. Commercial vaccines are available, but the effectiveness of the vaccine is variable under high infection pressure.

SRS (Salmonid rickettsial septicaemia)

SRS (Salmonid rickettsial septicaemia) is caused by Piscirickettsia salmonis, a parasitic intracellular bacterium that causes a fatal septicaemic condition of salmonids. SRS occurs mainly in Chile, but has also been found in Norway, Scotland and Canada. The disease typically leads to mortality between 10 per cent and 30 per cent, but mortality in Chile has reached up to 90 per cent. Other symptoms are loss of appetite and lethargy. The disease is mainly controlled by vaccination and antibiotics and thus far the industry has been able to manage the disease. However, the dependence on antibiotics and risk of SRS becoming resistant towards commonly used drugs represent a risk of significant losses.

GD (Gill disease)

GD (Gill disease) is a general term used to describe gill pathology occurring in seawater. The changes may be caused by different infectious agents such as amoeba, viruses or bacteria, as well as environmental factors including algae or jelly-fish blooms. Little is known about the cause of many of the gill conditions and to what extent infectious or environmental factors are primary or secondary causes of disease. Gill damage can lead to respiratory distress and significant mortality may occur. Currently there is no general cure applicable to all types of GD.

In Scotland and Ireland, Marine Harvest experienced a dramatic increase in the prevalence of Amoebic Gill Disease (AGD) caused by a ubiquitous microscopic parasite (amoeba) in 2012. AGD was the main cause of mortality in 2012 both in terms of biomass and fish numbers and represent a challenge for the Group's future operations in these countries. Treatments for AGD, when used systematically and in a coordinated manner, limits the impact of the disease.

In 2019, Mowi is still all too aware of the risks of diseases writing in their Integrated Annual Report 2018 (March 2019) that "continued disease problems may also attract negative media attention and public concerns".

RISK AND RISK MANAGEMENT

	RISK	SHORT DESCRIPTION
1c	**Risks related to our fish farming operations**	
III	Our fish stocks, operations and reputation can be adversely affected by various diseases	Our fish are affected by diseases caused by viruses, bacteria and parasites which may have an adverse effect on fish survival, health, growth and welfare and result in reduced harvest weight and volume, downgrading of products, claims from customers and increased costs. Continued disease problems may also attract negative media attention and public concerns.
1e	**Risks related to our industry**	
II	The farmed-salmon industry may be subject to negative media coverage.	Farmed salmon has in some instances been subject to criticism from various research communities and NGOs, which may affect consumer attitudes towards farmed salmon. Such negative consumer attitudes may result in a lower demand for our products.

Mowi has a raft of reasons to comprehend the risky nature of their salmon farming business. Mortality and disease data published by the Scottish Government's Fish Health Inspectorate on 20 September 2019 details nearly 2 million mortalities already during 2019 with Pancreas Disease, Cardiomyopathy Syndrome, Anaemia and Gill Disease cited.

Site Name	Date reported	Mortality rate recorded (%)	Explained reasons	Total mortality during event	Additional information
Craig an Tsagairt	02/07/2019	1.37	Treatment Losses	7000	Thermolicer treatment started on 24th June for 4 days. Fish with bleeding gills, "collision damage" and heart damage. Not aware of any disease issues at the site but health team have been in and they are awatiing histo results. Mort levels appear to be back to normal. Only treated 10 of the 12 pens. Current lice levels 0.4 average adult females. Site should be fallow by end July.
Rum	01/07/2019	1.09	Treatment Losses	8400	12 hour freshwater treatment in Intercaledonia. Mainly from; Pen 11 lost approximatly 45% and pen 5 lost 15%. Swimbladder issue and mechanical damage.
Muck	30/06/2019	1.02	Treatment Losses	10500	Following week morts; 10/6/19 0.27%, 17/6/19 0.24%
Rum	30/06/2019	2.79	Treatment Losses		37000 fish morts for June up until 24/6/19. 12 hour freshwater treatment in Intercaledonia. Mainly from; Pen 11 lost approximatly 45% and pen 5 lost 15%. Swimbladder issue and mechanical damage.
Rum	30/06/2019	2.16	Treatment Losses		37000 fish morts for June up until 24/6/19. 12 hour freshwater treatment in Intercaledonia. Mainly from; Pen 11 lost approximatly 45% and pen 5 lost 15%. Swimbladder issue and mechanical damage.
North Shore	27/05/2019	1.23	PD	15516	Action taken to be confirmed
MacLean's Nose	01/05/2019	3.41	CMS	20801	
MacLean's Nose	01/05/2019	3.75	CMS	24726	
MacLean's Nose	01/05/2019	4.02	CMS	25534	
MacLean's Nose	01/05/2019	3.91	CMS	23876	
MacLean's Nose	01/05/2019	3.63	CMS	21266	
MacLean's Nose	01/05/2019	4.73	CMS	24670	

Site Name	Date reported	Mortality rate recorded (%)	Explained reasons	Total mortality during event	Additional information
Loch Greshornish	18/03/2019	1.46	Anaemia	2658	Awaiting further information
Loch Greshornish	18/03/2019	1.02	Anaemia	1205	Awaiting further information
Soay	18/03/2019	3.30	Gill	16119	Awaiting further information
Soay	18/03/2019	1.42	Gill	4514	Awaiting further information
Soay	18/03/2019	1.33	Gill	2634	Awaiting further information
Soay	18/03/2019	1.17	Gill	3038	Awaiting further information
Grey Horse Channel	18/03/2019	1.74	CMS/ Anaemia	7771	Awaiting further information
Grey Horse Channel	18/03/2019	5.36	CMS/ Anaemia	22249	Awaiting further information
Grey Horse Channel	18/03/2019	2.29	CMS/ Anaemia	8777	Awaiting further information
Grey Horse Channel	18/03/2019	1.35	CMS/ Anaemia	4523	Awaiting further information
Grey Horse Channel	18/03/2019	1.24	CMS/ Anaemia	3608	Awaiting further information
Grey Horse Channel	18/03/2019	1.16	CMS/ Anaemia	1479	Awaiting further information
Seaforth	18/03/2019	1.10	Anaemia	5770	No further information

More via: Video Nasty: Mowi's Dead Salmon at 'Bay of the Dead Heads'

The Scottish Salmon Company is another salmon farmer with significant disease risks. Mortality and disease data published by the Scottish Government's Fish Health Inspectorate on 20 September 2019 cited Pancreas Disease, Amoebic Gill Disease, Cardiomyopathy Syndrome, Fungus, Costia and Anaemia.

Site Name	Date reported	Mortality rate recorded (%)	Explained reasons	Total mortality during event
Maaey		5.43	PD	27780
Lamlash	26/07/2019	3.21	PD & Gill health	7125
Grimsay	26/07/2019	10.86	CMS & maturation of broodstock	52
Sgian Dubh	24/07/2019	1.01	AGD	7864
Maaey	18/07/2019	1.13	PD	3029
Druimyeon Bay	18/07/2019	1.02	PD	6854
Kenmore loch Torridon	18/07/2019	3.8	AGD	6182
Vuia Mor	18/07/2019	1.03	Predation	5299
Lamlash	18/07/2019	2.10	PD/Gill	5140
Maaey	16/07/2019	4.02	PD	11192
Druimyeon Bay	16/07/2019	1.27	PD	8628
Maaey	07/07/2019	5.1	PD	15000
Maragay Mor	07/07/2019	1.6	PD	10000
Druimyeon Bay	07/07/2019	1.9	PD	13000
Lamlash	07/07/2019	1.6	PD	4000

Site Name	Date reported	Mortality rate recorded (%)	Explained reasons	Total mortality during event
Druimyeon Bay	24/06/2019	2	PD	14000
Maaey	24/06/2019	7.38	PD	29631
Maaey	07/06/2019	8.65	PD	48500
Barvas Hatchery	22/05/2019	2.3	Fungus	number not provided
Barvas Hatchery	22/05/2019	7.7	Poor hatch quality in a few tanks, fungus, costia	number not provided
Geocrab Hatchery	22/05/2019	6.54	Deformities & quality culls	number not provided
Amhuinsuidhe Hatchery	22/05/2019	1.86	Fungus	number not provided
Loch Tuath	22/05/2019	1.87	PD, PGD & handling	number not provided
Glenan Bay	22/05/2019	1.27	Handling & transfer/Treatment	number not provided
Lamlash	22/05/2019	2.28	Anaemia & PD	6725
Loch Langavat	16/04/2019	2.61	Fungus	20000

More via The Severely Damaged Scottish Salmon Company - For Sale Now!

Salmon Farms as "Pathogen Culture Facilities"

Salmon farms have been described by one Norwegian scientist as "pathogen culture facilities".

> Finally we would stress again the position of marine rearing pens as pathogen culture facilities at the crossroads for migrating salmonids moving between fresh and saltwater. We know nothing of the epidemiology of disease of marine salmon, beyond the fact that highly pathogenic organisms such as ISA are unlikely to have a wide distribution in nature because they would kill salmon before they had dispersed. The possibility of organisms such as this colonizing smolts on migration and then having a significant impact on marine salmon stocks should be treated very seriously.

A report - "Review of fish disease interactions and pathogen exchange between farmed and wild finfish and shellfish in Europe" – published in 2007 by the European Union examined the evidence for the transmission of pathogens between farmed and wild fish populations. The report stated that:

"Diseases in farmed fish may affect wild populations. Outbreaks of disease in farmed populations could change the disease status in the wild population through elevated pathogen levels."

Aquaculture, especially factory salmon farming, spreads diseases. As a 'Disease Report' published in 2009 via the Salmon Aquaculture Dialogue stated: "Aquaculture activities in themselves can contribute to the spread of pathogens. There are many cases where the movement of fish for public or commercial salmon farming or even the movement of fish products has been clearly linked to the movement of pathogens into new locations, even crossing ecological boundaries. Whirling diseases in the Unites States, Gyrodactylus in Europe, and IHN in BC are all examples of diseases that have been moved by the movement of fish, water or equipment tied to public or private aquaculture."

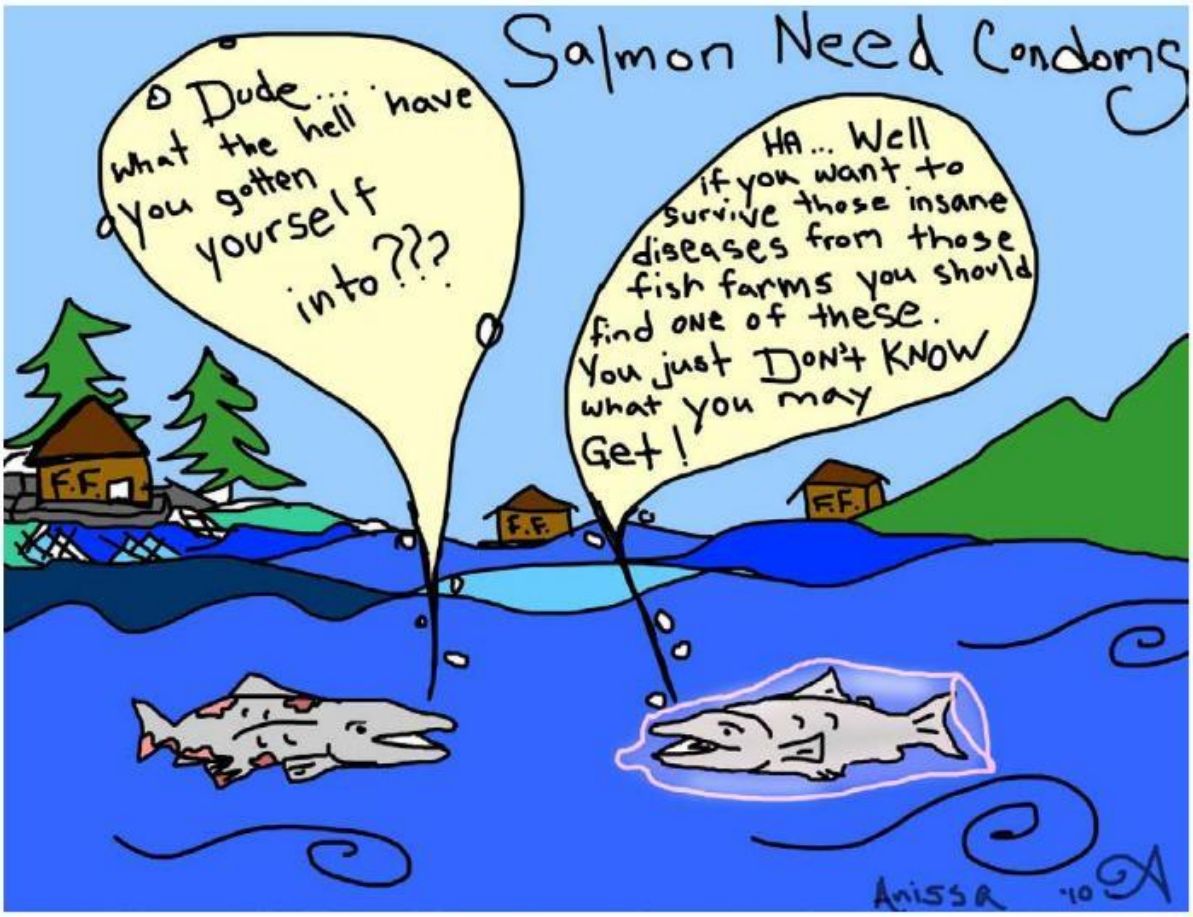
A scientific paper - "Disease interaction and pathogens exchange between wild and farmed fish populations with special reference to Norway" - published in 2011 stated:

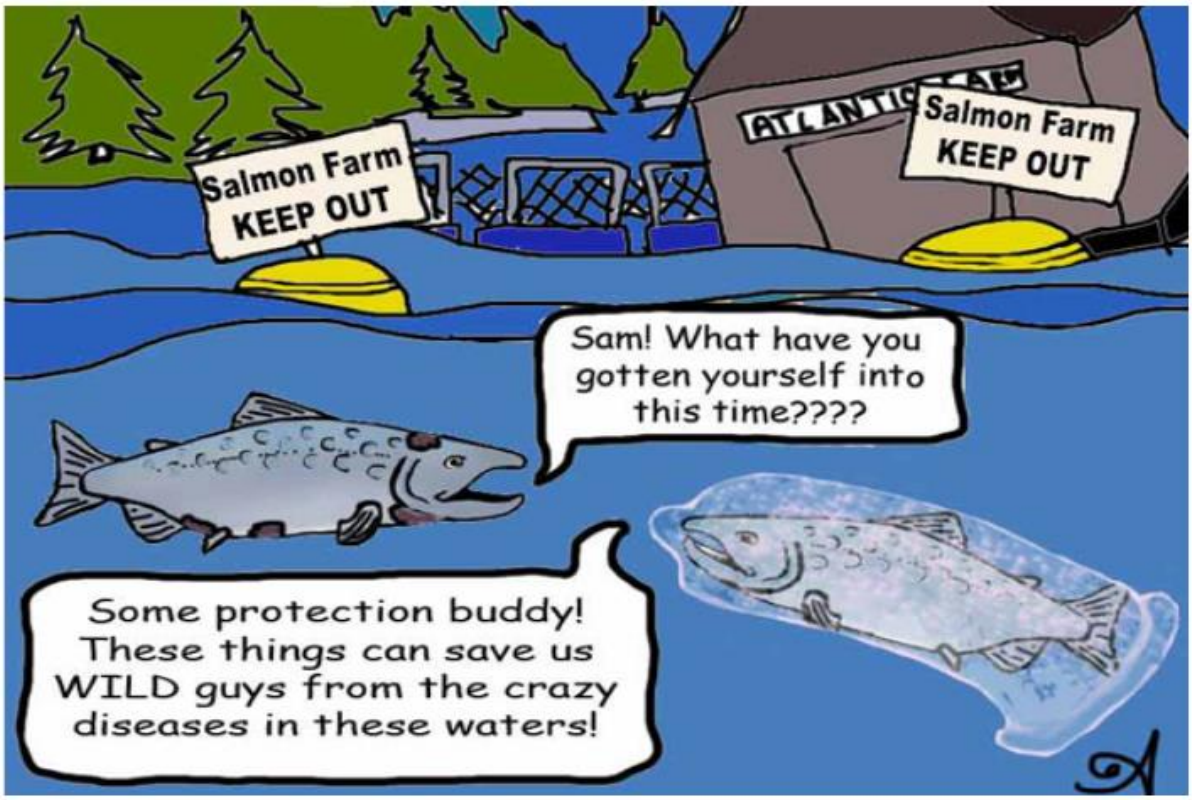
"Net pens allow pathogen exchange with the surrounding environment. This is a recognised and widely debated problem for sea lice in salmon farming, where planktonic larval stages produced on fish in the pens drift passively into the surroundings with the water current. The spread of other pathogens by passive drift in the water current has also been suggested in a number of studies. Most of these studies rely on the tendency for disease outbreaks to cluster in space and time. This is well documented for ISA in Norway (Jarp and Karlsen, 1997; Scheel et al., 2007; Vågsholm et al., 1994), Canada and USA (McClure et al., 2005) and Chile (Mardones et al., 2009) and for PD in Norway (Kristoffersen et al., 2009)."

Dr. Marty Krkosek reported in a scientific paper - "Population biology of infectious diseases shared by wild and farmed fish" - published in 2017:

"Hydrodynamics allow pathogens to disperse broadly, interconnecting farms into metapopulations of domesticated host fish in regions that also support related species of wild fish. Spillover and spillback dynamics of pathogen transmission between wild and farmed fish can create novel transmission pathways or bioamplify pathogen abundance, potentially depressing or endangering wild fish..... Looking forward, both theory and empirical work suggest that a future of continued aquaculture growth includes an intensification of ecological and evolutionary processes that facilitate disease emergence."

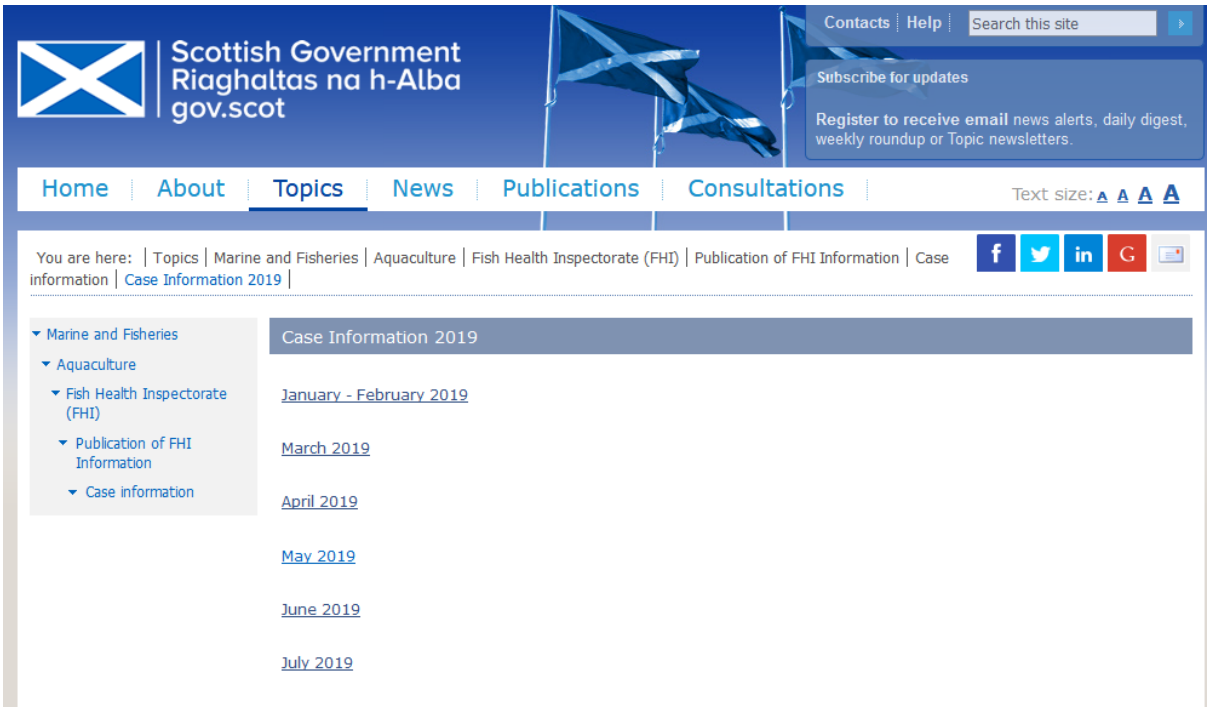
Read more via 'The Infectious Salmon Aquacalypse'


Salmon Need Condoms
Dude... what the hell have you gotten yourself into???
HA... Well if you want to survive those insane diseases from those fish farms you should find one of these. You just DON'T KNOW what you may Get!
F.F.
F.F.
F.F.
Anissa '10


Salmon Farm KEEP OUT
Salmon Farm KEEP OUT
Sam! What have you gotten yourself into this time????
Some protection buddy! These things can save us WILD guys from the crazy diseases in these waters!

Appendix:

Scottish Government Fish Health Inspectorate 'Case Information' for 2019



Here's a summary of the 'Case Information' for 2019:

July 2019 (published online on 10 September):

p46 to 54 via https://www2.gov.scot/Resource/0054/00548386.pdf

marinescotland science

Scottish Government
Riaghaltas na h-Alba
gov.scot

[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0544	**DATE OF VISIT**	04/07/2019
SITE NO	FS1240	**SITE NAME**	Highland – River Forss
INSPECTOR	[redacted]	**CASE NO**	20190322

Section 1: Summary

Following observations of moribund and dead wild Atlantic salmon in the River Forss, the River Superintendent contacted the Fish Health Inspectorate on the 4th July 2019. Fish Health Inspectors visited the river to conduct diagnostic sampling. Five moribund fish were removed from a pool using hand nets. Several other moribund fish with lesions and fungal-like infection were also observed in the same pool. It was reported that fish with similar clinical signs had been observed since April 2019.

Histopathology examination revealed mild to marked bacterial branchitis, presence of some epitheliocystis which tested positive for *Candidatus* branchiomonas cysticola by QPCR, and a mild multifocal myositis. Features consistent with clinical salmon gill poxvirus were noted in all fish, this was confirmed by QPCR.

Aeromonas spp. and *Pseudomonas florescence* were isolated. The level and purity of growth would not suggest that bacteria are the primary source of morbidity. Although *P.florescence* has been associated with fish disease.

Microscopic examination also revealed a fungus-like organism matching the characteristics of *Saprolegnia* sp. on samples taken.

Fins were examined by light microscopy and displayed heavy fungal-like growth. The structures exhibited microscopic characteristics of Saprolegnia sp.. Saprolegnia sp. was observed on plates taken from tissue material of two fish.

A heavy infestation of *Anisakis simplex* was noted in the vents of three fish with a lighter infestation in two, one vent was noted to be reddened.

Section 2: Case Detail

Observations

Externally, haemorrhaging was observed on the throat of F4, and on the ventrum and base of fins on all fish. The gills in all fish were pale in colour and lesions were observed on the flank, head and tail of all fish sampled.

Internally, all fish except F2 had petechial haemorrhaging on the liver, with F4 exhibiting some tissue breakdown. The liver was pale in F1-3 and dark in F5. There was petechial haemorrhaging noted on the pyloric caeca of F3-4 with all fish showing a lack of fat. The spleen was enlarged in F1-4. No food was present in the guts of any of the fish sampled and yellow pseudo-faeces were noted in F1-4. There was slight haemorrhaging on the swim bladder of F3 and the kidney of F4 was slightly granular. Parasites were present in F1-2 and 4.

Samples

Samples were collected from 5 fish according to the table below:

Fish number	Pool number	Species	Stage
F1-5	P1	Atlantic salmon	2.5-5kg

Results

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

The following bacteria were isolated:

- *Aeromonas* sp. (Isolate A): Fish 1-5 (Lesion, Kidney and Gill)
- *Aeromonas* sp. (Isolate C): Fish 2-5 (Lesion, Kidney and Gill)
- *Aeromonas* sp. (Isolate D): Fish 2 (Kidney)
- *Pseudomonas fluorescens* (Isolate E): Fish 1, 4-5 (Lesion and Gill)

Saprolegnia sp., a fungal-like (oomycete) organism was also observed on plates.

Tissue samples were tested for segments of nucleic acid indicative of the presence of the following pathogen using real-time PCR (QPCR).

***Candidatus* branchiomonas cysticola**

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F5	23.95	34.31	34.54	34.58	POSITIVE

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

The following pathogen was identified:

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	24.00	23.54	23.67	23.65	POSITIVE
F2	24.09	25.57	25.54	25.52	POSITIVE

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

[redacted]

F3	25.23	24.11	24.24	24.11	POSITIVE
F4	25.52	33.47	33.64	33.5	POSITIVE
F5	23.95	26.04	26.09	26.09	POSITIVE

Case No: 2019-0322 Date of visit: 04/07/2019

Site No: FS1240 Inspector: [redacted]

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
PA_ANIP	5/5	10/07/2019	[redacted]	10/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
MG IHN	0/1	16/07/2019	[redacted]			13/08/2019	[redacted]	[redacted]
MG IPN	0/1	16/07/2019	[redacted]			13/08/2019	[redacted]	[redacted]
MG SAV	0/1	16/07/2019	[redacted]			13/08/2019	[redacted]	[redacted]
MG VHS	0/1	16/07/2019	[redacted]			13/08/2019	[redacted]	[redacted]
MG ISA	0/1	16/07/2019	[redacted]			13/08/2019	[redacted]	[redacted]
AERO	5/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
SAPR	5/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
PSPE	3/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
ANIH	1/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
CEST	1/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
EPIT	1/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
GPAT	5/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
MPAT	2/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
SPVH	5/5	24/07/2019	[redacted]	24/07/2019	[redacted]	13/08/2019	[redacted]	[redacted]
MG SAL POX	5/5	01/08/2019	[redacted]	02/08/2019	[redacted]	13/08/2019	[redacted]	[redacted]
MG BRAN CYS	1/5	01/08/2019	[redacted]	02/08/2019	[redacted]	13/08/2019	[redacted]	[redacted]
MG PMCV	0/1	08/08/2019	[redacted]			13/08/2019	[redacted]	[redacted]
MG PRV	0/1	08/08/2019	[redacted]			13/08/2019	[redacted]	[redacted]

Report Summary			
Case Type	Date	Insp	2nd Insp
DIA	13/08/2019	[redacted]	[redacted]


F1


F2


F3
F3

June 2019 (published on 8 August & 10 September):

Additional Cases:

p28 to 32 via https://www2.gov.scot/Resource/0054/00548393.pdf

marinescotland science

Scottish Government
Riaghaltas na h-Alba
gov.scot

[redacted]
Site 6
Cromwellpark
Almondbank
Perth
PH1 3LW
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0544	**DATE OF VISIT**	07/06/2019
SITE NO	FS1245	**SITE NAME**	Tayside – River Garry
INSPECTOR	[redacted]	**CASE NO**	20190296

Section 1: Summary

A call was received from a biologist at the freshwater laboratory in Pitlochry on the 6th of June 2019. He had found a freshly dead 2 sea winter Atlantic salmon near the bank of the River Garry. The fish was collected, chilled and transported to the Marine laboratory in Aberdeen for diagnostic sampling. The fish was displaying lesions/ulcers across approximately 20% of its body and was approximately 4.5 kg in weight. The fish did not arrive until late in the evening so the fish was not sampled until the following morning on the 7th June 2019.

The fish had been dead longer than 24 hours therefore only samples for molecular genetic analysis and parasitology were viable.

Parasitology examination showed a heavy infestation of *Anisakis simplex* within the vent tissue sampled. A number of *Anisakis* were also observed on the liver and spleen during the internal examination of the fish.

Section 2: Case Detail

Observations

The fish was collected for sampling as it was displaying similar clinical signs of disease that had been reported in other rivers across Scotland. The fish was transported to the Marine Laboratory for diagnostic sampling.

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Tel – 0131 244 3498 Fax – 0131 244 0944 Email – ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

External haemorrhaging and lesions were observed on the throat, ventrum, base of fins and flank of the fish. Some post mortem damage to the head and eyes was also observed, this was most likely caused by predators or scavengers whilst the fish was in the shallows of the river.

Internally, the heart appeared anaemic, there was also a distinct lack of fat on the pyloric caeca and the spleen was enlarged. There was no food present in the gut, however there was yellow pseudo faeces present in the lower gut. A number of *Anisakis simplex* were attached to the liver and spleen.

[Cases 20190072-20190272]

p1 to 15 via: [https://www2.gov.scot/Resource/0054/00548048.pdf]

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[redacted]
Dee District Salmon Fishery Board
River Office
Mill of Dinnet
Aboyne
Aberdeenshire
AB34 5LA
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0544	**DATE OF VISIT**	21/06/2019
SITE NO	FS1239	**SITE NAME**	Grampian – River Dee
INSPECTOR	[redacted]	**CASE NO**	20190072

Section 1: Summary

Following notification of the capture of one wild Atlantic salmon showing haemorrhaging on the ventral surface on the River Dee samples were collected for diagnostic purposes.

Histopathology examination revealed mild mytosis and mild cardiomyopathy. The kidney showed some cysts-like structures.

Parasites collected from the body cavity included *Anisakis* sp. and *Diphyllobothrium latum*. The vent showed heavy infestation of *Anisakis simplex*.

Section 2: Case Detail

Observations

Marine Scotland Science Fish Health Inspectorate was contacted by the Dee District Salmon Fishery Board on the 21 June 2019 regarding a wild Atlantic salmon caught in the River Dee on the Ballogie fishing beat with haemorrhaging on the ventral surface. The fish was not moribund or lethargic and had been line caught. Due to recent concerns regarding wild Atlantic salmon displaying similar clinical signs the decision was taken to collect samples. The fish was kept in a keep net at the river bank until inspectors arrived in the afternoon to conduct a full diagnostic sample.

Externally the fish showed haemorrhaging on the ventral surface and had a small area of possible physical damage on the flank with what looked to be the early stages of a developing lesion. As well as damage to the ventral surface of the caudal fin and the vent was inflamed. Internally a moderate level of free parasites were observed in the body cavity.

Additional Case Information:

Contacted by the River Dee Trust [redacted] regarding an Atlantic salmon caught in the River Dee on the Ballogie fishing beat with haemorrhaging on the ventral surface. The fish was not moribund or lethargic and was being kept in a keepnet. A full diagnostic sample was collected. The River Dee has seen high water levels in recent weeks, this means fish do not appear to have any problems getting upriver. It was discussed that some anglers had seen salmon in recent weeks with sea lice still attached to the fish indicating the salmon had been in the river for less than 24hrs that also showed ventral haemorrhaging.

Accompanied by [redacted], all sampling by [redacted] supervised by [redacted]

2019-0072 Wild fish diagnostic River Dee 21/6/2019

p22 to 35 via: https://www2.gov.scot/Resource/0054/00548048.pdf

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Cromarty Firth Fishery Board
Reay House,
17 Old Edinburgh Road,
Inverness,
IV2 3HF
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0544	**DATE OF VISIT**	13/06/2019
SITE NO	FS1240	**SITE NAME**	Highland – River Conon
INSPECTOR	[redacted]	**CASE NO**	20190186

Section 1: Summary

Following a report from the Cromarty District Salmon Fishery Board on the 12th June 2019 of a fish caught showing lesions and ulcers on the ventral surface, Fish Health Inspectors visited the river on the 13th June 2019. The fish had been placed in a keep net overnight prior to inspection and diagnostic samples were taken.

Histopathology examination revealed myxosporidiosis, which is thought to be incidental. No other significant pathology was found.

Section 2: Case Detail

Observations

Following reports of a diseased wild Atlantic salmon at the river Conon the fish was examined and diagnostic sampling was carried out.

The ghillie from the river Conon informed the inspectorate of a live fish they had caught with lesions and ulcers on the ventral surface. On talking with the fishery board representative, this was the first fish caught with signs of disease on the river and no mortalities have been reported prior to this inspection.

The fish was still alive at time of inspection and did not appear weak. External examination showed there to be slight haemorrhaging on the ventral surface and gills were slightly pale but no other visible signs. Internally, petechial haemorrhaging was noted of the liver and lack of fat of the pyloric caeca. Haemorrhaging was also noted of the body wall and swim bladder.

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Website - www.gov.scot/Topics/marine/science

Samples

Samples were collected according to the table below:

Fish number	Pool number	Species	Stage	Origin
F1	P1	Atlantic salmon	4.5-6 kg	River Conon

Additional Case Information:

The Cromarty Firth DSFB contacted FHI on 12/06/2019 to report a salmon that had been caught on the r. Conon with haemorrhaging on the undseride. Fish was placed in a keep net and an inspector attended the scene on 13/06/2019. Fish was still alive at time of inspection and did not appear weak. There was slight haemorrhaging on the underside but no other signs. On talking with the fishery board representative, this was the first fish caught with signs of disease on the river and no mortalities have been reported prior to this inspection.

p37 to 50 via: https://www2.gov.scot/Resource/0054/00548048.pdf

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Kyle of Sutherland District Salmon Fishery Board
Bank House
Ardgay, Sutherland
IV24 3BG
[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0544	**DATE OF VISIT**	13/06/2019
SITE NO	FS1240	**SITE NAME**	Highland – River Cassely
INSPECTOR	[redacted]	**CASE NO**	20190189

Section 1: Summary

Following reports of increased wild Atlantic salmon mortalities from the Kyle of Sutherland District Salmon Fishery Board the Fish Health Inspectorate (FHI) were contacted on the 13th June 2019 to report a moribund salmon that had just been caught on the River Cassely with severe lesions, haemorrhaging and patches of fungus. Unfortunately when the inspector arrived the fish was dead, however a full set of diagnostic samples was taken as time of death was unknown and the fish had been reported to be alive earlier the same day.

Histopathology examination revealed cutaneous saprolegniasis.

The gill sample was screened for salmon gillpox virus (SGPV) by QPCR and tested positive. However, histopathology did not show tissue alteration consistent with clinical SPGV.

Microscopic examination revealed a fungus-like organism matching the characteristics of *Saprolegnia* sp.. However, the level and mixed nature of the growth would not suggest it to be the primary source of the clinical signs observed.

Yersinia ruckeri, *Flavobacterium psychrophilum* and *Aeromonas* sp. were isolated. *Yersinia ruckeri* and *Flavobacterium psychrophilum* are known to be the causative agents of enteric redmouth disease (ERDM) and rainbow trout fry syndrome (RTFS). *Aeromonas* sp. and *Saprolegnia* sp. are more commonly known as opportunist pathogens. However, the level and purity of growth would not suggest they are the primary cause of morbidity in this case.

Section 2: Case Detail

Observations

Following reports of increased mortality in wild Atlantic salmon at the River Cassely, one moribund fish was reported, examined and sampled on the 13th June 2019. Three fish with haemorrahging on the underside and in the fins had already been handed in to the Kyle of Sutherland DSFB and had been frozen. These fish were not sampled.

Externally examination of the fish sampled showed haemorrhaging on the ventral surface, severe lesions on the flank and pale gills. A fungus-like infection was also present on the flank and head.

Internally, haemorrhaging was observed on the liver, body wall and swim bladder. The swim bladder was also fluid filled.

Samples

Samples were collected according to the table below:

Fish number	Pool number	Facility number	Species	Stage	Origin
F1	P1	n/a	Atlantic salmon	4.5-6 kg	River Cassely

Results

Bacteriology: Kidney, gill, spleen and lesion material were inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated:

- *Yersinia ruckeri* (gill, spleen, kidney & lesion)
- *Flavobacterium psychrophilum* (spleen)
- *Aeromonas* sp. (spleen & kidney)

Saprolegnia sp. a fungal-like (oomycete) organism was also observed on plates taken from gill & kidney material.

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

Fish 1 tested positive by PCR (QPCR) for the following:

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	24.86	36.76	36.12	37.66	Positive

Case No:	2019-0189	Date of visit:	13/06/2019
Site No:	FS1240	Inspector:	[redacted]

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
MG_IHNQ	0/1	19/06/2019	[redacted]	19/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
MG_IPN	0/1	19/06/2019	[redacted]	19/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
MG_ISA	0/1	19/06/2019	[redacted]	19/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
MG_SAV	0/1	19/06/2019	[redacted]	19/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
MG_VHS	0/1	19/06/2019	[redacted]	19/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
BA_AERO SPP	1/1	27/06/2019	[redacted]	28/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
BA_YRUK	1/1	27/06/2019	[redacted]	28/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
BA_FPSY	1/1	27/06/2019	[redacted]	28/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
BA_SAPR	1/1	27/06/2019	[redacted]	28/06/2019	[redacted]	01/08/2019	[redacted]	[redacted]
GS	0/1	17/07/2019	[redacted]	25/07/2019	[redacted]	01/08/2019	[redacted]	[redacted]
NSIG	1/1	17/07/2019	[redacted]	25/07/2019	[redacted]	01/08/2019	[redacted]	[redacted]
SAPR (Histo)	1/1	17/07/2019	[redacted]	25/07/2019	[redacted]	01/08/2019	[redacted]	[redacted]
MG PMC	0/1	04/07/2019	[redacted]	25/07/2019	[redacted]	01/08/2019	[redacted]	[redacted]
MG PRV	0/1	04/07/2019	[redacted]	25/07/2019	[redacted]	01/08/2019	[redacted]	[redacted]
MG_SPVP	1/1	25/07/2019	[redacted]	25/07/2019	[redacted]	01/08/2019	[redacted]	[redacted]

Report Summary			
Case Type	Date	Insp	2nd Insp
DIA	01/08/2019	[redacted]	[redacted]

Additional Case Information:

Kyle of Sutherland DSFB contacted FHI on 13/06/2019 to report a moribund salmon that had just been caught on the river Cassely with severe lesions, haemorrhaging and patched of fungus. FHI inspected and samples taken the same day. The fish was dead on arrival but had been alive earlier in the day. Full set of samples taken as time of death was unknown. Three fish had already been handed into the fishery board and frozen. Fish handed in had haemorrahging on the underside and in the fins but no lesions. These fish were not sampled.

p51 to 73 via: https://www2.gov.scot/Resource/0054/00548048.pdf

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[redacted]
Helmsdale District Salmon Fishery Board
Borrobol
Kinbrace
Sutherland
KW11 6UB

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0544	**DATE OF VISIT**	04/06/2019
SITE NO	FS1240	**SITE NAME**	Highland – River Helmsdale
INSPECTOR	[redacted]	**CASE NO**	20190212

Section 1: Summary

Following a report of increased wild Atlantic salmon mortalities from the River Helmsdale District Salmon Fisheries Board on the 31st May 2019, Fish Health Inspectors visited the river on 4th June 2019. Two fish were caught by rod on 3rd June 2019 and held in tanks at the DSFB hatchery. One moribund fish with evidence of a fungus-like infection was removed from the river on the day of the inspection. All three fish were examined and diagnostic samples were taken.

Histopathology examination revealed mild myositis in F1 and F2. F3 showed an increase in inflammatory cells in the hematopoietic tissue of the kidney (nephritis), marked bacterial necrotising splenitis and minimal myocarditis. Cestoda parasites were seen but are known to live commensally. Myxosporidiosis was observed in the kidney of F1 and is likely incidental.

Parasitology examination identified the presence of cestode postlarvae of the species *Hepatoxylon squali* in F3. A plerocercoid of *H. squali* was also found embedded in the tissue of F1. The vent of F1 also showed heavy infestation of *Anisakis simplex*, while the vent of F2 showed a light infestation of the same parasite. These are not considered to have contributed to morbidity.

Yersinia ruckeri, *Aeromonas* spp., *Pseudomonas fluorescens* and *Saprolegnia* sp. were all identified on plates taken from F3 showing mixed levels of growth. No significant growth was observed on plates taken from F1 and F2. It should be noted that *Yersinia ruckeri* is a primary fish pathogen and that *Aeromonas* spp. at the level observed would probably have had an impact on the health of F3.

Observations

Following reports of increased mortality in wild Atlantic salmon at the River Helmsdale, three fish were examined and diagnostic sampling was carried out. F1 and F2 were rod-caught on the 3rd June 2019 from Beat 3 above and Beat 5 lower respectively, and held in tanks until the time of sampling. F3 was moribund, and netted from the river (Beat 4 above) on the 4th June 2019 while inspectors were on site.

Bailiffs informed the inspectors that they had recovered between 50-60 dead and moribund salmon from the river since the beginning of May 2019, all of which appeared to be fresh run from the sea. It was also noted that water levels in the river had been good, and no significant fluctuations in water temperature had been recorded over this period.

Externally, haemorrhaging was observed along the ventral surface and the base of the fins in all three fish. The vent in all three fish was also observed to be inflamed and the gills in F3 were markedly pale in colour. F3 showed evidence of a fungus-like infection on the flank and belly.

Internally, petechial haemorrhaging was observed in the liver of all three fish and in the pyloric caeca of F2. The spleen was enlarged in F3 and none of the fish sampled had any food in their gut. Parasites were noted in F1 and F3.

Samples

Samples were collected from 3 fish according to the table below:

Fish number	Pool number	Species	Stage	Origin
F1-3	P1	Atlantic salmon	4.5-6kg	River Helmsdale

Results

Bacteriology: Kidney, gill, spleen and lesion material from F1-3 were inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated from fish F3:

- *Yersinia ruckeri* (Kidney, Spleen, Lesion)
- *Aeromonas* spp. (Kidney, Spleen, Lesion)
- *Pseudomonas fluorescens* (Gill)
- *Saprolegnia* sp. (Lesion)

Additional Case Information:

River Helmsdale DSFB contacted FHI on 31/05/2019 to report an increase of wild atlantic salmon mortality beginning in May. Bailffs have recovered 50-60 dead and moribund salmon, all affected salmon appear to be fresh run from the sea, with evidence of a fungus-like infection and haemorrhaging/physical damage on the belly. Water levels in the river have been good, it is not expected that there have been any major fluctuations in water temperature over this period.
FHI attended the Helmsdale DSFB hatchery (FS1184) on 04/06/2019. Two fish caught by rod on 03/06/2019 (F1 - Beat 3 above and (F2 - Beat 5 lower) were held in one of the hatchery tanks. Both fish showed evidence of haemorrhaging/physical damage on belly and around vent, the fish appeared in good condition apart from this and were very active in the holding tank. A third fish (F3 - Beat 4 above) was netted from the river on the 04/06/2019 during the inspection, the fish was moribund and showed signs of a fungus-like infection on the head, flank and belly. Sampling carried out on all 3 fish. Fish were dispatched one at a time immediately before sampling.
F1 sampled by JET, F2-3 sampled carried out by NYL, supervised by JET. Casesheet completed by JET.

Salmon gill poxvirus PCR test carried out after case originally closed. Additional testing carried out due to salmon gillpox virus pathology being observed in another wild fish diagnostic case (2019-0322), gill material from pevious wild fish cases was re-read, with similar gill pathology observed in F3 from this case. PCR test confirmed the result. Updated fish health report issued.

Case No: 2019-0212 Date of visit: 04/06/2019

Site No: FS1240 Inspector: [redacted]

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
MG_IHN	0/1	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
MG_IPN	0/1	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
MG_ISA	0/1	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
MG_SAV	0/1	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
MG_VHS	0/1	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
HIST_BACT	1/3	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
HIST_SPAT	1/3	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
HIST_KPAT	1/3	10/06/2019	[redacted]	10/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
BACT_YRUK	1/3	20/06/2019	[redacted]	20/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
BACT_SAPR	1/3	20/06/2019	[redacted]	20/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
BACT_PSFL	1/3	20/06/2019	[redacted]	20/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
BACT_AERO	1/3	24/06/2019	[redacted]	24/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
BACT_AERO	1/3	24/06/2019	[redacted]	24/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
PARA_HEPA	2/3	12/06/2019	[redacted]	12/06/2019	[redacted]	18/07/2019	[redacted]	[redacted]
MG_PRV PMCV	0/3	09/07/2019	[redacted]	11/07/2019	[redacted]	18/07/2019	[redacted]	[redacted]
PARA_ANIP	2/3	11/07/2019	[redacted]	11/07/2019	[redacted]	18/07/2019	[redacted]	[redacted]
PA_GS	0/2	18/07/2019	[redacted]	18/07/2019	[redacted]	18/07/2019	[redacted]	[redacted]
MG_SAL_POX	1/1	02/08/2019	[redacted]	02/08/2019	[redacted]	02/08/2019	[redacted]	[redacted]

Report Summary			
Case Type	Date	Insp	2nd Insp
DIA	18/07/2019	[redacted]	[redacted]
DIA update	02/08/2019	[redacted]	[redacted]

Cases 20190273-20190310

p82 to 98 via https://www2.gov.scot/Resource/0054/00548049.pdf

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[redacted]
Dee District Salmon Fishery Board
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[redacted]

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0544	**DATE OF VISIT**	19/06/2019
SITE NO	FS1239	**SITE NAME**	Grampian, River Dee
INSPECTOR	[redacted]	**CASE NO**	20190306

Section 1: Summary

Following notification of the capture of one wild Atlantic salmon showing haemorrhaging on the ventral surface on the River Dee samples were collected for diagnostic purposes.

Histopathology examination revealed minor hepatitis and some minor gill inflammation.

A motile *Aeromonas* sp. and *Hafnia* sp. were isolated. Although some species of either genera are known to be pathogenic to fish, the level and mixed nature of the growth would not suggest them to be the primary source of the clinical signs observed.

Microscopic examination revealed a fungus-like organism matching the characteristics of *Saprolegnia* sp. on plates taken from lesion material. However, the level and mixed nature of the growth would not suggest it to be the primary source of the clinical signs observed.

A parasite collected free in the body cavity was identified as *Eubothrium crassum*, which in large numbers may have an effect on performance and survival in salmonids.

Marine Scotland Science Fish Health Inspectorate was notified by the Dee District Salmon Fishery Board on the 19 June 2019 that an Atlantic salmon with ventral haemorrhaging was caught on the River Dee near Potarch. The fish was not moribund or lethargic and had been line caught. Due to recent concerns regarding wild Atlantic salmon displaying similar clinical signs the

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decision was taken to collect samples. The fish was kept in a keep net at the river bank until inspectors arrived in the afternoon to conduct a full diagnostic sample.

Externally the fish showed haemorrhaging on the ventral surface and around the base of the pelvic fins, with beginnings of a small lesion at the base of one pelvic fin. The gills were slightly pale. Internally, petechial haemorrhaging was present on the liver and the spleen was enlarged. Some parasites were observed free in the body cavity.

Samples

Samples were collected according to the table below:

Fish number	Pool number	Species	Stage	Origin
F1	P1	Atlantic salmon	2.2+ *	River Dee, near Potarch

* as determined by scale reading, the salmon spent 2 years in freshwater before going to sea as a smolt, it subsequently spent 2+ years at sea before returning to freshwater as an adult

Results

Bacteriology: Kidney, gill, spleen and lesion material was inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated:

- *Aeromonas* sp. (lesion)
- Hafnia sp. (lesion)

Saprolegnia sp. a fungal-like (oomycete) organism was also observed on lesion plates.

Additional Case Information:

Line caught Atlantic salmon caught on the River Dee (NO600979) with ventral haemorrhaging reported to the MSS FHI on 19/6/19 by Dee DSFB [redacted] Fish was not moribund or lethargic. Fish was kept in a keepnet and was still alive on arrival of inspector onsite.

2019-0306 Wild fish diagnostic (F1) – River Dee