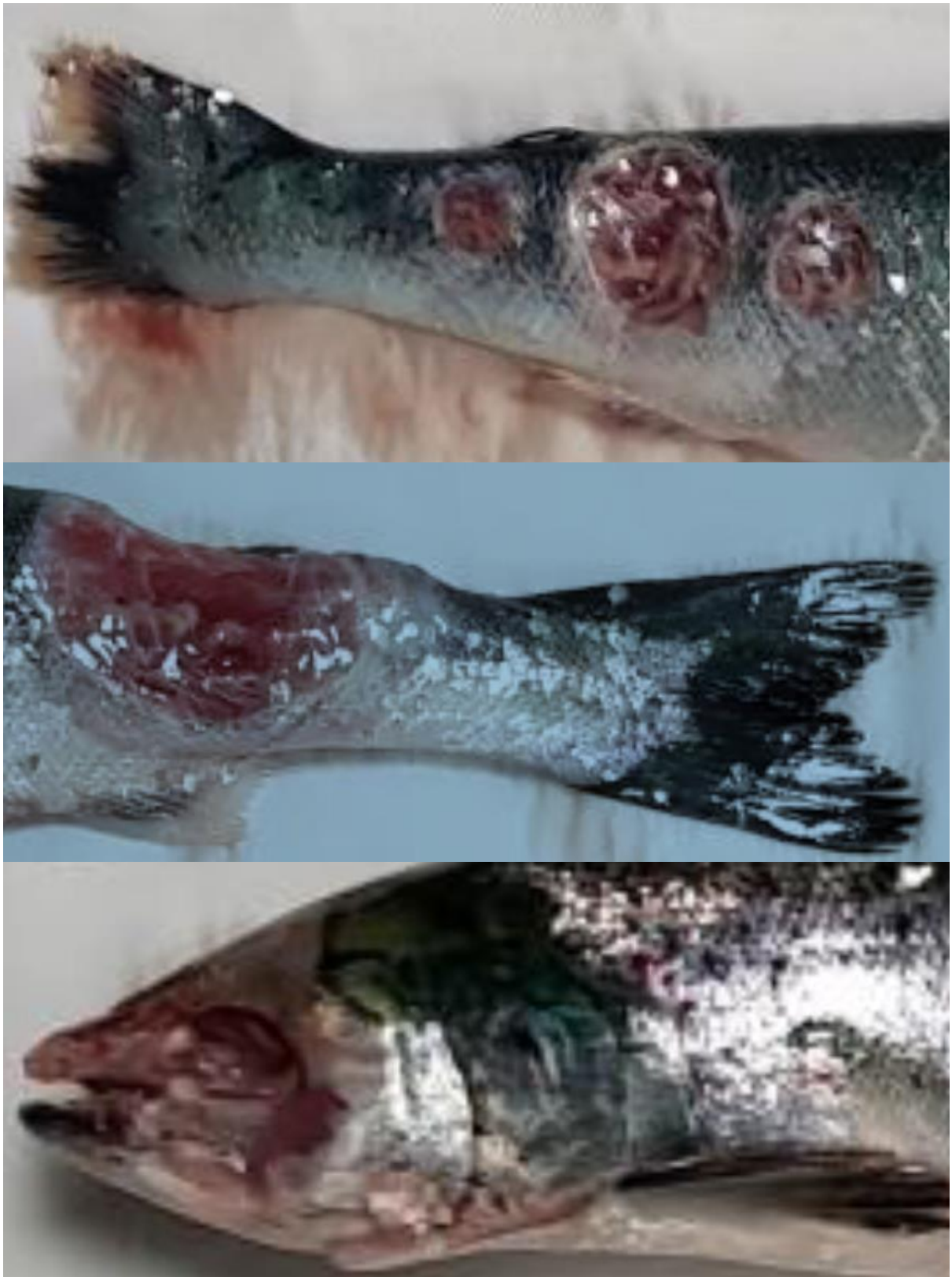
Scottish Salmon Watch, August 2018

HARD EVIDENCE: PHOTOS OF DISEASED & DEFORMED SCOTTISH SALMON



Photos disclosed by the Scottish Government via FOI (FOI-18-01782) on 2 August 2018 - made available [online via Dropbox]

Fol 18 01782

Sorted by name


2016-0098-photos-Sgian... bh.pdf


2016-0118-photos- Yett... art.pdf


2016-0170-photos-Marin... Lab.pdf


2016-0263-photos- Kirk... ter.pdf


2016-0322-photos- Djub... ick.pdf


2016-0393-photos- East... irth.pdf


2016-0444-photos-Trille... or.pdf


2016-0455-photos- Furn... rry.pdf


2016-0456-photos- Ardg... en.pdf


2016-0460-photos- Glen... Bay.pdf


2016-0463-photos- Meil Bay.pdf


2016-0590-photos- Uye... Isle.pdf


2018-0078-photos- Tarb... uth.pdf


2018-0113-photos- Mea... yne.pdf

The Scottish Government's FOI reply dated 2 August 2018 included:

Response to your request

Please find the attached web link containing photographs which have been taken as part of the Fish Health Inspectorate's statutory inspection programme. For the time period of the requests we have released all photographs associated with cases which are completed and published in accordance with the FHI case publication plan, where by those photographs relate to images of diseased farmed salmon. The photographs are grouped according to their case number which is a unique number identifying any one particular FHI visit. Please note that we do hold some additional photographs which relate to this request but these have been provided to you previously through our response to FoI/18/01141.

The images should be viewed in line with the case inspection notes – available at http://www.gov.scot/Topics/marine/Fish-Shellfish/FHI/CaseInformation which provide additional context to the population of fish stocked on site at the point of inspection, as well as the findings and observations from the inspection and sampling undertaken.

The Fish Health Inspectorate's (FHI) mission is to support the Scottish Government's vision of a sustainable, growing and diverse aquaculture industry whilst maintaining the high health status of farmed and wild fish and shellfish stocks in Scotland by preventing the introduction and spread of listed and emerging diseases. The FHI do this by undertaking statutory inspection and sampling programmes, providing advice to stakeholders and implementing regulatory functions in accordance with the current aquaculture and aquatic animal health regulations.

The attached images have been identified as within scope of this request. The majority show fish which have been removed and euthanised for post mortem analysis and investigative testing by the FHI.

Photographs are taken as they are a useful tool in the analytical process and it is important to view these photographs in context. The photographs attached have been taken as part of the Fish Health Inspectorate's risk based surveillance programme, which involved 160 inspections relating to fish farms in 2017.

In the wild, the reproductive strategy of fish, particularly salmon, is to produce a large number of offspring with the aim that a proportion will survive to adulthood. Fish are subject to a number of pressures in the environment, particularly naturally present pathogens and other environmental parameters, with farmed fish being no exception. It can therefore be expected that some fish will experience challenges to good health. Those fish which have been removed by the FHI represent a very small proportion of the total number of fish on an aquaculture site (for example 5 fish from sites holding between 250,000 to 1.8 million fish). The images attached do not present any human health concerns and are not a representation of the entire fish population on site.

In many cases these actions have been undertaken in support of on-going investigations which were being conducted by the farm veterinarian and in-house animal health professionals.

The photographs can be accessed through the following weblink:

Marine Laboratory, 375 Victoria Road,
Aberdeen AB11 9DB
www.gov.scot/marinescotland

https://www.dropbox.com/sh/roj2qg783oh04fh/AAA8TbtL-EKVydWyEgNVSq1Ga?dl=0

Read the Scottish Government's letter in full via:

FoI-18-01782 and
FoI-18-01869 reply.p

Note the photos can be cross-referenced with the [Fish Health Inspectorate's 'Case Information'] which provides more context:

#1 (2016-0098) - Sgian Dubh (Scottish Salmon Company)

2016-0098-photos-Sgian Dubh.pdf

FHI Case Information online via https://www.gov.scot/Resource/0050/00508590.pdf (p28 onwards)

Photos include:


1
3


1
3
2


2


3


2

The Fisheries Health Inspectorate Case Information (p28 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0098							Date of visit:	06/04/2016		
Time spent on site:	4 hours							Main Inspector:	SJD		
Site No:	FS1281	Site Name:	Sgian Dubh								
Business No:	FB0169	Business Name:	The Scottish Salmon Company								
Case Types:	1 VMD	2 DIA	3	4	5	6					
Water Temp (°C):	8.1	Thermometer No:	Site					FHI 045 completed			
Observations:		Region:	ST		Water type:	S		CoGP MA:	M-45		
Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.									
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.									
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.									
Diagnostic samples taken?	Y										

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Additional Case Information:

Surveillance frequency completed as noted that different frequency from Strone Point. Changed Strone from medium to low as no longer so many movements between the sites. Sgian Dubh remains as low.
Treatment in November (peroxide) and graded November/December - lesions present since then. Morts going for incineration as ensiler limited volume.
Peroxide treatment in November - high mortality ~92000.
~121000 morts due to physical damage/grading - since input.
Skamic lice removal system used in March - good results. Lower mortalities than peroxide.
Ensiled waste - goes to Secanim at Widnes.
Slice treatments on input, then August 15, Oct 15 and Jan 16.
Morts removed daily using uplift system and staff remove moribunds when seen. Morts had been removed already so not many moribunds seen. Several fish (not-moribund or lethargic) seen with physical damage. 3 fish taken for diagnostic samples (2 with lesions, 1 without).
Results of surveillance not checked as paperwork completed before doing diagnostic sampling.

"Lesions from physical damage"

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[redacted]

FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	**DATE OF VISIT**	06/04/2016
SITE NO	FS1281	**SITE NAME**	Sgian Dubh
INSPECTOR	Sonia Duguid	**CASE NO**	20160098

Section 1: Summary

During an inspection of the above site for sampling for veterinary residues three moribund fish were sampled for diagnostic investigation as the site had been suffering from increased mortality. The site was attributing the mortality to physical damage following treatment and grading. Several fish were seen across the site with apparent physical damage, although most were not moribund or lethargic.

Histological examination revealed that fish were compromised by skin lesions with loss of epithelium and subsequent bacterial infection. An isolate identified as *Vibrio* sp. was cultured from kidney material of 2/3 fish. It was also isolated from gill and lesion.

Please contact myself or the duty inspector should you require any further information, have any queries regarding this report or if any problems develop.

Section 2: Case Detail

Observations

The above site was visited to conduct sampling for veterinary residues. Inspection of the mortality records showed that the site had been experiencing elevated mortality which was being attributed to physical damage following treatment and grading.

The site had treated with peroxide in November 2015 and graded in November/December 2015. Lesions had been observed in the population since then. Following the peroxide treatment in November approximately 92000 mortalities were recorded. A total of approximately 121000 mortalities have been attributed to physical damage or grading since stock input in spring 2015.

On inspection of the site several fish were observed with apparent physical damage. Most of those observed were not moribund or lethargic. Mortalities and moribund fish had already been

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

removed that day, prior to the inspection. However, three moribund fish were removed for diagnostic sampling.

Externally fish 1 and 2 had lesions on the flank and scale oedema. Fish 3 was dark in colour and anorexic.

Internally fish 2 and 3 had yellow pseudo-faeces present and none of the fish had food present in the gut.

Histopathological examination revealed the following:

Gill: Presence of mixed aneurysms (F1 & F2). Basal hyperplasia and F1 showed apically moderate hyperplasia with lamellae fusion. Free blood among gill filaments and some lamellae congestion were also observed.

Skin & Muscle: Partial or total absence of epidermis, thick dermis with oedema and presence of mixed bacteria, congested hypodermis, cell infiltration and haemorrhage in skeletal muscle (F1 & F2). F3 within normal range.

Liver: Focal liver necrosis (F2) and area of haemorrhage, few scattered apoptotic cells and minor vacuolation (F1). F3 within normal range.

Kidney: Few scattered shrunken glomeruli and few tubule with dilated lumen (F2)

Spleen: Congested in two fish (F1 & F2)

Gut and pyloric caeca: Within normal range.

Pancreas: Within the normal range.

Heart: cell Infiltration in spongy layer of ventricle (F1 & F2)

Signed: [redacted] Date: 22/06/2016
Fish Health Inspector

#2 - (2016-0118): Yetts O Muckart (Cooke Aquaculture)

2016-0118-photos- Yetts O Muckart.pdf

FHI Case Information online via https://www.gov.scot/Resource/0050/00503689.pdf (p51 onwards)

Photos included:

Fisheries Health Inspectorate Case Information (p57 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0118							Date of visit:	15/03/2016
Time spent on site:	6hrs					Main Inspector:			SAE
Site No:	FS0371	Site Name:	Yetts O' Muckart						
Business No:	FB0235	Business Name:	Cooke Aquaculture (Freshwater) Ltd						
Case Types:	1 ECI	2 CNI	3 VMD	4 DIA	5	6			
Water Temp (°C):	4.6	Thermometer No:	Site			FHI 045 completed			
Observations:		Region:	CE	Water type:	F	CoGP MA			

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

4. Recent mortality (last 4 wks): around 30 morts per day per site, mostly attributed to HSS

5. Evidence of recent increased/atypical mortalities? Y

If yes, facility nos/no mortality per facility/no stock per facility/reason:

wk19 2015 1,417 per site per week transport morts and input; increase in July-October 2015 approximately 1,000-3,000 morts per week per site due to increased problems with fungus post grading; some issues with RTFS in July &August, issues with lesions in August; wk40 2015 6,259 morts per site per week due to fungus; mortalities decreasing to normal levels in November; wk2 2016 1,900 morts per site due to issue with probe causing low oxygen in one tank, total morts in C4 due to low oxygen 1663;

6. Any other peaks in mortality during period checked? Y

If yes, detail: wk24 2014 1,355 morts per site per week due to fungus; wk30 2014 1,608 morts per site per week due to fungus & HSS; morts elevated throughout August and September 2014 between 1,000-2,000 per site per week due to fungus, HSS + Furunculosis; October 2014 morts still high; wk 40 2014 29,676 morts per site per week due to fungus, HSS + Furunculosis; back down to below 1,000 morts per site per week in November 2014; back down to normal numbers in December 2014.

3. Any significant results? Y

If yes, detail (if not detailed under recent disease problems). Fungus, HSS, RTFS, Furunculosis, lesions

2015: some issues with lesions, RTFS(FVG report from 28/7/15), HSS (FVG report from 8/4/15) and fungus (see mort details), some opercula (FVG report from 14/7/15) and fin erosion noted (FVG report 2/11/15); 2014: waterborne insult in July 2014, Furunculosis October 2014, some HSS, fungus

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[redacted]

FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0235	DATE OF VISIT	15/03/2016
SITE NO	FS0371	SITE NAME	Yetts O' Muckart
INSPECTOR	Svenja Elwenn	CASE NO	20160118

Section 1: Summary

During a routine site inspection a moribund fish was observed and removed for diagnostic sampling. Histopathology indicates evidence of kidney necrosis and vaccine adjuvant reaction. Some features resembling haemorrhagic smolt syndrome (HSS) were also observed.

Section 2: Case Detail

Observations

Yetts O' Muckart was visited in accordance with the Aquatic Animal Health (Scotland) Regulations 2009, and to meet the requirements of European Community Council Directive 2006/88/EC. Inspection of the site records indicated mortality levels were not particularly elevated, however approximately 30 mortalities for the site per day were being experienced. The majority of these mortalities were attributed to HSS.

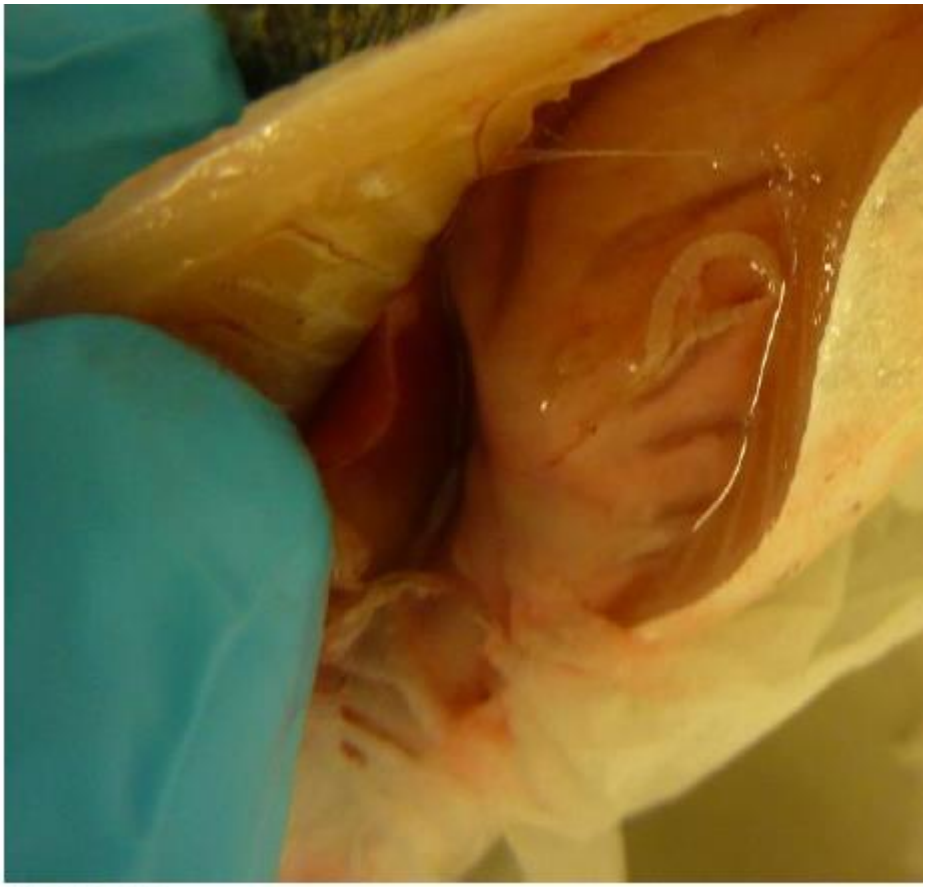
On inspection one moribund fish was observed and was removed for further examination. Externally this fish has an distended abdomen, haemorrhaging on the throat, ventrum and base of the fins and pale necrotic gills. The vent was also inflamed. Internally the fish had ascites and haemorrhaging on the pyloric caeca.

#3 (2016-0170) Marine Scotland Laboratory:

2016-0170-photos-Marine Scotland Marine Lab.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00512983.pdf (p1 onwards)

Photos included:



Parasite

Fisheries Health Inspectorate Case Information (p1 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0170								Date of visit:	09/08/2016	
Time spent on site:	1 hour							Main Inspector:		JMS	
Site No:	FS0943	Site Name:	Marine Scotland Marine Laboratory								
Business No:	FB0394	Business Name:	Marine Scotland Marine Laboratory								
Case Types:	1 DIA	2 REP	3	4	5	6					
Water Temp (°C):	10.9	Thermometer No:	Site				FHI 045 completed				
Observations:		Region:	GR	Water type:	B		CoGP MA				

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Additional Case Information:

Two dead salmon were sampled from the Aquarium. One died 08/08/16 and one died morning of 09/08/16. Both fish had been kept in the fridge. Fish appeared slightly thin and had ragged fins, no food was present in the gut of either fish and F2 had what looked like a tapeworm. F1 had a large lesion behind the right pectoral fin, F2 had a small pinpoint lesion behind the right pectoral fin.
Fish transferred to site from Arkaig on 29/03/2016
Sampling carried out by DCB, Paperwork JMS

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Additional comments:

Yellow hue over ventral surface of F1. Both fish had ragged fins. F1 had a large lesion behind right pectral fin. F2 had small pinpoint lesion behind right pectrol fin. F2 had a tapeworm in the gut.

#4 (2016-0263) Kirbister (Cooke Aquaculture):

2016-0263-photos- Kirkabister.pdf

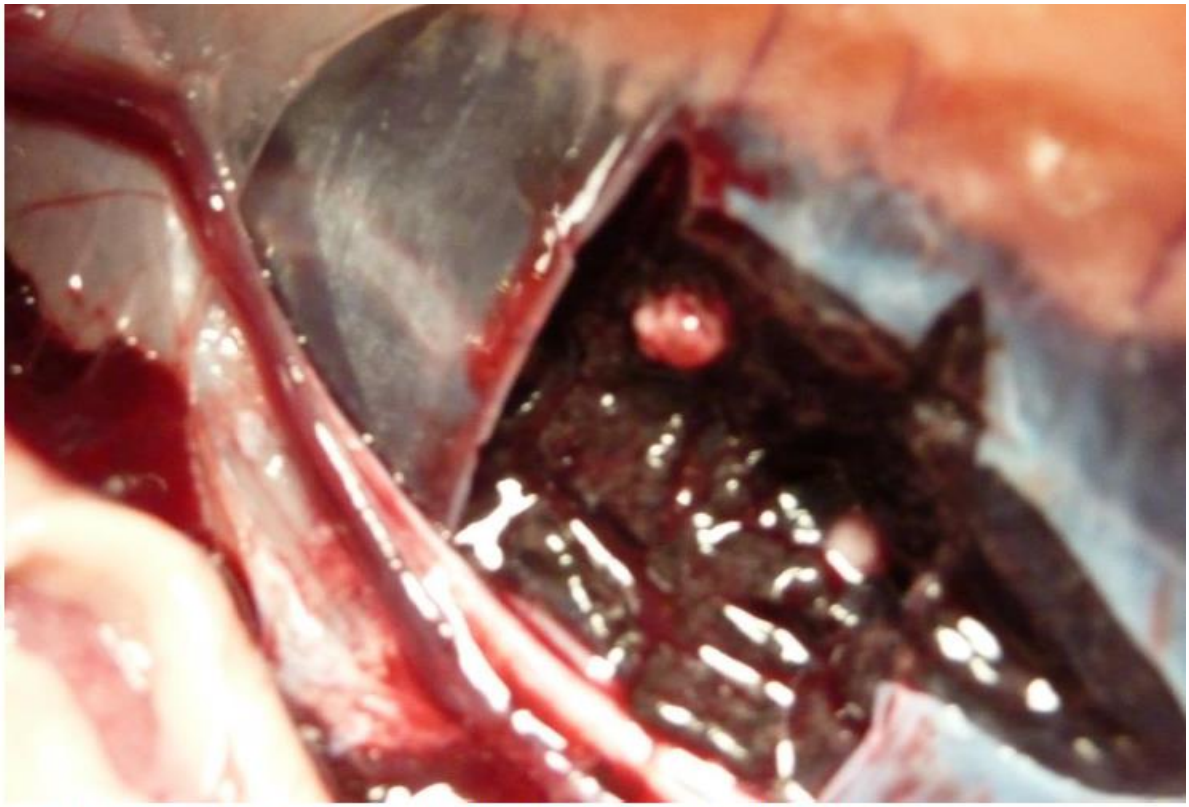
FHI Case Information online via https://www.gov.scot/Resource/0050/00508592.pdf (p 153 onwards)

Photos included:

F1 Inflamed vent and haemorrhaging

F1 haemorrhaging at the throat

F2 Haemorrhaging



F3 white object found in kidney, histology sample taken

F4 haemorrhaging and lesion

Fisheries Health Inspectorate Case Information (p153 onwards) included:

Case No:	2016-0263			Date of visit:	28/06/2016
Time spent on site:	4 Hours			Main Inspector:	SAE
Site No:	FS0802	Site Name:	Kirkabister		
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd		

Case Types:	1	VMD	2	REP	3	MRT	4	DIA	5		6	

Water Temp (°C):	10.3	Thermometer No:	T205	FHI 045 completed	
Observations:		Region:	SH	Water type: S	CoGP MA: S-3

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

FHI 059, Version 10 Issued by: FHI Date of issue: 12/02/2016

Additional Case Information:

Authorisation for 12 x 80 m grids, now have 10 x 90m circles.

Paperwork by DCB, supervised by SAE. Site inspection by DCB & SAE. Diagnostic sample F1 & F2 by DCB. Diagnostic sample F3, F4 & F5 by SAE. VMD sampled by DCB.

Considerable number of lethargic and moribund fish observed in all cages. Fish removed from several cages for diagnostic sampling. Large number of runts observed in all cages.

3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	Mortality has been increased due to CMS. It has averaged 2350 per week across the whole site for the last 4 weeks.
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
Cages 5 and 6 showing the highest level of mortality with figures between 200-500 per week, this has been attributed to CMS.. Rest of the cages averaging around 150 fish per cage, per week.	
6. Any other peaks in mortality during period checked?	Y
If yes, detail:	2nd sept 2015, 8108 morts for the site. 16 sept 2015, 3392 morts for the site, previous mort case reported.

FHI 059, Version 10 Issued by: FHI Date of issue: 12/02/2016

Additional comments:

F2 melanin on PC, F3 round objects in kidney

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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 were observed, however these are thought not to be fish pathogens.

Section 2: Case Detail

Observations

The site was visited for the collection of VMD samples for residue analysis. Increased mortality had also been reported from the site, which was attributed to CMS. Mortality levels were still elevated at the time of the visit and CMS had been diagnosed on site. Moribund and lethargic fish were observed in most cages. Five moribund and lethargic fish were removed for diagnostic sampling.

Externally haemorrhaging was observed on the throat of F1-F3 and F5, as well as haemorrhaging on the ventrum of F1 – F3 and at the base of the fins of F2 and F5. The gills appeared pale, zoned and necrotic in F1 and F3. F5 also had zoned gills. A lesion on the flank was observed on F4. F1 had an inflamed vent and all fish had a high lice burden between 5-15 lice (all stages) per fish.

R09

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

Internal gross pathology showed bloody ascites in all fish. Abnormalities to the heart were observed in F2, F3 and F5. F2 had petechial haemorrhaging on the liver and showed some tissue breakdown. F1 and F3 showed petechial haemorrhaging on the pyloric caeca. An enlarged spleen was observed in F1, F3 – F4. Yellow pseudo-faeces were observed in F4. Haemorrhaging of the body wall was observed in F1 and F3.

Results

Virology: Tissue samples were tested for the presence of viral haemorrhagic septicaemia virus (VHSv), infectious haematopoietic necrosis virus (IHNv) and infectious pancreatic necrosis virus (IPNv) by cell culture.

IPNv was identified from P1.

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

The following bacteria were isolated:

- Unidentified bacteria from F4 (kidney and lesion)
- Unidentified bacteria from F1 & F5 (gill); F2 (kidney and gill); F4 (kidney, lesion and gill)

Molecular Genetics: Tissue samples were tested for segments of RNA indicative of the presence of infectious salmon anaemia virus (ISAv) and salmonid alphavirus (SAV) using real-time PCR (QPCR). Further tests were conducted for piscine myocarditis virus (PMV) and piscine reovirus (PRV).

PMV and PRV were identified from P1.

Histopathological examination by light microscopy revealed the following:

Gill: Presence of few aneurysms (F3 & F4), gill filament congestion (F2), some epithelial lifting, likely post-mortem artefact (F1-F4), basal hyperplasia (F1-F4).

R09
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Skin & Muscle: Partial erosion of epidermal layer (F1 & F5) and absence in F4. F4 showed dermal oedema with a minor cell infiltration and skeletal muscle degeneration with severe cell infiltration (myositis). Few scattered white fibres with degeneration also noted in F1 & F2.
Liver: Minor to diffuse hepatocyte vacuolation and multifocal necrosis with pyknotic nuclei (F1& F2). F3 showed some capillary dilation.
Kidney: Within normal range.
Spleen: Minor congestion (F1 - F5), sparse white pulp (F1, F2 & F5).
Gut and pyloric caeca: Some cell sloughing.
Pancreas: Within normal range.
Heart: Pericarditis (F1-F5), diffuse degeneration of trabecular myocardium and inflammation at the spongy layer of ventricle and atrium (F1-F3). F4 showed multiple focus of myocardial degeneration and cell infiltration at the spongy layer and clots of blood in bulbous. Increase number of eosinophilic granular cells noted in bulbous of F1. F3 showed a trombus in the atrium.

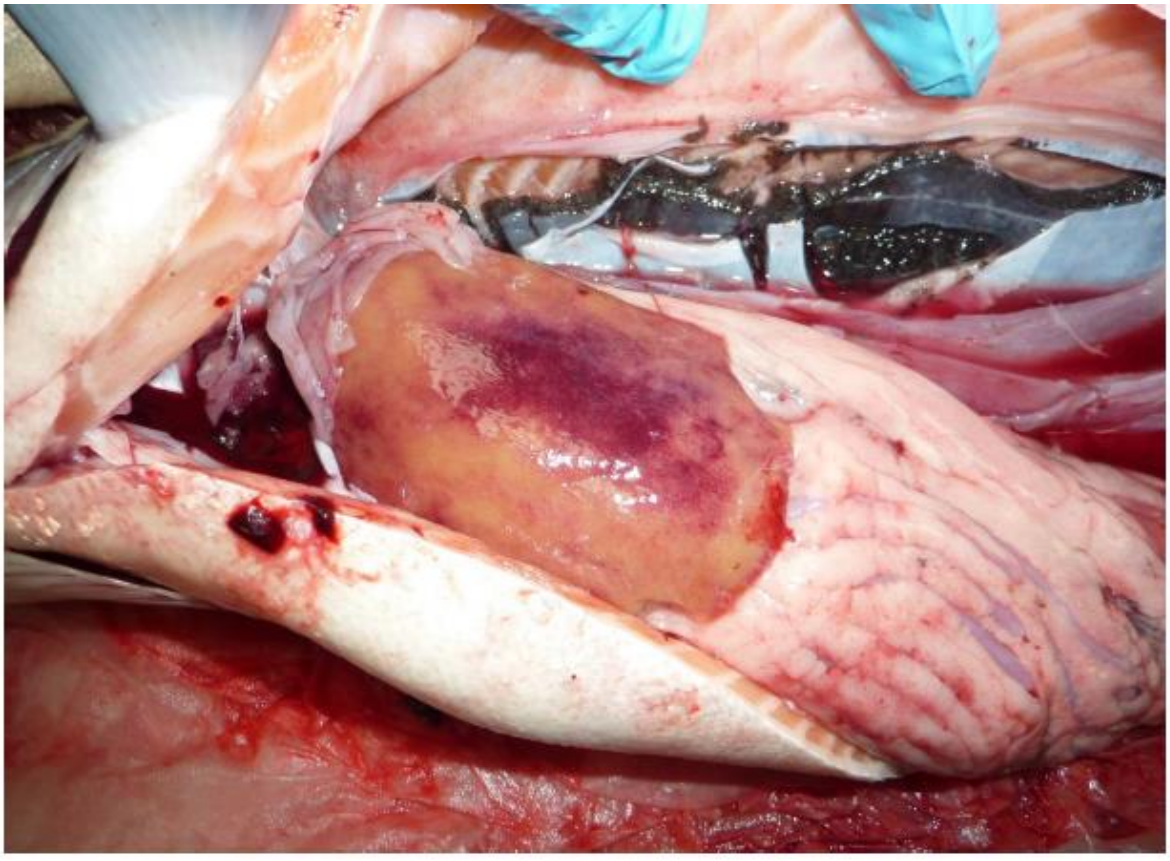
Signed: [redacted] Date: 28/07/2016
Fish Health Inspector

#5 (2016-0322) Djubawick (Cooke Aquaculture):

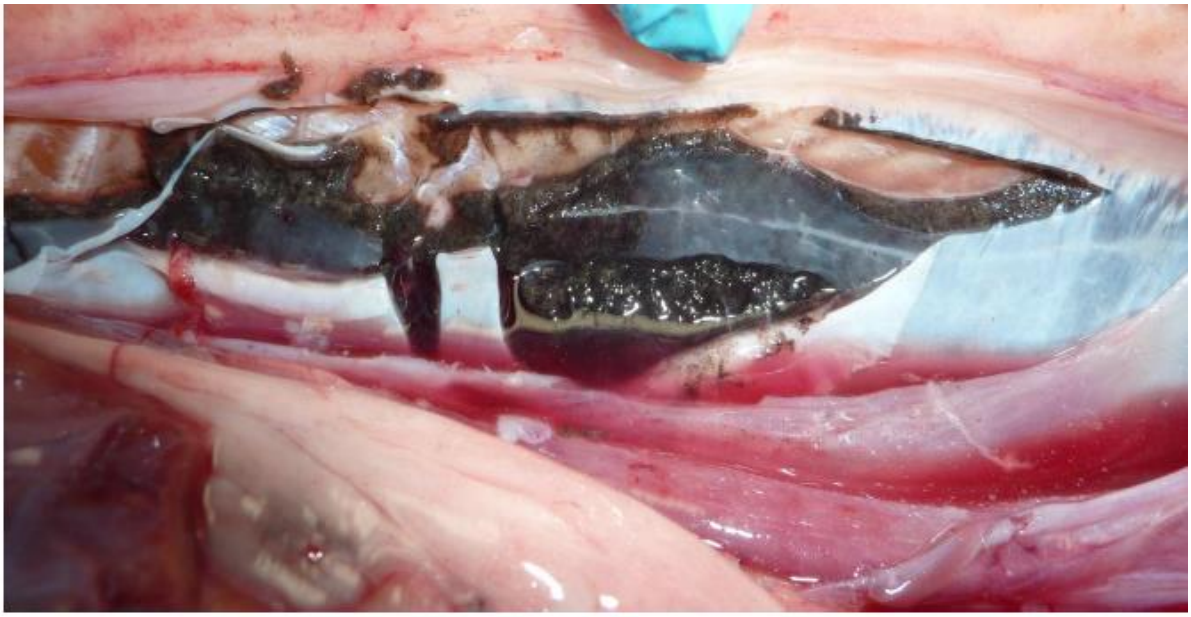
2016-0322-photos- Djubawick.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00512991.pdf (p96 onwards)

Photos included:



Fish 2 – Haemorrhaging on liver



Fish 2 kidney

Fisheries Health Inspectorate Case Information included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0322								Date of visit:	21/07/2016	
Time spent on site:	5 hours							Main Inspector:		ALW	
Site No:	FS0656	Site Name:	Djubawick								
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd								
Case Types:	1 REP	2 ECI	3 CNI	4 SLI	5 VMD	6 DIA					
Water Temp (°C):	11.4	Thermometer No:	T148					FHI 045 completed			
Observations:		Region:	SH	Water type:	S		CoGP MA	S-3			

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

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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.

Section 2: Case Detail

Observations

The site was inspected following a report from the operator of increased mortality levels. Mortalities earlier in the year had been attributed to an algal bloom and predation, but recent mortalities were attributed to pancreas disease (PD) and CMS. Fish had been treated for amoebic gill disease (AGD) just prior to the inspection.

A few fish were observed in the cages with physical damage and some anorexic fish were also observed. Three lethargic fish were removed for diagnostic sampling. Fish one was dark and anorexic with a lack of fat on the pyloric caeca and yellow pseudo-faeces in the gut. Fish two had bloody ascites internally, a fluid filled swim bladder and a grey kidney covered with a pseudomembrane. Fish three was anorexic with shortened gill opercula and a pale liver and yellow pseudo-faeces in the gut.

Results

Virology: Tissue samples were tested for the presence of viral haemorrhagic septicaemia virus (VHSv), infectious haematopoietic necrosis virus (IHNv) and infectious pancreatic necrosis virus (IPNv) by cell culture.

Pool 1 was positive for IPNv.

Bacteriology: Kidney and gill material from fish one to three was inoculated onto appropriate media for the isolation of bacteria.

No significant bacteria were isolated.

Molecular Genetics: Tissue samples were tested for segments of RNA indicative of the presence of infectious salmon anaemia virus (ISAv) and salmonid alphavirus (SAV) using real-time PCR (QPCR). Further tests were conducted for piscine myocarditis virus (PMV) and piscine reovirus (PRV).

Pool 1 was positive for SAV, PMV and PRV.

Histopathological examination revealed the following:

Gill: Presence of few aneurysms (Fish 1 & 2), basal hyperplasia (Fish 2 & 3) and focus of hyperplasia and lamellae fusion (Fish 1).

Skin & Muscle: Few scattered white fibres with degeneration noted in Fish 2 & 3.

Liver: Diffuse hepatocyte vacuolation (Fish 3) and widespread multifocal necrosis with pyknotic nuclei and thick capsule (Fish 2) and in Fish 1 noted foci of sinusoidal congestion.

Kidney: Increase number of melanomacrophages (Fish 1) and minor tubule dilation (Fish 1 & 3).

R09
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Website - www.gov.scot/Topics/marine/science

Spleen: Sparse white pulp and evidences of erythrophagocytosis (Fish 2).

Gut and pyloric caeca: Hindgut of Fish 2 with intestinal folds and submucosa congested. Absence of peripancreatic fat in Fish 1.

Pancreas: Periacinar tissues fibrosis and loss of pancreatic cells noted in Fish 1.

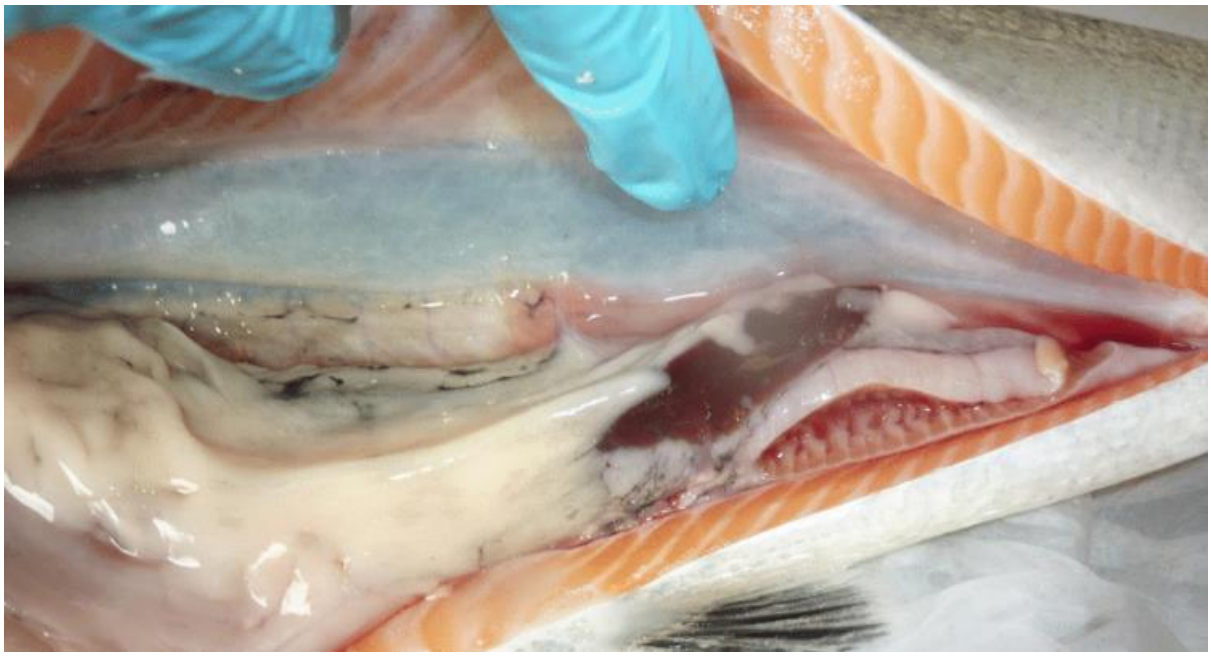
Heart: Pericarditis (Fish 2), diffuse degeneration of trabecular myocardium and inflammation at the spongy layer of ventricle (marked endocarditis) and atrium (Fish 2), presence of trombus in the atrium (Fish 2). Fish 1 showed focus of hypercellularity of myocardial cells and cell infiltration, mainly in ventricle.

#6 (2016-0393) East Voe Laxfirth (Grieg Seafood):

2016-0393-photos- East Voe Laxfirth.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00512992.pdf (p175 onwards)

Photos included:



Fisheries Health Inspectorate Case Information (p175 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0393								Date of visit:	13/09/2016	
Time spent on site:	4 hours							Main Inspector:		JET	
Site No:	FS0333	Site Name:	East Voe Laxfirth								
Business No:	FB0440	Business Name:	Grieg Seafood Shetland Ltd								
Case Types:	1 ECI	2 CNI	3 SLI	4 VMD	5 DIA	6 MOV					
Water Temp (°C):	12.2	Thermometer No:	T172				FHI 045 completed				
Observations:		Region:	SH	Water type:	S		CoGP MA:	S-9			

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Additional Case Information:

Site manager advised to inform FHI of any future increased mortality events.

Adult female lice numbers increase above suggested criteria for treatment 27/01/16, treated with peroxide 03/03, numbers drop below suggested criteria. 02/05 adult female numbers above suggested criteria for treatment, treated with slice, but adult female numbers continued to increase. Warm water treatments 22/06 bring numbers below suggested criteria. Adult female lice numbers increase above suggestred criteria 13/07, warm water treatment brings numbers down below suggested criteria. Warm water treatments again 22/08, as adult female numbers just above suggested criteria.
Moribund and lethargic fish observed across site, diagnostic samples taken.

Total mortality during event (if available):	Additional information (e.g. action taken by company):	Action taken by FHI (include case no where applicable):
4554	Company vets and Norwegian vets from Optimar attended site.	Mortailty event recorded during inspection (2016-0393). Cages inspected, diagnostic samples taken.
4008	Company vets attended site. Harvest to be brought forward.	Mortailty event recorded during inspection (2016-0393). Cages inspected, diagnostic samples taken.

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0440	**DATE OF VISIT**	13/09/2016
SITE NO	FS0333	**SITE NAME**	East Voe Laxfirth
INSPECTOR	Joe Triscott	**CASE NO**	20160393

Section 1: Summary

During a routine inspection a number of moribund and lethargic fish were observed across the site. Five fish were removed for further examination and subsequent diagnostic sampling. Histopathological examination showed compromised gills, necrosis of gill epithelium and tissue lesions suggestive of post treatment effects. Enteritis in the gut and hepatic necrosis was also observed.

Section 2: Case Detail

Observations

During a routine inspection several moribund and lethargic fish were observed across the site. Five fish were removed for examination and diagnostic sampling.

External examination of the fish showed minor haemorrhaging at the base of the ventral fins of fish 2 and 3. Lice loads of between 6 and 16 were observed on the fish.

Internal examination showed slightly pale hearts in all fish and petechial haemorrhaging of the liver in fish 2 and 3. The livers of all fish examined appeared pale. Evidence of yellow pseudo-faeces was observed in the gut of fish 3. The spleen of fish 5 appeared enlarged.

Histopathological examination revealed the following:

Gill: Mixed aneurysms, basal hyperplasia, marked cell sloughing and epithelial lifting, foci of lamellae fusion and necrosis with fragmented nuclei, focus of lamellae lacunae filled with cell debris, generalised irregular epithelial surface, epithelial inclusions, increase number of eosinophilic granular cells (EGC) at the centre of gill filament (F1 F5) and one encapsulated copepod like structure noted in F1.
Skin & Muscle: Missing epidermal layer.
Heart: Presence of eosinophilic granular cells (EGC) in bulbus (F1, F2 & F4) and valve (F4), thrombus in atrium of F4/ F3.
Gut and pyloric caeca: Moderate to severe cell sloughing.
Pancreas: Within normal range.
Liver: Multifocal hepatic necrosis (F1 F5).
Kidney: Increase of melano macrophage aggregates (F1 & F5).

#7 (2016-0444) Trilleachan Mor (Scottish Salmon Company):

2016-0444-photos-Trilleachan Mor.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00517223.pdf (p241 onwards)

Photos included:

Fisheries Health Inspectorate Case Information (p241 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0444							Date of visit:	04/10/2016
Time spent on site:	5 hours							Main Inspector:	ALW
Site No:	FS1118	Site Name:	Trilleachan Mor						
Business No:	FB0169	Business Name:	The Scottish Salmon Company						
Case Types:	1 REP	2 MRT	3 DIA	4	5	6			
Water Temp (°C):	12.8	Thermometer No:	T148				FHI 045 completed		
Observations:		Region:	WI	Water type:	S		CoGP MA:	W-6	

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

Additional Case Information:

Company reported an increase in mortalities which started on 19/9/16. Site was being prepared for Salmosan treatment using tarpaulin and two cages were treated (cages 2 & 4). Unusual behaviour was observed and mortality rate in cages 5 and 9 increased although no treatment had been administered yet.
Mortality across the site had been low. Mortalities in cage 5 have risen from 462 (1-18/9/16) to 14,832 (19/9/16 to date) and in cage 9 from 552 (1-18/9/16) to 8,591 (19/9/16 to date).
Mortality rates in some cages are also elevated, up to 5% (range from 297 to 2,155 from 19/9/16 to date).
Cage 5 was graded into cage 9 in April 2016, but all stock on site is from Russell Burn.
Various health issues have been identified on site. AGD was diagnosed along with some non AGD pathology in June. The non AGD pathology was identified as branchiomonas (clinically significant) and Desmozoon lepeoptherii. Samples have also tested positive for PRV and pox. Moritella was also suspected earlier in the year. Tests for SAV were negative.
Site was due an EC inspection, but weather conditions were poor and initially thought an inspection of the site would not be possible. Managed to get to the site, but only inspected cage 9 due to conditions. Although the water was dark, fish were shoaling just below the surface and seemed aimless. Five fish were removed for diagnostic sampling. Fish 1 and 2 had pale gills with petechial haemorrhaging.

4. Recent mortality (last 4 wks):	38,580 for site for September to date (7.94%)
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
Cage 5/14,832 (37%)/39,809 & cage 9/8,591 (24.5%)/34988 from 19/9/16 to date (stock numbers as of 19/9/16) - multiple gill issues (Rest of cages range from 297-2155 for this period)	
6. Any other peaks in mortality during period checked?	Y
If yes, detail:	Wk 25 and wk 33 - increase in mortalities following AGD treatments
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	Stopped treatments and are monitoring situation
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

FHI 059, Version 10 Issued by: FHI Date of issue: 12/02/2016

Additional comments:

Fish 1 & 2 - Petechial haemorrhaging on gills. Fish 2 - liver was slightly mottled (two cream/yellow shades), had fluid in the hind gut and the heart was rounded.

Total mortality during event (if available):	Additional information (e.g. action taken by company):	Action taken by FHI (include case no where applicable):
38,580 (7.94%) for site to 4/10/16	Multiple gill issues - pox, AGD, branchiomonas and Desmozoon lepeoptherii. Assessing situation, treatments on hold. Mainly affecting cages 5 (37%) and 9 (24.5%)	Samples taken by FHI

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	**DATE OF VISIT**	04/10/2016
SITE NO	FS1118	**SITE NAME**	Trilleachan Mor
INSPECTOR	Andrea Warwick	**CASE NO**	20160444

Section 1: Summary

A report was received from the operator of increased mortality levels at the site due to complex gill issues. Five lethargic fish were removed for diagnostic sampling.

Histopathology revealed compromised gill pathology due to the presence of *Neoparamoeba* species, the causative agent of amoebic gill disease (AGD), and confirmed by QPCR. *Chlamydia*-like bacteria were also seen by histological examination. This was confirmed by PCR and sequenced as *Candidatus* syngnamydia salmonis. Tissue lesions suggestive of post treatment effects and hepatic necrosis were also seen.

Due to gill health issues observed on site samples were screened for salmon gill poxvirus (SGPV) and *Paranucleospora theridion* (syn. *Desmozoon lepeophtherii*). The samples tested positive for both pathogens.

Section 2: Case Detail

Observations

The site was inspected following a report from the operator of increased mortality levels at the site due to complex gill issues over the previous couple of weeks. Two cages were mainly affected with losses of 37% from cage 5 and 25% from cage 9 over the two week period prior to the inspection.

Five lethargic fish were removed for diagnostic sampling. Fish 1 and 2 had pale gills with petechial haemorrhaging. Internally fish 2 had a deformed heart, fluid in the hind gut and the liver was pale and mottled. All fish had yellow pseudofaeces in the gut. Fish 1 and 2 had grey kidneys.

Bacteriology: Kidney and gill material from fish 1 to 5 was inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated from the gills of fish 1 to 5 and the kidneys of fish 1 and 3, but the mixed growth would not suggest that this was a primary pathogen in fish mortality.

Vibrio species

Molecular Genetics: Tissue samples were tested for segments of RNA or DNA indicative of the presence of the following pathogens using PCR or real-time PCR (QPCR):

Pathogen	Result	Fish or pool
Infectious salmon anaemia virus (ISAv)	Negative	Pool 1
Salmonid alphavirus (SAV)	Negative	Pool 1
Salmon gill poxvirus (SGPV)	Positive	Fish 1-5
Neoparamoeba perurans	Positive	Fish 1-5
Paranucleospora theridion	Positive	Fish 4
Chlamydia-like bacteria	Positive	Fish 1-3 & 5

Sequencing data for the *Chlamydia*-like bacteria was obtained from fish 1, identifying it as *Candidatus* syngnamydia salmonis.

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

Histopathological examination revealed the following:

Gill: Mixed aneurysms, prominent mucous cells, irregular epithelial surface, few lacunae with cell debris, epithelial inclusions (likely *Chlamydia*-like inclusions), vascular disturbances, moderate interlamellar hyperplasia with lamellae fusion mainly at the tips of the gill filament, foci of lamellar

necrosis, marked lamellae adhesion (Fish 2), moderate displacement of chloride cells and presence of cells resembling *Neoparamoeba perurans*.

Skin & Muscle: Missing epidermal layer.

Heart: Presence of eosinophilic granular cells (EGC) in bulbous (Fish 1).

Gut and pyloric caeca: Adhesions associated to vaccine (Fish 4).

Pancreas: Within normal range.

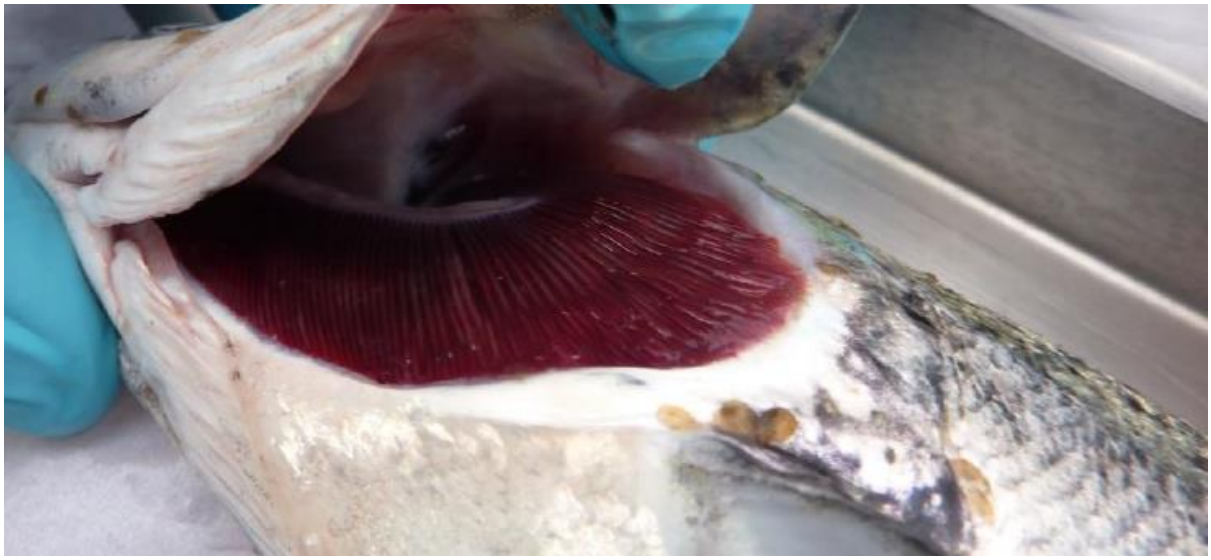
Liver: Multifocal hepatic necrosis with pyknotic nuclei (Fish 1, 2 & 5), mild widespread vacuolation (Fish 1, 3 & 5), minor thickness of serosa (Fish 3).

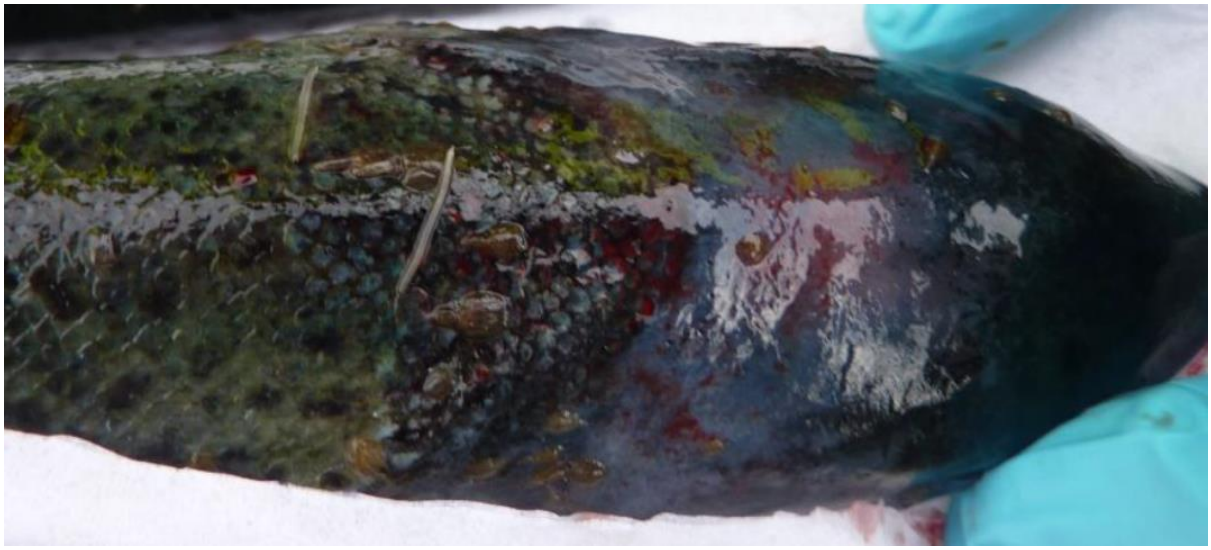
#8 (2016-0455) Furnace Quarry (Scottish Salmon Company):

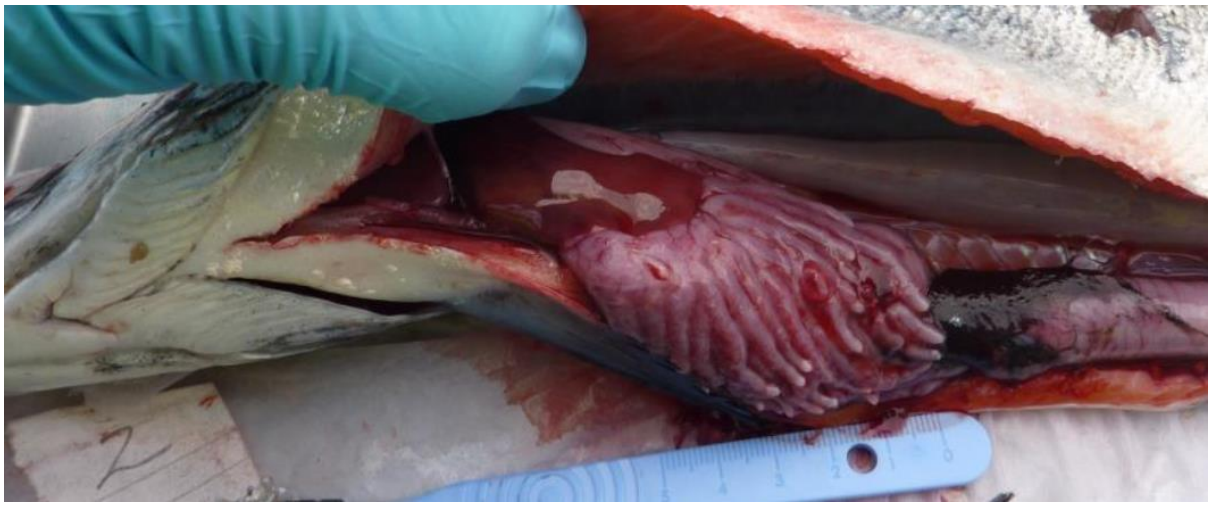
2016-0455-photos- Furnace Quarry.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00517223.pdf (p382 onwards)

Photos included:







Fisheries Health Inspectorate Case Information (p382 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0455							Date of visit:	11/10/2016
Time spent on site:	4 Hours							Main Inspector:	JMS
Site No:	FS0567	Site Name:	Furnace Quarry						
Business No:	FB0169	Business Name:	The Scottish Salmon Company						
Case Types:	1 MRT	2 DIA	3 REP	4 VMD	5	6			
Water Temp (°C):	12.5	Thermometer No:	Site				FHI 045 completed		
Observations:		Region:	ST	Water type:	S		CoGP MA:	M-42	

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

Additional Case Information:

Last salmosan treatment 01/10/16

Three health reports since the last inspection 2nd sample date 15/09/16 showed generally good health with a touch of PGD. 1 fish sampled with microsporidia. There was mild - mixed gill pathology throughout samples with epithelial degeneration and sloughing of gill epithelial cells on histological examination. Effects of gill problems ongoing

June, 2016. Recovering PD, low levels of proliferative gill pathology with slight inflammation.

April 2016 Signs of PD in fish from pen 3. Minor gill pathologies

Peroxide treatments throughout Loch Fyne, lice levels coming down below 50% of untreated total, however resettlement is quick.

Number of lice damaged fish within cages.

Lice load currently above suggested criteria for treatment. Site, in addition to most sites in area (whole loch) is treating with peroxide, however treatment has been difficult because of gill issues.

Stock hasn't been vaccinated for PD

Company reported landcatch stock on site seems more affected by gill issues.

Recent (last 4 wks) disease problems?	
If yes, detail:	Gill Issues, PGI
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	Mortalities between 15% and 8.5% per cage. Averaging around 10.5 per cage last four weeks
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
Cage 1:10.14% Cage 2: 8.57% Cage 3: 6.48% Cage 4: 15.72% Cage 5: 11.64% Cage 6:10.45% over the last four weeks ~16,000 fish stocked per cage/ gill issues.	

FHI 059, Version 10 Issued by: FHI Date of issue: 12/02/2016

Additional comments:

F1 - Adhesions and a mottled liver. F2- F4 - Swollen heart, adhesions. F5 - adhesions. F1-2 lesions on head

Total mortality during event (if available):	Additional information (e.g. action taken by company):	Action taken by FHI (include case no where applicable):
18,310	Complex gill issues, Fish vet group and FHI informed	Mort case, DIA inspection

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	DATE OF VISIT	11/10/2016
SITE NO	FS0567	SITE NAME	Furnace Quarry
INSPECTOR	Jeanna Sandilands & David Bradley	CASE NO	20160455

Section 1: Summary

An inspection was conducted following notification by the company of elevated mortality rates. During the inspection a number of lethargic fish were observed in each cage, five were removed for diagnostic sampling.

Histopathology examination revealed severely compromised gills with mixed pathology associated with amoeba gill disease (AGD) which was confirmed by QPCR . There was also evidence of tissue lesions suggestive of post treatment effects and features suggestive of chronic pancreas disease (PD), which was confirmed by QPCR.

Due to the gill health issues observed on site, samples were screened using real time PCR (QPCR) for the presence of salmon gill poxvirus (SGPV) and *Paranucleospora theridion* all of which tested positive.

Section 2: Case Detail

Observations

An inspection was conducted following notification by the company of elevated mortality rates. Between the 11th of September and the 11th of October 2016, mortality at the site ranged between 8.5% and 15% per cage. Fish health reports suggested on going gill problems throughout the site. Fish had also recently been treated with Salmosan.

During the inspection a number of lethargic fish were observed in each cage. Five were removed for diagnostic sampling. Externally fish 1 and 2 were anorexic and had lesions on the head. The gills of fish 3-5 were pale. Internally, fish 1 had clear ascites and fish 2 and 4 had bloody ascites.

Fish 2-5 had pale livers and there was a lack of fat on the pyloric caeca of fish 1 and 2. The spleen of fish 2 was also enlarged. Fish 1-3 and 5 had yellow pseudo-faeces. The kidney of fish 3 was also slightly grey.

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

The following bacteria were isolated:

- *Vibrio* spp.

Vibrio sp. was isolated from lesions on fish 1 and 2. A second *Vibrio* sp. was isolated from the kidney of fish 2. The level and purity does not suggest these would be implicated as a primary pathogen.

Molecular Genetics: Tissue samples were tested for segments of RNA or DNA indicative of the presence of the following pathogens using real-time PCR (QPCR):

Results

Pathogen	Result	Fish/Pool
Infectious salmon anaemia virus (ISAv)	Negative	Pool 1
Salmonid alphavirus (SAV)	Positive	Pool 1
Salmon gill poxvirus (SGPV)	Positive	F1, F2, F3, F5
Neoparamoeba perurans	Positive	F2-F3
Paranucleospora theridion	Positive	F1-F5

Gill: Congestion of secondary lamellae (F1 & F2), generalized irregular epithelial surface (F1-F3), two foci of hyperplasia with lamellae fusion and necrosis (F1), generalized basal interlamellar hyperplasia (F1-F5), few mixed aneurysms (F3), moderate lamellar thrombosis (F3-F5), marked hyperplasia with lamellae fusion, mainly distally (F4-F5), few lacunae filled with cell debris (F5) and presence of cells resembling *Neoparamoeba perurans* (F2).

Skin & Muscle: Degeneration of few scattered skeletal white fibres (F1).

Heart: Few scattered nests of cell infiltration at the spongy layer of ventricle (F1, F3, F4 & F5).

Gut and pyloric caeca: Lack of adipose tissue (F1 & F2).

Pancreas: Fibrosis of periacinar tissues (F2) and minor cell infiltration (F1).

Liver: Minor hepatocyte vacuolation (F3 & F4), some capillary dilation (F1) and evidences of hepatocyte regeneration (F3).

Kidney: Increase number of melanomacrophages (F1).

Spleen: Marked congestion (F1) and marked sparse white pulp (F3).

#9 (2016-0456) Ardgadden (Scottish Salmon Company):

2016-0456-photos- Ardgadden.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00517223.pdf (p400 onwards)

Photos included:

Fisheries Health Inspectorate Case Information (p400 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0456							Date of visit:	11/10/2016		
Time spent on site:	4 Hours							Main Inspector:	JMS		
Site No:	FS0851	Site Name:	Ardgadden								
Business No:	FB0169	Business Name:	The Scottish Salmon Company								
Case Types:	1 MRT	2 DIA	3 REP	4	5	6					
Water Temp (°C):	13	Thermometer No:	Site				FHI 045 completed				
Observations:		Region:	ST		Water type:	S		CoGP MA:	M-42		

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Additional Case Information:

Health surveillance carried out by business revealed site positive for PRV

Number of lice damaged fish within cages.

Lice load currently above suggested criteria for treatment. Site, in addition to other TSSC sites in Loch Fyne is treating with peroxide, however treatment has been difficult because of gill issues.

Stock hasn't been vaccinated for PD

Mortalities are being removed whole, in skips, by Billy Bowie

4. Recent mortality (last 4 wks):	Morts ranging between 6.24% to 31.6% per cage. Total over site 20.07%
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
Cage 1: 31.6% Cage 2: 16.89% Cage 3: 11.63% Cage 4: 12.02% Cage 5: 11.42% Cage 6: 6.34% Cage 7:9.74% Cage 8:12.74% Cage 9: 19.02% Cage 10: 24.98% over last four weeks	
6. Any other peaks in mortality during period checked?	Y
If yes, detail:	Losses whenever fish have been treated for lice due to gill issues since week 29.
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	Fish vet group and FHI informed
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Additional comments:

F2 - Mottled liver F4 - Haemohraged atrium, F2 lesion on head

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	**DATE OF VISIT**	11/10/2016
SITE NO	FS0851	**SITE NAME**	Ardgadden
INSPECTOR	Jeanna Sandilands & David Bradley	**CASE NO**	20160456

Section 1: Summary

An inspection was conducted following notification by the company of elevated mortality rates. During the inspection a number of lethargic fish were observed in each cage, five were removed for diagnostic sampling.

Histopathology examination revealed severely compromised gills with hyperplastic response associated with amoeba gill disease (AGD) and confirmed by QPCR plus post treatment effects. A focal, chronic, granulomatous reaction was also noted in gill of fish 5.

Due to the gill health issues observed on site, samples were screened using real time PCR (QPCR) for the presence of salmon gill poxvirus (SGPV) and *Paranucleospora theridion* all of which tested positive for their presence.

Section 2: Case Detail

Observations

An inspection was conducted following notification by the company of elevated mortality rates. Between the 11th of September and the 11th of October 2016, mortality at the site ranged between 6.24% and 31.6% per cage. Losses had also occurred when fish had been treated with hyrdrogen peroxide.

During the inspection five lethargic fish were removed for diagnostic sampling. Externally a lesion was observed on the head fish 2. Internally fish 1 and 5 had clear ascites. Fish 1 and 3 had a pale anaemic heart, the heart of fish 3 was deformed. There were signs of haemorrhaging of the atrium of fish 4. Fish 1,3 and 4 had pale livers and fish 2 had a mottled liver. The spleen of fish 5 was enlarged, and the gut contained no food. Fish 1 also had yellow pseudo-faeces present.

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

The following bacteria were isolated:

- *Vibrio* spp

Two separate *Vibrio* spp. were identified on plates taken from kidney, lesion and gill material of fish 2. The same two *Vibrio* spp. were observed on plates taken from gill material of fish 1, 2 and 3. Plates taken from kidney material of fish 1, 3, 4 and 5 showed no growth. Due to the level of growth would not suggest these bacteria were the primary pathogen in fish mortality.

Molecular Genetics: Tissue samples were tested for segments of RNA or DNA indicative of the presence of the following pathogens using real-time PCR (QPCR):

Results

Pathogen	Result	Fish/Pool
Infectious salmon anaemia virus (ISAv)	Negative	Pool 1
Salmonid alphavirus (SAV)	Negative	Pool 1
Salmon gill poxvirus (SGPV)	Positive	F1-F5
Neoparamoeba perurans	Positive	F1-F5
Paranucleospora theridion	Positive	F1-F5

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

Tissues from 5 Atlantic salmon were examined by light microscopy. The following histopathological changes were observed:

Gill: Few mixed aneurysms (F1-F5), moderate epithelial hyperplasia of secondary lamellae (F1), foci of adherence of secondary lamellae (F1-F5), minor cell infiltration (F1-F5), generalised basal interlamellar hyperplasia (F1-F5), mild lamellae congestion (F2), presence of few cells resembling *Neoparamoeba perurans* (F2), multiple foci of lamellae necrosis with karyorrhectic nuclei (F1-F5), hypertrophic epithelial cells (F1-F5), mild to moderate displacement of chloride cells (F1-F5), epithelial inclusions (F2) and 5 gill filaments with granulomatous reaction with associated giant cells at the center of gill filament (F5).

Skin & Muscle: Epidermal layer partially eroded (F2), oedema of dermis and marked presence of mixed bacteria at the dermis and hypodermis layer (F2), increased brown pigmentation at the basement membrane (F3), focus of minor cell infiltration (F1) and focus of vacuolation (F3) noted in red fibres, degeneration of few scattered skeletal white muscle fibres (F2).

Heart: Minor pericarditis (F2), foci of cell infiltration noted in ventricle and atrium (F1 & F2).

Gut and pyloric caeca: mild to moderate cell sloughing (F1, F2 & F4).

Pancreas: Within normal range.

Liver: Mild diffuse hepatocyte vacuolation (F1) and some capillary dilation (F5).

#10 (2016-0460) Glenan Bay:

2016-0460-photos- Glenan Bay.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00517224.pdf (p26 onwards)

Photos included:

Fisheries Health Inspectorate Case Information (p26 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0460						Date of visit:	12/10/2016	
Time spent on site:	4 hours					Main Inspector:		JMS	
Site No:	FS0590	Site Name:	Glenan Bay						
Business No:	FB0169	Business Name:	The Scottish Salmon Company						
Case Types:	1 MRT	2 DIA	3 REP	4	5	6			
Water Temp (°C):	12.5	Thermometer No:	Site			FHI 045 completed			
Observations:		Region:	ST	Water type:	S	CoGP MA	M-42		

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

Additional Case Information:

Wild caught mixed species WRA used as cleaner fish from Mull. Farmed Ballan form Otterferry. Site reported that wild caught wrasse were more effective at Lice control than farmed

Fish from Barvis and KLM - KLM fish showing higher mortalities.

Health reports: June 2016 - Complex gill pathology with acute and chronic changes, AGD like infilling. Cage 9 gill lesions larger. Acute changes consist of widespread lamellar circulatory disturbance. Diffuse epithelial degeneration and some necrosis.

Aug 2016 - Severe and active AGD. Chronic recovery of PD.

June 2016 - Evidence of PD, AGD and lesions.

May 2016 - Minor irritation, not sufficient to affect respiration.

Lice load currently above suggested criteria for treatment. Site, in addition to other TSSC sites in Loch Fyne is treating with peroxide, however treatment has been difficult because of gill issues.

3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	SAL ranging between 27% - 2.96 per cage. Total for site 12.24%
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	Cage 1: 27.03% Cage 2: 13.71% Cage 3: 21.81% Cage 4: 7.33 Cage 5: 5.9% Cage 6: 8.63% Cage 7: 2.96% Cage 8: 4.02% Cage 9: 9.74% Cage 10 12.10% Cage 11. 13.47% Cage 12. 15.65% Cage 13. 12.95% Cage 14. 16.75% over the last 4 weeks
6. Any other peaks in mortality during period checked?	Y
If yes, detail:	PD induced mortality from around week 18 until week 25. Mortality subsided until week 30 when there was a kerina bloom in the area.
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	FVG and FHI notified.
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

FHI 059, Version 10 Issued by: FHI Date of issue: 12/02/2016

Additional comments:

F1 - S shaped diformity and adhesions F2 - Adhesions, heart was mushy. F4 Adhesions, F5 - Blood clot on aerota, liver was mottled (3/4), F1 lesion on head

Lice load, ~ 5 adult females per fish.

FHI 059, Version 10 Issued by: FHI Date of issue: 12/02/2016

Case No: 2016-0460 Site No: FS0590 Date of visit: 12/10/2016

Start date:	End date: (if applicable)	Size of fish:	Average weight of affected population:	Species:	Yearclass:	Timescale	Mortality rate recorded(%):	Explained/ unexplained:	If explained, select reason(s):
25/07/2016	N/A	≥750g	1.3 Kg	SAL	15 S0	5 weeks	16.78	Explained	AGD, Algal bloom, PD

Total mortality during event (if available):	Additional information (e.g. action taken by company):	Action taken by FHI (include case no where applicable):
48,544	FVG and FHI informed	DIA

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	**DATE OF VISIT**	12/10/2016
SITE NO	FS0590	**SITE NAME**	Glenan Bay
INSPECTOR	Jeanna Sandilands & David Bradley	**CASE NO**	20160460

Section 1: Summary

An inspection was conducted following notification by the company of elevated mortality rates. During the Inspection a number of lethargic fish were observed in each cage, five fish were removed for diagnostic sampling.

Histopathology examination revealed severely compromised gills with hyperplastic response potentially associated with amoebic gill disease (AGD) and tissue lesions suggestive of post treatment effects. Hepatic necrosis, epitheliocystis (Chlamydia-like organisms) and features associated with pancreas disease (PD) were seen. Salmonid alpha virus (SAV), the causative agent of PD was confirmed by QPCR.

Moritella vicosa was isolated from three of the five fish, however due to the level and purity of growth, it is not thought to be the primary pathogen.

Due to the gill health issues observed on site, samples were screened using real time PCR (QPCR) for the presence of salmon gill poxvirus (SGPV) and *Paranucleospora theridion,* all of which tested positive. Chlamydia-like bacteria were confirmed by PCR.

Section 2: Case Detail

Observations

An inspection was conducted following notification by the company of elevated mortality rates. Between the 12th of September and the 12th of October 2016, mortality at the site ranged between 2.96% and 27% per cage.

R09

Marine Laboratory, 375 Victoria Road, Aberdeen, AB11 9DB
Tel - 01224 295525 Fax - 01224 295620 Email - ms.fishhealth@gov.scot
Website - www.gov.scot/Topics/marine/science

During the inspection five lethargic fish were removed for diagnostic sampling. Externally fish 1 and 5 were anorexic. Fish 1, 2 and 5 had shortened opercula. The gills of fish 2, 3 and 4 were pale and a lesion was observed the head of on fish 1. Internally fish 1 had clear ascites and fish 2, 3, 4 and 5 had pale hearts, as were the livers of fish 2, 3 and 4. There was a lack of fat on the pyloric caeca of fish 1 and 4 and the spleen of fish 4 was enlarged were present on fish 4. Fish 1-4 had yellow pseudo-faeces present in the gut.

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

The following bacteria were isolated:

- *Vibrio sp.*
- *Moritella vicosa*

Vibrio sp. and *Moritella vicosa* were isolated from the lesion material of fish 1. The *Vibrio* sp. was also isolated from the gill of fish 1-5 and the kidney of fish 1, 2 and 5. *Moritella vicosa* was isolated from the gill of fish 1 and 2 and the kidney of fish 1, 2 and 5.

The purity and level of bacterial growth across the 5 fish did not indicate be a primary bacterial infection.

Molecular Genetics: Tissue samples were tested for segments of RNA or DNA indicative of the presence of the following pathogens using PCR or real-time PCR (QPCR):

Results

Pathogen	Result	Fish/Pool
Infectious salmon anaemia virus (ISAv)	Negative	Pool 1
Salmonid alphavirus (SAV)	Positive	Pool 1
Salmon gill poxvirus (SGPV)	Positive	F1, F3-F5
Neoparamoeba perurans	Positive	F1 and F5
Paranucleospora theridion	Positive	F1-F5
Chlamydia like bacteria	Positive	F1 and F4

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.

Tissues from 5 Atlantic salmon were examined by light microscopy. The following histopathological changes were observed:

Gill: Free blood among gill filament, minor interlamellar hyperplasia (F1), foci of adherence of secondary lamellae (F1), few scatter lamellar thrombosis (F2, F3), moderate epithelial necrosis with karryiorhectic nuclei (F2 & F5), few basophilic epithelial inclusions (likely epitheliocystis) (F3 & F4), few aneurysms (F3), moderate displacement of chloride cells (F1-F5), congested secondary lamellae (F4), increased number of eosinophilic granular cells (EGC) at the centre of gill filament (F3, F4) and moderate hyperplasia with secondary lamellae fusion and few lacunae (F5).

Skin & Muscle: Missing epidermal layer (F1), some white fibre oedema (F3), degeneration of few scattered skeletal red fibres (F4) and white fibres (F1).

Heart: Minor epicarditis (F1), few scattered nests of nuclei(F2, F3).

Gut and pyloric caeca: Lack of adipose tissue (F1), adhesions (F1).

Pancreas: Patchy pyknotic acinar cells and vacuolation (F1).

Liver: Minor hepatocyte vacuolation (F1), focus of haemorrhage (F1), evidences of old necrosis with areas of fibrosis and few regenerate hepatocyte (F2), multifocal hepatic necrosis (F3) and hepatic necrosis with associated haemorrhage, mainly at the edge of section (F5).

Kidney: Minor increase number of melanomacrophages (F1 & F5), minor renal tubular dilation (F1).

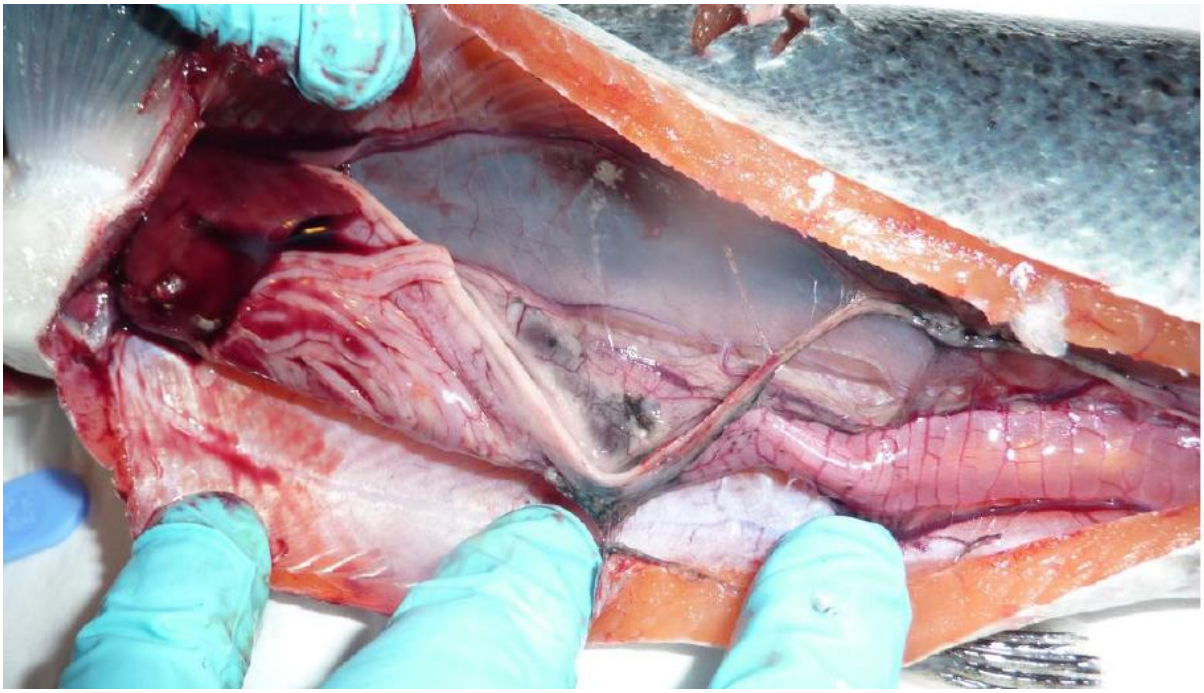
Spleen: Evidences of erythrophagocytosis (F3 & F4).

#11 (2016-0463) Meil Bay (Cooke Aquaculture):

2016-0463-photos- Meil Bay.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00517224.pdf (p59 onwards)

Photos included:



Fisheries Health Inspectorate Case Information (p59 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0463			Date of visit:	13/10/2016
Time spent on site:	4.5 hours			Main Inspector:	JET
Site No:	FS0597	Site Name:	Meil Bay		
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd		
Case Types:	1 REP	2 DIA	3 MRT	4	5 6
Water Temp (°C):	12.5	Thermometer No:	Site	FHI 045 completed	
Observations:		Region: OR	Water type: S	CoGP MA:	O-2

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Additional Case Information:

Site to be emptied out and fish transferred to Quanterness and Carness by December 2016.
First 2 weeks in August, Oxygen at low levels, compressors used to increase O2 levels. Mid August gill scores increased, 26/08/16 Peroxide treatment administered, gills scores have since dropped to between 0-1.

Cage 1 and 2 fish stocked from Haweswater, Cage 6 from Ardtaraig, Cage 3,4,5,7,8,9,10 from Furnace.
Moribund fish taken from cage 2 for diagnostic sampling, no other lethargic or moribund fish seen across site.

3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	38386 (7%), 7000 attributed to seal damage, the remaining losses may be related to gill issues, PGD and AGD has been detected, however not at levels that would normally be associated with these levels of mortality, gill scores have been low recently and look in good condition.
5. Evidence of recent increased/atypical mortalities?	Y

If yes, facility nos/no mortality per facility/no stock per facility/reason:

Cage 2 most severely affected. Week 39 - 1945 (5.10%), Week 40 - 6002 (16.63%), Week 41 - 3362 (11.14%), Week 42 - 3100 (11.55%).

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, company biologists and FVG have been on site to investigate and sample fish 30/09/2016. Results showed PGD and low level AGD.
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Case No: 2016-0463 Site No: FS0597 Date of visit: 13/10/2016

Start date:	End date: (if applicable)	Size of fish:	Average weight of affected population:	Species:	Yearclass:	Timescale	Mortality rate recorded(%):	Explained/ unexplained:	If explained, select reason(s):
19/09/2016		≥750g	900g	SAL	S1 2016	5 weeks	7.00	Unexplained	

If unexplained, select observations:	Total mortality during event (if available):	Additional information (e.g. action taken by company):	Action taken by FHI (include case no where applicable):
Anorexic, Gut Yellow pseudo-faeces, Lesion on flank, Lethargic, Moribund, Pyloric caeca Lack of fat	38386	7000 attributed to seal damage, the remaining losses may be related to gill issues, PGD and AGD has been detected, however not at levels that would normally be associated with these levels of mortality, gill scores have been low recently and look in good condition. FHI notified, company biologists and FVG have been on site to investigate and sample fish 30/09/2016. Results showed PGD and low level AGD.	Site inspected and diagnostic samples taken (2016-0463)

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

Business No	FB0095	**Date of Visit**	13/10/2016
Site No	FS0597	**Site Name**	Meil Bay
Inspector	Joe Triscott	**Case No**	20160463

Section 1: Summary

The above site was inspected in response to a report from the operator of increased mortality. Five moribund fish were removed for diagnostic sampling.

Histopathology examination revealed severely compromised gills, with hyperplastic response associated with amoebic gill disease (AGD), this was confirmed by qPCR. Features possibly associated with pox virus were seen and the presence of the virus was confirmed by qPCR.

Due to gill health issues observed on site samples were screened for *Paranucleospora theridion* (syn. *Desmozoon lepeophtherii*) and tested positive.

Bacteriology examination identified two colonies of *Vibrio* sp. and a third colony unable to be fully identified, but likely to be a motile Aeromonad. The purity and level of growth would not suggest these bacteria were present as primary pathogens.

Section 2: Case Detail

Observations

The site was inspected following a report from the operator of increased mortality levels over the previous few weeks. The majority of mortalities were from one cage, with weekly mortality levels between 5.1% and 16.6% for the previous four weeks.

During the site inspection a number of moribund fish were observed in one cage, including two fish hanging vertically in the water column. Both these fish and an additional three moribund fish were removed for diagnostic sampling.

External examination of the fish showed evidence of anorexia and pale gills in all fish, a lesion was observed on the flank of fish 3.

Internal examination showed yellow pseudo-faeces present in all fish, lack of fat on the pyloric caeca was observed in fish 1, 2, 4 and 5.

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

The following bacteria were isolated:

- *Vibrio* sp. (Isolate A): Fish 2-3 (Kidney)
- *Vibrio* sp. (Isolate B): Fish 2-5 (Kidney)
- Suspected *Aeromonas* spp.: Fish 1-5 (Kidney, Gill, Lesion)

Molecular Genetics: Tissue samples were tested for segments of RNA or DNA indicative of the presence of the following pathogens using real-time PCR (QPCR):

Pathogen	Result	Fish or Pool
Infectious salmon anaemia virus (ISAv)	Negative	Pool 1
Salmonid alphavirus (SAV)	Negative	Pool 1
Salmon gill poxvirus (SGPV)	Positive	Fish 1-5
Neoparamoeba perurans	Positive	Fish 1-5
Paranucleospora theridion	Positive	Fish 2-5

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: Few aneurysms (F1-F5), lamellae congestion (F1-F5), moderate widespread lamellar adhesions (F1-F5), irregular epithelium with cell hypertrophy and karyorrhexis, chloride cells displacement (F1-F5), some cell sloughing, foci of hyperplasia with lamellae fusion and few lacunae (F1-F5), presence of cells resembling *Neoparamoeba perurans* (F2-F5) with few of them associated with the tissue.
Skin & Muscle: Missing epidermal layer (F1).
Heart: 2 to 3 tiny foci of cell infiltration (F1), minor pericarditis (F2, F3, F4 & F5).
Gut and pyloric caeca: Some cell sloughing (F2 & F4).
Pancreas: Some adhesions associated with vaccine (F1 &F3).
Liver: Focus of sinusoidal congestion (F1 & F5) and capillary congestion (F1).
Kidney: Slightly increased number of melanomacrophages (F1, F2, F3 & F5).

#12 (2016-0590) Uyea Isle (Cooke Aquaculture):

2016-0590-photos- Uyea Isle.pdf

FHI Case Information online via https://www.gov.scot/Resource/0051/00517226.pdf (p309 onwards)

Photos included:

Haemorrhaging F1

Fisheries Health Inspectorate Case Information (p309 onwards) included:

FHI 059, Version 10 | Issued by: FHI | Date of issue: 12/02/2016

Case No:	2016-0590							Date of visit:	23/11/2016		
Time spent on site:	5 hours							Main Inspector:	JMS		
Site No:	fs0382	Site Name:	Uyea Isle								
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd								
Case Types:	1 ECI	2 CNI	3 SLI	4 REP	5 DIA	6 VMD					
Water Temp (°C):	9.5	Thermometer No:	Site					FHI 045 completed			
Observations:		Region:	SH	Water type:	S			CoGP MA	S-2		
Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.									
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.									
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.									
Diagnostic samples taken?	Y										

Additional Case Information:

Multi year class area - risk assessment carried out for this

Recent mortality:
Week 44 2026
Week 45 3577
week 46 2825
week 47 4311
week 48 2930

September 2016 2785
October 2016 13470 - gills
November 2016 13612 - gills
Bleeding gills have been observed during gill scoring and lice counts, there are also issues with maturing fish
A number of lethargic fish were seen across the site but were sitting low in the water. Feeding response appeared good in the cages where fish caught for VMD. Two fish taken for diagnostic sampling, one with clinical and gross pathology consistent with CMS and one maturing male with gill pathology.

Adult female lice above 3 for past two counts - not treated yet due to gill issues - on going sampling by company/vets to determine effect of treating on fish health. 2/11/16 - AF 2.06, G 3.00 15/11/16 - AF 1.18, G 3.92. Hoping to get the hydrolicer early in the new year.
Hydrogen Peroxide treatments for AGD and lice x 6 since input - appear to have been successful
Sapphire nets and Froyer rings in place across the site

Dead haul harvests planned

3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks): 15669 morts between 27/10/16 - 23/11/16/site	
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
see above and additional comments - mort levels similar across all cages	
6. Any other peaks in mortality during period checked?	Y
If yes, detail: Nov 2015 10026 morts cage 12 post transfer - From Ardtariag, parr not ready to go to sea	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action: Samples taken	
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

FHI 059, Version 10 Issued by: FHI Date of issue: 12/02/2016

Additional comments:
F1 - pseudo membrane across liver, swollen atrium. F2 maturing male, pale liver and heart

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

Business No	FB0095	**Date of Visit**	23/11/2016
Site No	FS0382	**Site Name**	Uyea Isle
Inspector	Jeanna Sandilands	**Case No**	20160590

Section 1: Summary

During a routine inspection of the above site, a number of lethargic Atlantic salmon (*Salmo salar*) were observed. Two fish were removed for diagnostic sampling. Histopathological examination revealed marked endocarditis suggestive of cardiomyopathy syndrome (CMS) and complex gill issues with hyperplastic and hypertrophic response suggestive of amoebic gill disease (AGD), which were confirmed by QPCR. Hepatic necrosis was noted.

Due to gill health issues observed on site, samples were screened by QPCR for salmon gill poxvirus (SGPV) and tested positive.

Section 2: Case Detail

Observations

During a routine inspection of the above site, a number of lethargic Atlantic salmon (*Salmo salar*) were observed. Two fish were removed for diagnostic sampling. At the time of the inspection the site was stocked with 266,038 2015 s0 Atlantic salmon at an average weight of 3.4kg. On-going gill issues were being experienced at the site, AGD had been confirmed by Fish Vet Group at the beginning of October 2016.

Externally: Both fish were lethargic. F1 had a distended abdomen and haemorrhaging around the ventrum. F2 was a maturing male, the gills appeared pale and necrotic.

Internally: F1 had bloody ascites in the body cavity, a pseudo membrane across the liver and the swim bladder was fluid filled. The atrium of F1 also appeared swollen. F2 had a pale liver and heart and a lack of fat around the pyloric ceaca. Both fish had yellow pseudo faeces in the gut.

Molecular Genetics: Tissue samples were tested for segments of RNA or DNA indicative of the presence of the following pathogens using real-time PCR (QPCR):

Pathogen	Result	Fish or pool
Infectious salmon anaemia virus (ISAv)	Negative	P1
Salmonid alphavirus (SAV)	Negative	P1
Salmon gill poxvirus (SGPV)	Positive	F1-2
Neoparamoeba perurans	Positive	F2
Piscine myocarditis virus (PMV)	Positive	P1
Piscine reovirus (PRV)	Negative	P1

Histology: Tissue samples of gill, skin and skeletal muscle, heart, pyloric caeca, pancreas, hind gut, liver, spleen and kidney were taken from F1 and F2. The tissue samples were fixed in 10% neutral buffered formalin.

Histopathological examination revealed the following:

Gill: Presence of few aneurysms (F1) and lamellar thrombus (F2), minor interlamellar hyperplasia (F1) and mild multifocal hyperplasia with secondary lamellae fusion (F2), some spongiosis (F2), minor epithelial stratification (F2), few lacunae (F2), irregular epithelial surface with hypertrophic cells, few cells resembling *Neoparamoeba perurans* (F2) and increase number of eosinophilic granular cells (EGC) at the centre of gill filament (F2).

Skin & Muscle: Some spongiosis of epithelial layer (F1), slightly increase of eosinophilia in skeletal red fibres (F2).

Heart: Minor pericarditis (F1 & F2), diffuse degeneration of trabecular myocardium and inflammation at the spongy layer of ventricle and atrium (F1), presence of thrombus in the atrium (F1).

Gut and pyloric caeca: Within normal range

Pancreas: Within normal range

Liver: Widespread multifocal necrosis with pyknotic nuclei (F2) and F1 showed evidences of multifocal fibrosis and presence few eosinophilic granular cells (EGC).

Kidney: Few dilated tubules and minor tubular epithelial vacuolation (F1).

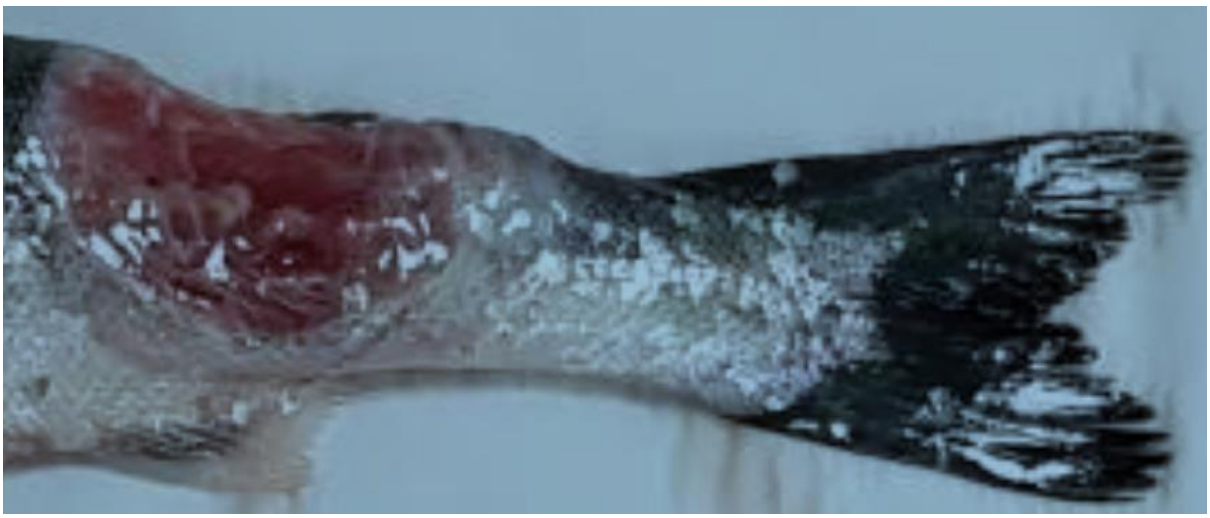
#13 (2018-0078) Tarbert South (Scottish Salmon Company):

2018-0078-photos- Tarbert South.pdf

FHI Case Information online via https://www.gov.scot/Resource/0053/00537756.pdf (p99 onwards)

Photos included:

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



F4 – Enlarged gall bladder observed underneath liver.

Fisheries Health Inspectorate Case Information (p99 onwards) included:

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 ECI	2 CNI	3 SLI	4 VMD	5 DIA	6					
Water Temp (°C):	10	Thermometer No:	T147			FHI 045 completed					
Observations:		Region:	ST	Water type:	S	CoGP MA	M-42				

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

FHI 059, Version 11 Issued by: FHI Date of issue: 12/09/2017

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.

FHI 059, Version 11 Issued by: FHI Date of issue: 12/09/2017

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 attched photos.

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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

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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.

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 amoxycillin, 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

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

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).

#14 (2018-0113) Meall Mhor (Scottish Salmon Company):

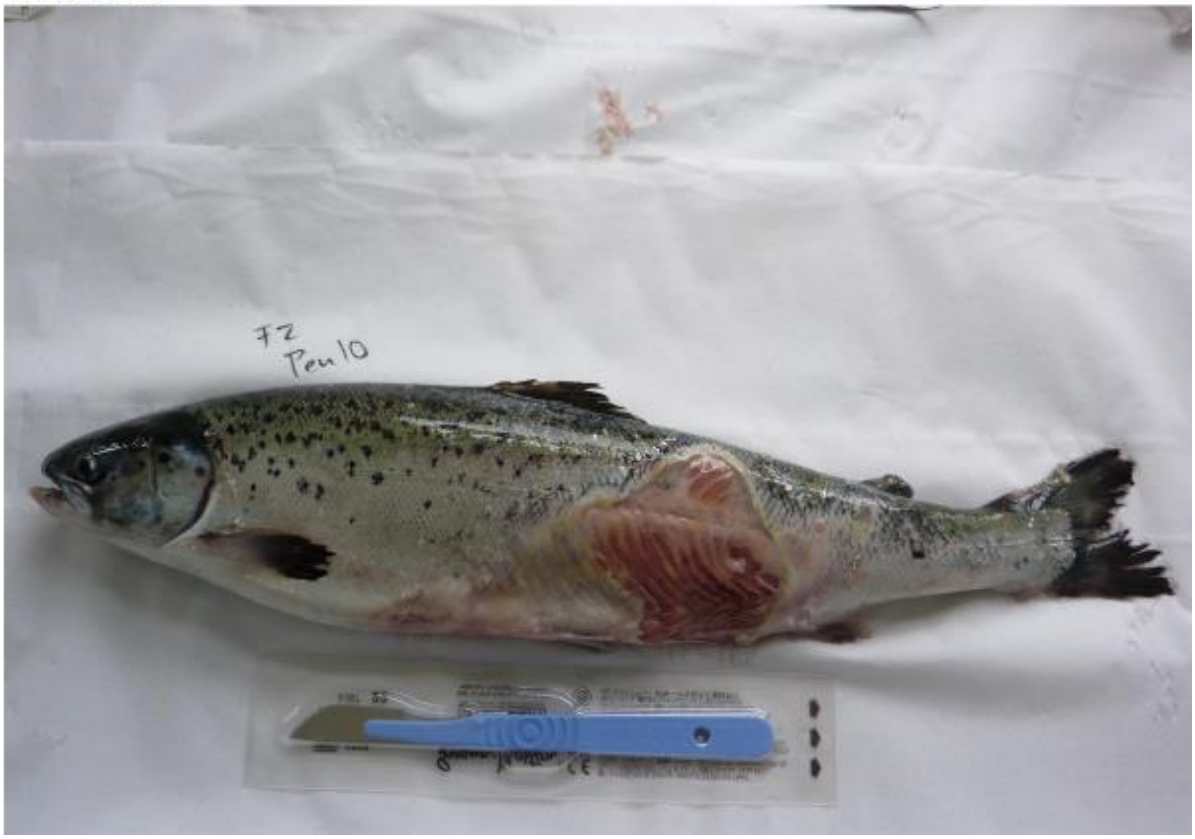
2018-0113-photos- Meall Mhor Loch Fyne.pdf

FHI Case Information online via https://www.gov.scot/Resource/0053/00537757.pdf(p124 onwards)

Photos included:

2018-0113 Meall Mhor Loch Fyne
F1 external

F2 external



F4 external

F5 external

Fisheries Health Inspectorate Case Information (p124 onwards) included:

FHI 059, Version 11 | Issued by: FHI | Date of issue: 12/09/2017

Case No:	2018-0113							Date of visit:	26/03/2018		
Time spent on site:	6 hrs							Main Inspector:	SAE		
Site No:	FS0091	Site Name:	Meall Mhor Loch Fyne								
Business No:	FB0169	Business Name:	The Scottish Salmon Company								
Case Types:	1 ECI	2 CNI	3 SLI	4 VMD	5 DIA	6					
Water Temp (°C):	7	Thermometer No:	T205			FHI 045 completed					
Observations:		Region:	ST	Water type:	S	CoGP MA	M-42				

Dead/weak/abnormally behaving fish present?	Y	If yes, see additional information/clinical score sheet.
Clinical signs of disease observed?	Y	If yes, see additional information/clinical score sheet.
Gross pathology observed?	Y	If yes, see additional information/clinical score sheet.
Diagnostic samples taken?	Y	

FHI 059, Version 11 | Issued by: FHI | Date of issue: 12/09/2017

Additional Case Information:

Some issues with physical damage on site, unsure what is causing this but suspect bad weather in conjunction with strong tidal flow on site. All cages affected, however 3 cages particularly bad.

Fish from Migdale (particularly Loch Damph) came with a lot of morts due to fungus on first delivery. First week on input: 25,500 morts. First weeks morts go against the FW site.

Once fish are split down from 6 cages to 12 cages, site will receive hatchery reared lumpsuckers.

Large number of fish with physical damage observed on the site with a number of moribund and dying fish near the surface in some cages. The damage consistently appeared as large lesions on the flanks. This appears consistent with the fish being rubbed on the nets. Fish sampled for VMD appeared healthy.

3. Mortality records complete and correctly entered?		Y
4. Recent mortality (last 4 wks):	w/b 26/2/18 1,195 morts; w/b 5/3/18 1,000 morts for site; w/b 12/03/18 1,812 morts for site; w/b 19/3/18 4,589 morts per site, 26/3/2018 492 morts	
5. Evidence of recent increased/atypical mortalities?		Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:		
increased morts due to physical damage, unsure what is causing this but suspect bad weather cages 12, 2, 10 worst affected		
6. Any other peaks in mortality during period checked?		Y
If yes, detail:	w/b 25/09/2017: 25,500 morts due to fungus. w/b 2/10/2017 15,158 morts second input also issues with fungus, w/b 9/10/2017 3000 morts w/b16/10/2017 349 morts	
7. Have increased (unexplained) mortalities been reported to vet or FHI?		Y
If yes, detail action:	biologists notified and have come and sampled	
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.		Y

FHI 059, Version 11 | Issued by: FHI | Date of issue: 12/09/2017

Additional comments:

Caudal fins in very bad condition on all fish, F4 missing part of the upper jaw, F5 missing one eye. Lesions look like fish have been rubbed on the nets.

marinescotland science

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	DATE OF VISIT	26/03/2018
SITE NO	FS0091	SITE NAME	Meall Mhor Loch Fyne
INSPECTOR	Svenja Elwenn	CASE NO	20180113

Section 1: Summary

During a routine site inspection moribund fish were observed on site and five fish were removed for diagnostic sampling. Histopathological examination revealed skin lesions with high numbers of mixed bacteria and mild skeletal muscle necrosis, which is consistent with the physical damage observed on site.

Two *Vibrio* sp. and *Moritella viscosa* were isolated. The mixed growth would not suggest to be the primary source of morbidity however the level of growth was significant.

Section 2: Case Detail

Observations

At the time of inspection slightly elevated mortalities were occurring on site due to physical damage, suspected to have been caused by sustained bad weather in conjunction with strong tidal flows. Mortality levels appeared to peak at 4,589 for the site in the week prior to inspection. A large number of fish with physical damage were observed on the site with a number of moribund fish near the surface in some cages. The damage consistently appeared as large lesions on the flanks. This appears consistent with the fish being rubbed on the nets.
All five fish sampled were lethargic and moribund with a large lesion on the flank and with the caudal fin in poor condition. F4 was missing part of the upper jaw and F5 was missing an eye. Internally all fish had bloody ascites and an enlarged spleen, with some tissue breakdown evident in the liver in F3-F5 and haemorrhaging on the liver and pyloric caeca in F2.

Results

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

The following bacteria were isolated:

- *Vibrio* sp. (Isolate A) : F1-F5 (kidney, lesion, gill)
- *Vibrio* sp. (Isolate B): F2, F4-F5 (kidney)
- *Moritella viscosa:* F1 (lesion), F4 (kidney), F5 (kidney, lesion)

Histopathological examination by light microscopy revealed the following:

Gill: Small foci of interlamellar hyperplasia (F1-F2) and lamellar fusion (F2). Generalised lamellar congestion and presence of aneurysmal dilation/telangiectasia noted in all fish (likely associated with the killing method – percussion). Some epithelial lifting noted in all fish (likely associated with post-mortem artefact).
Skin & Muscle: Lesions showed absence of epidermal layer, dermal oedema with high numbers of mixed bacteria which were also noted on the skeletal muscle (F1-F5), mild haemorrhage in the hypodermis and skeletal muscle necrosis with mild haemorrhage and mild leukocyte cell infiltration (F2-F5). F2 also showed an increase of melanin deposits at the basement membrane.
Heart: Within the normal range.
Gut and pyloric caeca: Adipose tissue showed some fibrous adhesions likely associated with vaccine administration (F2) and some cell sloughing noted in F3.
Pancreas: Within the normal range.

R09

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Liver: Some capillary congestion (F1, F3) and multiple small foci of sinusoidal congestion and hepatocyte necrosis noted in F5.
Kidney: Within the normal range.
Spleen: Slightly reduction of white pulp (F3).

Read more via:

Horror photos of farmed salmon spark legal threat
EXPOSED: Gruesome Photos of Deformed & Diseased Scottish Salmon
Hard Evidence - Photos of Diseased & Deformed Scottish Salmon (June 2018)

More background online via Scottish Salmon Watch's web-page 'Welfare'