Cross-Party Group on Animal Welfare
Scottish Parliament
Holyrood Road
Edinburgh
EH99 SP

28 May 2018

Deaths, Deformities and Welfare Abuse at Scottish Salmon Farms During 2017 - Breach of the Animal Health & Welfare (Scotland) Act 2006?

Further to Scottish Salmon Watch's letter of 17 May 2018 regarding deaths at salmon farms due to the Thermolicer please be aware of damning data published on 27 April 2018 by the Scottish Government on deformities and welfare abuses on Scottish salmon farms.

The Fish Health Inspectorate's 'Case Information' (October - December 2017) details the latest enhanced inspections conducted under the Aquaculture and Fisheries (Scotland) Act 2007 - including reports of farmed salmon with deformed spines and hearts, cataracts, anorexia, lesions, necrotic gills, shortened jaws, damaged eyes, gillpox, evidence of erthrophagocytosis in the spleen, lamellar bleeding of the gills, multifocal hepatic necrosis, heart disease, haemorrhaging at the base of the pelvic fins and sea lice damage to the heads. Farmed salmon were reported "dead on the surface of the water" and with "sea lice grazing damage to heads". One lice-infested farmed salmon was reported "belly up as if concussed from banging".

For example, a Fish Health Inspection visit report from October 2017 for The Scottish Salmon Company's salmon farm at Vuia Beag in Loch Roag detailed a farmed salmon with a "deformed spine":

FHI 059, Version 11	Issued by: FHI	Date of issue: 12/09/2017
Additional comments:		
F1 - deformed spine.		

A "strong presence" of moribund, anorexic and lethargic farmed salmon in addition to lesions on the flank and a "medium presence" of necrotic gills was also reported:

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

Case no:	2017-0467	Site No:	FS0411	Method of killing:		
Date of visit:	17/10/2017	Inspector(s):	SJD	Sheet Relevant:	Y	

S for strong presence: M for medium presence: W for weak presence

Fish Number		1	2	3	4	5					
Time sampled after death (if > 45 minutes)				50	60	70					
External Signs											
Behaviour	Moribund	S	S	S	S	S					
	Lethargic	S	S	S	S	S					
	Hanging vertical										
	Spiralling										
	Flashing										
	Loss of equilibrium										
Body	Dark										
	Distended abdomen										
	Anorexic	W	S	S	S	W					
Gills	Pale										
	Zoned										
	Necrotic	M	M	M	M	M					
Lesions	Flank		S	W							

A [FHI visit report from October 2017] for The Scottish Salmon Company's salmon farm at Vuia Mor in Loch Roag detailed a total mortality since input of 30.23% with 32,487 morts. Recent disease issues cited were PGD, AGD, Para Ther, Sal Gill pox, PD, HSMI, microsporidia and epitheliocystis.

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Additional Case Information:

Site contact to be updated - confirm with business correspondent.
Just started stocking with lumpfish - first load arrived yesterday.
Recent issues - PGD, AGD, Para Ther, Sal Gill pox, PD, HSMI, microsporidia, epitheliocystis
Stocked in January 2017.
Mortality since input - generally 0.08%-0.7% per week.
Recent mortality - wk 42 - 366, wk 41 - 577, wk 40 - 31536 (6.24%), 39 - 67435 (11.91%)
Total 30.23% mortality since input.
Ongoing Slice treatment.
Site specific sea lice strategy.
Check with biologist regarding harvest plans.

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):
	32487		

A [FHI visit report from October 2017] for Marine Harvest's salmon farm at North Shore in Loch Erisort detailed a "presumptive Pasteurella skyensis diagnosis" and "pathology consistent with previous Pasteurella infections" as well as "some cadiomyopathy", Pancreas Disease, AGD (Amoebic Gill Disease), Salmon gill pox and ParaTher (Paranucleospora theridon):

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

Case No:	2017-0469			Date of visit:	18/10/2017
Time spent on site:	5 hours			Main Inspector:	SJD
Site No:	FS1033	Site Name:	North Shore		
Business No:	FB0119	Business Name:	Marine Harvest (Scotland) Ltd		

Case Types: 1 REP | 2 ESC | 3 DIA | 4 | 5 | 6

Water Temp (°C):	11.5	Thermometer No:	Site	FHI 045 completed	
Observations:		Region:	WI	Water type: S	CoGP MA: W-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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Additional Case Information:

Presumptive Pasteurella skyensis diagnosis - based on histology results from FVG. Gram -ve bacteria seen in sections and pathology consistent with previous Pasteurella infections. Also, isolate submitted via FVG to MS for sequencing.
Samples sent off to Ridgeway for isolation and confirmation - results expected at start of next week.
Pen 16 worst affected.
Samples from end of September showed some cardiomyopathy - FVG.
PD diagnosed at end of May (sub-type 5) - recent blood PCRs negative, no longer active infection. Don't think contributing to current mortality event. However, additional PCRs positive from Patogen tests at end of September. Patogen also had positive PCRs for CMS in one fish. Salmon gill pox and ParaTher also positive.
Stocked with lumpfish but extended FW treatments killed majority - close to 100% mortality.
PGD on site at present but not gross AGD lesions. PGD scores of 2-3 on moribunds but similar in un-affected fish.
Site vet reported - fluid being seen in pericardium - from clear to 'milky white'. Fluid in peritoneal cavity - blood tinged. Also some fluid on swim bladder. Mottled spleen in some with nodules. Adhesions present.

Original site plans to fallow in May/June 18 - but likely to be earlier now.
North Shore West - 287905@ 4.1kg
North Shore East - 289462 @ 3.9kg
Morts removed in tubs - collected by Gogar and transferred to Energen biogas.
NSW - morts started rising in August. Prior to this approx. 200/8 cages/ every few days. Now 43-201/c/day.
49608 across NSW since 28/06/17.
NSE - 95762 total mortality since 28/06/17. Similar to NSW - started rising in August. Now 12-311/c/day.
Morts have dropped again over last few days - peaked at 7500 across NSE/day on 28 September, now 741/site/day.
Staggered treatment with antibiotics (Florocol) - limited availability of antibiotic. 7 cages treated.
Morts also above reporting levels at Tabhaigh - weeks 32 -34
Escape investigation
Seal spotted in pen, disappeared before action taken to remove. Divers on site within 2 hours - found and repaired hole net. Due to size of hole not thought to be caused by seal, but by hat of uplift system.
Site manager in discussion with production manager regarding modifications to uplift system which may be possible to prevent re-currence.
Cage currently being treated with Florocol. Decision to be made following withdrawal period - either to harvest cage or carry out lice treatment. Fish will be counted at this time - don't want handling at present due to treatment.

Multiple moribund fish seen in cages 16, 17 and 2. 5 sampled for diagnostic purposes. Didn't see as much gross pathology or clinical signs as had been seen by vet.

Deformities such as a "shortened upper jaw" and "eyes damaged" were also reported:

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Additional comments:

F2 - shortened upper jaw, thickened membrane over kidney - gelatinous, adhesions.
F3 - shortened upper jaw, both eyes damaged, adhesions.
F4 - grilse
F5 - shortened upper jaw.

A FHI visit report from October 2017 for a salmon farm in Loch Kishorn (Kishorn A) operated by Scottish Sea Farms detailed disease problems including AGD, sea lice damage to the heads of farmed salmon, Paranucleospora theridon, salmon gillpox, Branchiomonas, lamellar bleeding of the gills, CMS and HSMI like pathology:

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

Case No:	2017-0496					Date of visit:	25/10/2017		
Time spent on site:	4 hours					Main Inspector:	ALW		
Site No:	FS0709	Site Name:	Kishorn A (South)						
Business No:	FB0125	Business Name:	Scottish Sea Farms Ltd						
Case Types:	1 REP	2 DIA	3 VMD	4	5	6			
Water Temp (°C):	13.8	Thermometer No:	T148			FHI 045 completed			
Observations:		Region:	HI	Water type:	S	CoGP MA	M-19		

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	

Recent (last 4 wks) disease problems?		Y	Any escapes (since last visit)?
If yes, detail:	CMS, AGD, Paranucleospora theridion, salmon gillpox and Branchiomonas		

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Additional comments:

Fish 2-5 sea lice damage to head

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

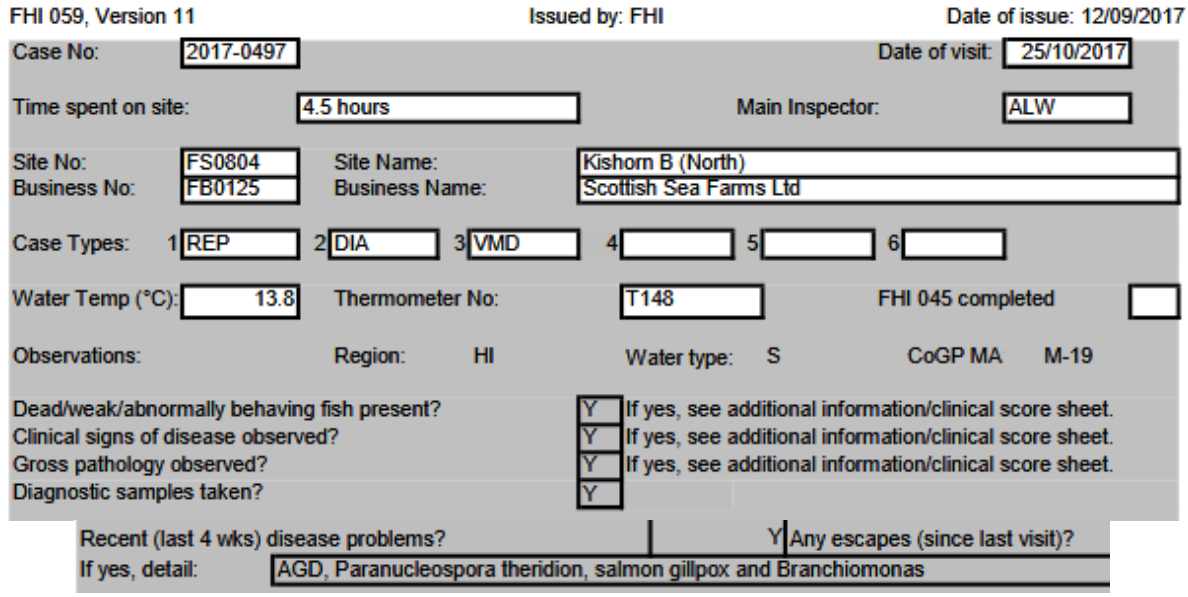
Additional Case Information:

Ongoing health issue on site. Company reported weekly mortality levels above 1%.

Tests positive for presence of AGD, Paranucleospora theridion, salmon gillpox and Branchiomonas. Also observed lamellar bleeding of the gills. CMS was detected earlier in the cycle (fish ~500g) and HSMI like pathology in more recent tests.
Advice from vets to accelerate harvests and not to attempt mechanical delousing in worst affected cages, bath only. Sea lice levels have increased (Most recent count on 27/9/17 - 5.67. No recent counts as harvesting out site). Treated all cages with Azamethiphos at end of Sept/early October.
Harvesting worst affected cages first and site should be empty over the weekend.

Mortalities being sent to Dundas for disposal. Due to volume of fish using a dedicated workboat operated by Fergusons Transport (Carly) who are organising the removal. Mortalities removed using uplift, transferred to tubs on site workboat and then pumped into sealed skips on boat. Boat moors at Kyle of Lochalsh each day and morts are collection by Billy Bowie.
A number of fish seen on site with lice damage to the head (estimate ~100 per cage visible). Removed 4 moribund fish and one apparently healthy fish for VMD. The gills of the fish removed for VMD had numerous pale patches so was included in the diagnostic sample. The four moribund fish had extensive lice damage to their heads, but gills appeared ok. Internally the heart of fish four was pale. Photos attached.

The FHI visit report from October 2017 for another salmon farm in Loch Kishorn (Kishorn B) operated by Scottish Sea Farms detailed similar disease problems including AGD, Paranucleospora theridon, salmon gillpox and Branchiomonas, lamellar bleeding of the gills and sea lice damage to the heads of farmed salmon.



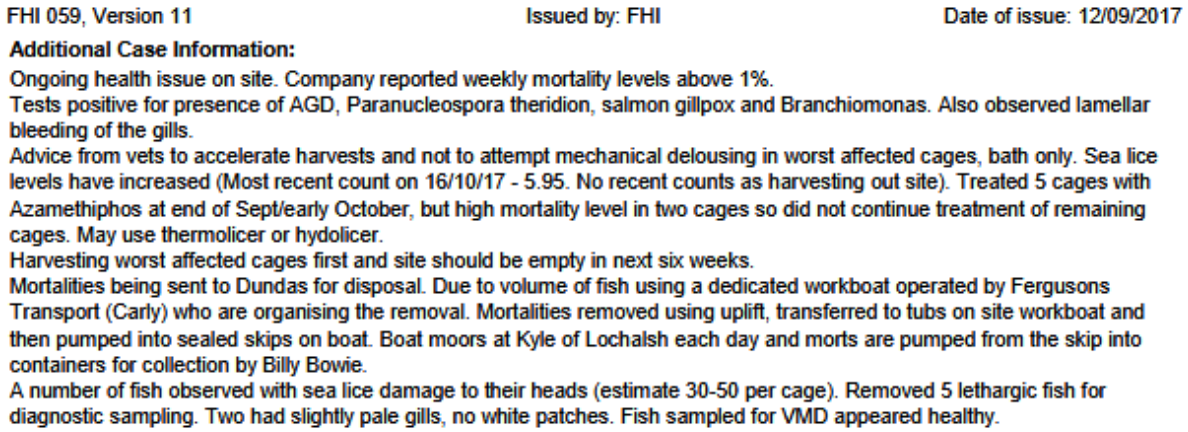
FHI 059, Version 11 | Issued by: FHI | Date of issue: 12/09/2017

Case No:	2017-0497						Date of visit:	25/10/2017	
Time spent on site:	4.5 hours					Main Inspector:		ALW	
Site No:	FS0804	Site Name:	Kishorn B (North)						
Business No:	FB0125	Business Name:	Scottish Sea Farms Ltd						
Case Types:	1 REP	2 DIA	3 VMD	4	5	6			
Water Temp (°C):	13.8	Thermometer No:	T148				FHI 045 completed		
Observations:		Region:	HI	Water type:	S		CoGP MA	M-19	

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	

Recent (last 4 wks) disease problems?		Y	Any escapes (since last visit)?
If yes, detail:	AGD, Paranucleospora theridion, salmon gillpox and Branchiomonas		

The FHI visit report (October 2017) for the Kishorn B (North) salmon farm operated by Scottish Sea Farms in Loch Kishorn stated: "Harvesting worst affected cages first and site should be empty in next six weeks".



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

Additional Case Information:

Ongoing health issue on site. Company reported weekly mortality levels above 1%.
Tests positive for presence of AGD, Paranucleospora theridion, salmon gillpox and Branchiomonas. Also observed lamellar bleeding of the gills.
Advice from vets to accelerate harvests and not to attempt mechanical delousing in worst affected cages, bath only. Sea lice levels have increased (Most recent count on 16/10/17 - 5.95. No recent counts as harvesting out site). Treated 5 cages with Azamethiphos at end of Sept/early October, but high mortality level in two cages so did not continue treatment of remaining cages. May use thermolicer or hydolicer.
Harvesting worst affected cages first and site should be empty in next six weeks.
Mortalities being sent to Dundas for disposal. Due to volume of fish using a dedicated workboat operated by Fergusons Transport (Carly) who are organising the removal. Mortalities removed using uplift, transferred to tubs on site workboat and then pumped into sealed skips on boat. Boat moors at Kyle of Lochalsh each day and morts are pumped from the skip into containers for collection by Billy Bowie.
A number of fish observed with sea lice damage to their heads (estimate 30-50 per cage). Removed 5 lethargic fish for diagnostic sampling. Two had slightly pale gills, no white patches. Fish sampled for VMD appeared healthy.

A FHI Fish Visit report dated November 2017 detailed disease problems at Cooke Aquaculture's salmon farm in the Stead of Aithness (Aith Voe) in Shetland.

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

Case No:	2017-0533	Date of visit:	08/11/2017
Time spent on site:	5 hrs	Main Inspector:	ASM
Site No:	FS0637	Site Name:	Stead of Aithness
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd

Case Types: 1 REP 2 DIA 3 4 5 6

Water Temp (°C): N/A Thermometer No: T172 FHI 045 completed

Observations: Region: SH Water type: S CoGP MA: S-8b

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	

"Harvest has been accelerated by 1 months (sic) due to increased morts," detailed FHI Fish Visit report dated November 2017. "Top sweep is being harvest first (sic) from the worst affected cages."

"During the inspection of the stock on site there were many fish high in the water column," continued the FHI Fish Visit report dated November 2017. "Many fish were moribund and about 20-30 fish over the site were observed dead on the surface of the water."

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Additional Case Information:

Morts removed daily using mort socks
Waste collected by TWMA. They can cope with the volume produced.
Site stocked with lumpsuckers but these have died. This occurred shortly after the lumpsuckers were input in July. 15,000 input. Company biologist took samples and sent to FVG. Mortality attributed to a bacterial infection.
Lice skirts used on site. Skirts are 6m deep. These are thought to be effective against lice.
Cages aerated using compressed air.
Harvest has been accelerated by 1 months due to increased morts. Top sweep is being harvest first from the worst affected cages.
FVG have been contacted and have conducted two site visit. Last report observed, another report is expected soon. The site representative agreed to contact ASM once the report has been received.
Site staff did not directly observe macroscopic jellyfish, however, FVG did suggest mortality was consistent with harmful microscopic zooplankton, either Muggiaea or Solmaris.
AGD treatments carried out earlier in 2017. Treated on 22/09/17, 09/08/17, 11/07/17. All treatments were reportedly successful.
SLICE treatments conducted on 23/06/17, 22/02/17 and 02/11/16. These were taken after very slight rises in lice numbers. All treatments were reportedly successful.
Lice numbers have been on the rise in the past weeks leading up to the inspection (thought to be related to the increase in immunocompromised fish on site), especially numbers of pre-adult males. Still under 3 adult females per fish.

Updated by SJD 19/12/17 - mortality percentage in Mortality events sheet updated to same as on master sheet. Master sheet entry was updated following a phone call on 24/11/17 as percentage recorded was incorrect.
Updated by ASM 21/12/17 - During the inspection of the stock on site there were many fish high in the water column. Many fish were moribund and about 20-30 fish over the site were observed dead on the surface of the water.

The mortality rate was reported as 11.52%.

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):
30/10/17	05/11/2017	≥750g	3.5kg	SAL	2016 S0	Weekly	11.52	Explained	Complex gill issues

With total mortality of 58,590 farmed salmon.

Total mortality during event (if available):	Additional information (e.g. action taken by company):	Action taken by FHI (include case no where applicable):
58590	Additional samples submitted to FVG	Inspection undertaken (2017-0533)

Marine Scotland Science detailed in their FHI Visit Report for November 2017 "pathology consistent with amoebic gill disease, presence of epitheliocystis and some features resembling salmon poxvirus" as well as mild hepatic necrosis and minor cardiomyopathy.

marinescotland science

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FINAL FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0095	DATE OF VISIT	08/11/2017
SITE NO	FS0637	SITE NAME	Stead of Aithness
INSPECTOR	Andy Mayes	CASE NO	20170533

Section 1: Summary

The fish health inspectorate were contacted by a representative for the above site during a mortality event. A site inspection was organised. During the inspection five fish were removed for diagnostic sampling.

Histopathology examination revealed complex gill issues with pathology consistent with amoebic gill disease, presence of epitheliocystis and some features resembling salmon poxvirus. Mild hepatic necrosis, likely associated with hypoxia, marked lamellar capillary disturbances or damage and minor cardiomyopathy were also noted.

Section 2: Case Detail

Observations

The fish health inspectorate were contacted on 31/10/17 regarding an increase in mortality over the level of reporting criteria. The mortality event started on 09/10/17 with a mortality rate of 1.9% (11,932 fish) over the week. This mortality rate peaked at 13.69% (81,698 fish) per week two weeks after the start of the event. The mortality event was attributed to complex gill issues by the business representative. A veterinarian had been called and samples had been taken.

During the inspection the preliminary results of the veterinarian investigation were observed. The pathology observed by the veterinarian was consistent with harmful microscopic zooplankton, most likely from the genus *Muggiaea* or *Solmaris*. Inspection of the treatment records showed the fish were treated three times for amoebic gill disease (AGD) since input starting on 11/07/17, 09/08/17 and 22/09/17. All treatments were reportedly successful. Three successful SLICE treatments were also carried out starting on 02/11/16, 22/02/17 and 23/06/17. These were

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

reportedly successful. Lice numbers the week before the inspection were increasing (thought to be related to the increase in the immunocompromised fish on site). The levels were below 3 adult female lice per fish.

During the inspection of the stock on site there were many fish high in the water column. Many fish were moribund and about 20-30 fish over the site were observed dead on the surface of the water. Five live fish were removed for diagnostic sampling.

All fish removed were lethargic and moribund, while fish 3 also had a cataract in one eye. The gills of fish 3-5 were pale, and in fish 4 and 5, were necrotic. All fish had a high lice burden, between 9 and 16 (all life stages). Internally all fish had yellow pseudo-faeces, fish 2, 4 and 5 had bloody ascites. Fish 2 and 4 also had a slightly grey kidney and fish 4 and 5 had a slightly swollen heart atrium.

A FHI Fish Visit report dated November 2017 detailed disease problems at another Cooke Aquaculture salmon farm at East of Holm Heogland in Shetland - including "variable complex gill disease including PGD and lowlevel AGD"; "Low level HSMI type pathology" as well as Costia and branchiomonas.

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

Case No:	2017-0546			Date of visit:	08/11/2017
Time spent on site:	2 hours			Main Inspector:	SJD
Site No:	FS0960	Site Name:	East of Holm Heogland (Burkwell)		
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd		
Case Types:	1 REP	2 DIA	3	4	5 6
Water Temp (°C):	10.6	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	

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

Additional Case Information:

Morts - October - 28,096 (7.14%) across site - Higher in cages 2 (4573 - 16.03%) and 3 (4310 - 15.35%).
9/10 - total 6675, 16/10 - total 5373 - to add to previously reported mortality events.
Week 30/10 - 1895 (0.52%) - below reporting levels.

FVG report - samples 11/09 - variable complex gill disease including PGD and low-level AGD. Low level HSMI type pathology.
FVG report - read date 26/10 - acute waterborne irritant, AGD, Costia, branchiomonas.

The FHI Fish Visit report dated November 2017 noted a pale/anaemic spleen and stated that the "heart lost shape when removed".

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Additional comments:

F2 spleen pale/anaemic, pale mustard coloured liver. Heart lost shape when removed.

The FHI Fish Visit report dated November 2017 noted positive tests for Salmon gill poxvirus (SGPV), Piscine myocarditis virus (PMCV), Neoparamoeba perurans (AGD) and Paranucleospora theridon:

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	23.00	33.26	33.11	33.03	POSITIVE
F2	24.12	29.70	30.26	30.12	POSITIVE

Piscine myocarditis virus (PMCV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	18.40	26.91	27.15	27.19	POSITIVE

Neoparamoeba perurans (AGD)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	23.00	>35	>35	>35	POSITIVE
F2	24.12	29.02	28.84	28.63	POSITIVE

Paranucleospora theridion

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	23.00	37.25	38.74	39.03	POSITIVE
F2	24.12	32.80	32.53	32.86	POSITIVE

A FHI Fish Visit report for November 2017 detailed disease problems at another Cooke Aquaculture salmon farm at Winna Ness in Shetland - with over 30% mortality and "acute gill pathology".

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

Case No:	2017-0550	Date of visit:	08/11/2017
Time spent on site:	2.5 hours	Main Inspector:	SJD
Site No:	FS0871	Site Name:	Winna Ness
Business No:	FB0095	Business Name:	Cooke Aquaculture Scotland Ltd

Case Types: 1 REP 2 DIA 3 4 5 6

Water Temp (°C): 10.6 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	

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Additional Case Information:

Morts - October- 36028 (10.11%) across site. Higher in cages 7 (5798 - 16.85%), 8(7869 - 26.31%) & 9 (8353 - 30.96%). Week 23/10 - below reporting level - 3109 morts (0.96%).

FVG report - sampled 09/10 - acute gill pathology - waterborne irritant such as plankton. Mild AGD.
Weather poor during visit - focussed on cages with higher mortality. Only two moribunds in cages 8 & 9 - both sampled.
Movement records not checked - ECI last month.

Updated 14/11/17 - SJD - mortality events for weeks 40, 41 & 42 had previously been reported - number of fish during mortality event confirmed.

The FHI Fish Visit report for November 2017 detailed "complex gill issues", "pathology consistent with cardiomyopathy syndrome (CMS) and mild amoebic gill disease", "multifocal hepatic necrosis (likely associated with hypoxia)" and positive tests for Paranucleospora theridon (syn. Desmozoon lepeophtheri) and salmon gill poxvirus (SGPV).

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0095	DATE OF VISIT	08/11/2017
SITE NO	FS0871	SITE NAME	Winna Ness
INSPECTOR	Sonia Duguid	CASE NO	20170550

Section 1: Summary

A report was received from the operator of increased mortality levels at the site being attributed to complex gill issues and environmental issues. Two fish were selected for diagnostic sampling.

Histopathology examination revealed pathology consistent with cardiomyopathy syndrome (CMS) and mild amoebic gill disease (AGD), both of which were confirmed by QPCR. Multifocal hepatic necrosis (likely associated with hypoxia) was also noted.

Due to gill health issues observed on site samples were screened for *Paranucleospora theridion* (syn. *Desmozoon lepeophtherii*) and salmon gill poxvirus (SGPV) by QPCR and fish 2 tested positive for both pathogens.

Section 2: Case Detail

Observations

The above site was inspected following a report from the operator of increased mortality in the Atlantic salmon stocked on the site. At the time of the inspection the site was stocked with 315,647 2016 S0 Atlantic salmon at an average weight of 4kg.

Mortality levels had begun to rise in August 2017 and continued to be elevated during September and October. A total mortality of 36,028 (10.11%) was reported across the site for the month of October. Mortality was higher in cages 7 (16.85%), 8 (26.31%) and 9 (30.96%) during October. Weekly mortality percentage had peaked at 4.73% across the site in week 40. Mortality had reduced prior to the visit to 0.96% in week 43 and 1.51% in week 44.

R09

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

Health surveillance carried out in October 2017 reported acute gill pathology attributed to a waterborne irritant. Mild AGD was also observed. Due to adverse weather conditions the inspection focussed on cages 7, 8 and 9, where only 2 moribund fish were observed. Both were sampled for diagnostic purposes.

Both fish were lethargic and had areas of necrosis on the gills. The gills of fish 1 were pale and zoned. Fish 2 had extensive haemorrhaging across the ventrum, throat and base of fins, an inflamed vent and areas of scale oedema. Fish 2 also had shortened opercula.

Internally, fish 1 was generally anaemic with a pale liver. Fish 2 had bloody ascites and a deformed heart with a large blood clot present in the pericardial cavity. Petechial haemorrhaging was observed on pyloric caeca, liver and swim bladder of fish 2.

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

Salmon gill poxvirus (SGPV)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F2	24.66	30.51	30.51	30.30	POSITIVE

F1 tested negative for salmon gill poxvirus.

Piscine myocarditis virus (PMCV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	19.91	20.48	20.68	20.70	POSITIVE

Neoparamoeba perurans (AGD)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	23.27	29.61	29.45	29.68	POSITIVE
F2	24.66	27.65	29.08	29.04	POSITIVE

Paranucleospora theridion

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F2	24.66	39.42	>40	39.00	POSITIVE

A FHI Fish Visit report dated November 2017 detailed disease problems at the Scottish Salmon Company's salmon farm at Portree on the Isle of Skye - including "complex gill issues", "anorexic and moribund fish", AGD, poxvirus and Desmozooan.

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

Case No:	2017-0555							Date of visit:	07/11/2017		
Time spent on site:	7.5 hr							Main Inspector:	RJS		
Site No:	FS0708	Site Name:	Portree								
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):	12.6	Thermometer No:	T213					FHI 045 completed			
Observations:		Region:	HI	Water type:	S			CoGP MA:	M-26		

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:

The site has been suffering from complex gill issues this cycle. This is thought to have been exacerbated by an algal bloom recently. No problems this cycle with predation, lice or jellyfish. Morts are removed by lift-up systems, although one is out of action currently. Morts are incinerated on site when the fish are small but have been getting transferred for storage at Kenmore, Loch Torridon as larger fish have been getting lost. The morts are taken by boat to Kenmore and are then sent to Dundas Bros using Billy Bowie. This activity has resulted in the sites inspection frequency increasing. The BMP and FMS both require updating with regard to mortality disposal. Fish are normally harvested live through Stornoway. Due to the recent elevated number of mortalities there were signs of decomposed mortalities at the surface in 4 cages. Hydrolicer used successfully on site on some cages in May 2017. A number of anorexic and moribund fish were observed in most cages. The fish were active when trying to catch them however. 4 moribund fish caught, one of which was anorexic. 4 other fish also caught for VMD sampling. Diagnostic samples were taken. Of the 5 fish sampled for diagnostic tests, 2 had zoned gills and 3 had pale gills. The moribund fish has not been feeding. Diagnostic surveillance by veterinary services has identified AGD, poxvirus and Desmozooan. A FW treatment is to be conducted to combat the effects on the gills.

A FHI Fish Visit report dated November 2017 detailed disease problems at Marine Harvest's salmon farm in Loch Greshornish on the Isle of Skye - including 20-30 Caligus (sea lice) with farmed salmon reported as "belly up as if concussed from banging":

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

Case No:	2017-0558							Date of visit:	09/11/2017		
Time spent on site:	9 hr							Main Inspector:	RJS		
Site No:	FS0015	Site Name:	Loch Greshornish								
Business No:	FB0119	Business Name:	Marine Harvest (Scotland) Ltd								
Case Types:	1 ECI	2 CNA	3 SLI	4 VMD	5 DIA	6					
Water Temp (°C):	12.5	Thermometer No:	T213				FHI 045 completed	N/A			
Observations:		Region:	HI	Water type:	S		CoGP MA:	M-24			

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 comments:

All fish had ~20-30 Caligus on the body. Fish 1, 2 and 5 were belly up as if concussed from banging 2ry equipment in cage. Fish 1 and 2 had white plaques on the gills. Fish 3 had a slightly flaccid heart muscle.

Marine Scotland Science's FHI Visit Report for November 2017 detailed "moribund and lethargic fish", "mild proliferative gill pathology with features consistent with amoebic gill disease (AGD), epitheliocystis, "anorexic poor-doing indivuduals" and positive tests for Neoparamoeba perurans, Paranucleospora theriodon (syn. Desmozoon lepeophtheri) and salmon gill poxvirus.

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0119	DATE OF VISIT	09/11/2017
SITE NO	FS0015	SITE NAME	Loch Greshornish
INSPECTOR	Ron Smith	CASE NO	20170558

Section 1: Summary

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

Histopathology examination revealed marked to mild proliferative gill pathology with features consistent with amoebic gill disease (AGD). Epitheliocystis were also noted in F2. F3 and F4 were anorexic poor-doing individuals.

Due to gill health issues observed on site, samples were also screened for *Neoparamoeba perurans*, *Paranucleospora theridion* (syn. *Desmozoon lepeophtherii*) and salmon gill poxvirus by QPCR and tested positive.

The report identified farmed salmon with cataracts and anorexia.

Section 2: Case Detail

Observations

During a routine inspection, a number of lethargic and moribund fish were observed. Five moribund and lethargic fish were caught for examination and diagnostic sampling.

External examination of the fish showed zonation in the gills of fish 1 – 5, cataracts and anorexia in fish 3 and 4.

Internal examination showed inflammation in the tubules of the pyloric caeca and no food in the gut of fish 3 & 4. Yellow pseudo-faeces was observed in the gut of fish 3 & 4, along with a lack of fat on the pyloric caeca. The heart of fish 3 also appeared to be slightly flaccid.

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A FHI Fish Visit report dated November 2017 detailed disease problems at The Scottish Salmon Company's salmon farm at Strome Point in Loch Fyne - including AGD, gill issues and "large mortality" and "bacterial infection with V. anguillarum":

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

Case No:	2017-0563								Date of visit:	09/11/2017	
Time spent on site:	5 hrs							Main Inspector:		SAE	
Site No:	FS1056	Site Name:	Strone Point								
Business No:	FB0169	Business Name:	The Scottish Salmon Company								
Case Types:	1 REP	2 DIA	3	4	5	6					
Water Temp (°C):	11.2	Thermometer No:	T205				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 11 Issued by: FHI Date of issue: 12/09/2017

Additional Case Information:

July 2017 issues with plankton blooms start. August 2017 Peroxide treatment for AGD, gill issues post treatment are mostly environmental (histology), PCR still positive for AGD. Gill issues continuing on into September with fortnightly gill swabs. Histology confirms mostly environmental insult (plankton blooms). October 2017 low dissolved oxygen on top of issues with gills causing large mortality and bacterial infection with V. anguillarum.

Recent (last 4 wks) disease problems?	Y	Any escapes (since last visit)?	N
If yes, detail:	complex gill issues exacerbated by environmental conditions and bacterial infection (thought to be secondary) Vibrio anguillarum isolated (5/11/17)		

Results of Surveillance

1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	gill issues and V. anguillarum

FVG report (5/11/17) Secondary infection with V. anguillarum 6/6. Fish have compromised gills with reduced function and low dissolved oxygen has been experienced on site since wk 37 which is exacerbating the issue. FVG (sample 18/10/17; report 20/10/17) AGD PCR (6/6), Branchiomonas cysticola (Epitheliocystis) 6/6, Paranucleospora theridion 6/6, SGPV 6/6.

Records checked between: 02/05/2017 - 9/11/17

In terms of mortalities, The Scottish Salmon Company reported for Strome Point in Loch Fyne that "mortalities start to increase in the beginning of October" with 20-70 morts per day per cage and 3,000 - 6,000 per day per site:

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Whole fish - Dundas Chemicals
If other detail:	
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	Mortalities start to increase in the beginning of October, some cages worse affected than others. Environmental issues with plankton blooms in October and some low dips in dissolved oxygen in mid October. Fish unable to cope with compromised gills and low oxygen. Some of the lower mort cages 20-70 morts per day per cage.
5. Evidence of recent increased/atypical mortalities?	Y

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

3000 - 6000 per day per site

6. Any other peaks in mortality during period checked?	Y
If yes, detail:	August 2017 2.66% for the month for the entire site some issues with AGD. AGD continuing on into September with numbers slightly decreasing.
7. Have increased (unexplained) mortalities been reported to vet or FHI?	Y
If yes, detail action:	Weekly reports are made to FHI, site visit was triggered by these reports.
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:

F3 black spherical objects observed on the gills (see photos) and haemorrage/ damage in the muscle tissue on the ventral surface internally (sample collected for histology).

F4 kidney unusual (see photos).

A FHI Fish Visit report dated November 2017 detailed disease problems at Marine Harvest's salmon farm at Poll Na Gille in the Sound of Jura - including "complex gill issues", anaemia, "severe PGD pathology and extensive haemorrhaging":

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

Case No:	2017-0603			Date of visit:	29/11/2017
Time spent on site:	4 hrs			Main Inspector:	PMM
Site No:	FS0629	Site Name:	Poll Na Gille		
Business No:	FB0119	Business Name:	Marine Harvest (Scotland) Ltd		
Case Types:	1 REP	2 DIA	3	4	5 6
Water Temp (°C):	11.4	Thermometer No:	T155	FHI 045 completed	
Observations:		Region: ST	Water type: S	CoGP MA	M-40

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:

Site inspected following increased mortalities above reporting level. Mortalities had been attributed to complex gill issues and anaemia. Site has harvested the worst affected stock. The remaining cages have been passive graded and fish split down, resulting in approx 20,000 fish per cage. Harvests have been a combination of live haul and dead haul. Dead haul have been conducted by the Viking Caledonia with loads being transferred to tankers in Oban.

Intercaledonia was on site conducting freshwater treatments, targeted treatments were conducted on cage 1 (16 hour treatment) and cage 16 (15 hour treatment). No issues observed or reported in cage 16. However, 3 fish hanging vertically removed from cage 1 and sampled.

Visibility excellent at time of inspection >6m, all cages fitted with 5m deep sea lice skirts. Majority of fish observed shoaling normally, 5 -10 lethargic fish per cage observed deeper in the water.

Health report 19/10/17 - pen 12 F1 - moderate PGD, P& - F1 - no signs of anaemia. P16 F5 & F6 - moribund severe anaemia presented in pale gills with moderate to severe PGD pathology and extensive haemorrhaging. Sampled blood was watery and measured haematocrit levels was at 6.5 and 5.1%. Histology reporting liver necrosis in both fish likely due to hypoxia caused by anaemia.

The mortality records stated that Marine Harvest had "harvested worse cages, reducing biomass":

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Whole fish - Dundas Chemicals
If other detail:	
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	wk 45 - 20,309 (~2.6%) (4,463 attributed to CMS and 15,846 attribited to anaemia), wk 46 - 8,129 (~2.1%) (3,212 attributed to CMS and 4,917 attributed to anaemia), wk 47 - 1,751 (~0.66%) (1,570 attributed to CMS and 181 attribited to hydrolicer treatment)
5. Evidence of recent increased/atypical mortalities?	Y
If yes, facility nos/no mortality per facility/no stock per facility/reason:	
week 45 for site 4,463 attributed to CMS and 15,846 attributed to anaemia.	
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:	Harvested worst cages, reducing biomass and passive graded remaining cages, split fish to 13 cages stocked at approx 20,000 per cage.
8. Have 'mortality events' been reported to FHI? If no, add MRT case and enter on mortality events sheet.	Y

Results of Surveillance	
1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	
Pen 12 - f1 - moderate PGD, P7 - F1 - no signs of anaemia, P16 F5 +6 - moribund severe anaemia presented in pale gils with moderate to severe PGD pathology and extensive haemorrhaging. Sampled blood was watery and measured haematocrit levels was at 6.5 and 5.1%. Histology reporting liver necrosis in both fish likely due to hypoxia caused by anaemia.	
Records checked between:	06/11/17 to 29/11/17

The [FHI Fish Visit report for November 2017] detailed "complex gill issues and anaemia", "mild cardiomyopathy with features resembling cardiomyopathy syndrome (CMS) and the presence of the causative agent, piscine myocarditis virus (PMCV)" and reported a positive test for Paranucleospora theridon (syn. Desmozoon lepeophtheri). Over 60,000 mortalities were reported in a four-week period (Week 33 to 36).

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0119	DATE OF VISIT	29/11/2017
SITE NO	FS0629	SITE NAME	Poll Na Gille
INSPECTOR	Paul McKay	CASE NO	20170603

Section 1: Summary

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

Histopathological examination revealed mild cardiomyopathy with features resembling cardiomyopathy syndrome (CMS) and the presence of the causative agent, piscine myocarditis virus (PMCV), was confirmed by real-time PCR (QPCR). Mild gill pathology was also noted.

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

Section 2: Case Detail

Observations

The above site was inspected following a report from the operator of increased mortality in the Atlantic salmon stocked on the site. At the time of the inspection the site was stocked with 265, 453 2016 S0 Atlantic salmon at an average weight of 4.4 Kg and ~17,500 wrasse of mixed age.

Mortality levels began to rise at the end of October 2017, peaking at 3.2% (20,053 Atlantic salmon) in week 43 and remained elevated during weeks 44 – 2.7% (13,830 Atlantic salmon), week 45 – 2.6% (20,309 Atlantic salmon) and week 46 – 2.1% (8,129 Atlantic salon). Mortality levels decreased to 0.66% (1,751 Atlantic salmon) during week 47.

The worst affected cages have been harvested and the remaining stock has been passive graded and biomass reduced across the remaining cages. Health surveillance carried out by the R09

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business reported complex gill issues and severe anaemia presented in pale gills. A number of lethargic salmon were observed across the site and three were sampled for diagnostic purposes.

All three fish were observed hanging vertically in the water. The gills of F1 and F2 were pale. Internally F1 and F3 presented clear ascites and F2 presented bloody ascites. All three fish displayed enlarged spleens. Cage one had undergone a freshwater treatment the day prior to the site inspection.

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 myocarditis virus (PMCV)

Pool Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
P1	17.92	30.35	30.25	30.33	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 salmon gill poxvirus.

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

Paranucleospora theridion

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	22.07	30.59	30.50	30.55	Positive
F2	22.12	35.2	35.62	34.81	Positive
F3	22.38	32.55	32.55	32.55	Positive

The FHI Fish Visit report signed off by stating that histopathological examination had found "some evidence of erthrophagocytosis" in the spleen, "mild diffuse hepatocyte vacuolation" in the liver, "mild pericarditis" in the heart and "lamellar congestion" in the gills.

Histopathological examination revealed the following:

Gill: Minor interlamellar basal hyperplasia (F1) and small foci of epithelial hyperplasia, lamellar fusion and lamellar congestion and some lamellar thickness noted in F3. Few aneurysmal dilation/telangiectasia were also noted in F3.

Skin & Muscle: Within the normal range.

Heart: Small foci of myofibre degeneration and cell infiltration noted in F2 and F3, mild pericarditis noted in F2.

Gut and pyloric caeca: Within the normal range.

Pancreas: Within the normal range.

Liver: Mild diffuse hepatocyte vacuolation (F1 & F2).

Kidney: Within the normal range.

Spleen: Some evidence of erythrophagocytosis (F3).

[redacted]

Signed: Date: 21/12/17

Fish Health Inspector

A FHI Fish Visit report for December 2017 detailed disease problems at The Scottish Salmon Company's salmon farm at Druimyeon Bay in the Sound of Gigha - including PGD, CMS and "sea lice grazing damage to heads".

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

Case No:	2017-0606						Date of visit:	05/12/2017	
Time spent on site:	3.5 hrs					Main Inspector:		PMM	
Site No:	FS0336	Site Name:	Druimyeon Bay						
Business No:	FB0169	Business Name:	The Scottish Salmon Company						
Case Types:	1 REP	2 DIA	3 VMD	4	5	6			
Water Temp (°C):	11.2	Thermometer No:	T155				FHI 045 completed		
Observations:		Region:	ST	Water type:	S		CoGP MA:	M-46	
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:

Site inspected following mortalities reported above the weekly threshold. Mortalities have been attributed to PGD, and post hydrolicer losses. Recent vet report has identified CMS and this is now a factor in losses. 5 fish removed for diagnostic sampling, 6/9 cages are on the harvest forecast sheet and the site may be fallow by the end of the year.
Site is quite exposed and water was very choppy which affected visibility at times during the inspection. ~10 moribund fish observed per cage, some of which had sea lice grazing damage to heads.
It was reported that there was a higher than normal % of mature fish, this was estimated to be ~20%, half of moribund fish visible in the cages were maturing fish.

All five farmed salmon tested had a "strong presence" for moribund and lethargic behaviour.

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

Case no:	2017-0606	Site No:	FS0336	Method of killing:	Percussive
Date of visit:	05/12/2017	Inspector(s):	PMM	Sheet Relevant:	Y

S for strong presence: M for medium presence: W for weak presence

Fish Number		1	2	3	4	5					
Time sampled after death (if > 45 minutes)											
External Signs											
Behaviour	Moribund	S	S	S	S	S					
	Lethargic	S	S	S	S	S					
	Hanging vertical		S								

The [FHI Fish Visit report for December 2017] reports all the usual suspects with over 30,000 mortalities in Week 43 citing problems such as PGD, CMS, AGD and PMCV.

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FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0169	DATE OF VISIT	05/12/2017
SITE NO	FS0336	SITE NAME	Druimyeon Bay
INSPECTOR	Paul McKay	CASE NO	20170606

Section 1: Summary

Reports were received from the operator of ongoing increased mortality levels at the site attributed to a combination of proliferative gill disease (PGD), handling/grading and cardiomyopathy syndrome (CMS). Five fish were removed for diagnostic sampling.

Histopathology examination revealed marked cardiomyopathy consistent with CMS and the presence of the causative agent, piscine myocarditis virus (PMCV), was confirmed by real-time PCR (QPCR). Mild complex gill issues with lesions suggestive of amoebic gill disease (AGD) were observed and confirmed by QPCR. Multifocal hepatic necrosis and marked nephropathy noted in fish three.

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

Section 2: Case Detail

Observations

The above site was inspected following a report from the operator of increased mortality in the Atlantic salmon stocked on the site. At the time of the inspection the site was stocked with 233,639 2016 S0 Atlantic salmon at an average weight of 3 Kg.

Mortality levels began to increase at the beginning of October 2017 (week 40), peaking at 2.81% (30,015 Atlantic salmon) in week 43. The worst affected cages had been harvested and the site was due to fallow by the end of 2017. Recent health surveillance conducted by the operator

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reported CMS. A number of moribund fish were observed across the site and five were removed for diagnostic sampling.

All fish sampled were moribund and lethargic, with F2 hanging vertically. F5 was anorexic. Internally F5 had clear ascites whilst F1, F3 and F4 had bloody ascites. The heart of F3 was deformed. There was gross haemorrhaging on the liver in F3, F4 and F5. The spleens of fish F1, F2, F4 and F5 were enlarged. There was no food present in the guts of any fish sampled and all had yellow pseudo-faeces.

Case Information published by the Scottish Government's Fish Health Inspectorate for July to September 2017 includes a FHI visit report for Loch Duart's salmon farm in Badcall Bay.

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

Case No:	2017-0183							Date of visit:	29/08/2017		
Time spent on site:	4.5						Main Inspector:		JMS		
Site No:	FS0067	Site Name:	Badcall Bay								
Business No:	FB0398	Business Name:	Loch Duart Ltd								
Case Types:	1 DIA	2 REP	3 VMD	4 ECI	5 CNI	6 SLI					
Water Temp (°C):	13.8	Thermometer No:	T152				FHI 045 completed				
Observations:		Region:	HI	Water type:	S		CoGP MA	M-4			
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							

The report details AGD lesions as well as "significant gill pathology (AGD, Branchiomonas, Desmazoon, SGPV), widespread inflammation and vascular damage". "Piscirickettsia suspected but not identified though staining (sic)" stated the report. Mortality rates for some of the worst cages were over 30%.

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

Additional Case Information:

The site was inspected following a report from the business correspondent of increased mortality at the site since the end of July 2017. The mortality was attributed to complex gill issues and a potential water borne insult. Liver pathology had also been observed in samples taken by FVG. Summary of FVG findings: 4/8/17 - acute and chronic gill pathology, AGD lesions, evidence of water borne irritant, no clinical findings in external organs. AGD listed as a concern. 16/8/17 - mixed acute and chronic gill pathology, exposure to water borne irritant, liver pathology. 23/8/17 - Significant gill pathology (AGD, Branchiomonas, Desmazoon, SGPV) widespread inflammation and vascular damage, AGD ct values from PCR suggested a worse infection than was seen by histology. No evidence of SAV. Liver necrosis observed, Piscirickettsia suspected but not identified though staining.

One cage group currently stocked with ~80000 (between 6500 and 9500/pen) salmon of Landcatch origin. Fish were transferred from Outer Bay and Drumbeg in June 2017.

Site received a Salmosan Vet treatment between 29/6/17 and 1/7/17 post transfer. Site received a Paramove treatment for AGD between 5/7/17 and 10/7/17, scores reduced post treatment. Three pens were treated on 8/8/17 with Paramove for AGD, the whole site was not treated due to the reaction of the fish. Low 02 levels have been a problem and site has been using aeration to help this. Mortality is being removed by uplift, stored in a sealed skip and removed by DK waste to Gray Composting. Harvests are carried out by dead haul.

Mortality:
Week 29 - 3.75% for site, worst cages b11 29.35% and B12 18.75% issues with dosing equipment - human error in mixing
Week 30 0.2%
Week 31 0.78%
Week 32 4.79% site worst cage B10 31.32% post H202 - H202 treatment halted
Week 33 7.07% site worst cages B01 10.45% and B02 11.86% and B05 12.44% B06 10.59% - not associated with treatment
Week 34 4.18% (mid week) worst cage B6 15.84%
Monthly totals June 2017 0.12%, July 9.66%, August 15.69% (up until 15th August) mainly attributed to gills and post treatment.
Wk 33 487 lumpsucker morts in cage 9 post H202 treatment

Results of Surveillance

1. Has any animal health surveillance been carried out by, or on behalf of, the business?	Y
2. If yes, are results available for inspection?	Y
3. Any significant results?	Y
If yes, detail (if not detailed under recent disease problems).	
Complex gill issues, AGD, liver pathology, branchiomonas, inflammation and vascular damage, desmazoon	
Records checked between:	12/11/14 - 29/8/17

The FHI visit report also described "no membrane between heart and liver" and "haemorrhaging at the base of the pelvic fins" in sampled farmed salmon.

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Additional comments:

Hearts appeared flabby and were difficult to cut. Some atriums added to pots separately. F1 heart appeared flat. No membrane between heart and liver in F3. F1, 2, 5 had haemorrhaging at the base of the pelvic fins.

The FHI visit report for August 2017 detailed "severe complex gill issues with chronic and acute pathology", epitheliocystis, Candidatus Branchiomonas cysticola, Candidatus Syngnamydia salmonis, vascular damage, mild hepatic necrosis, Salmon gill poxvirus and Paranucleospora theridon.

A FHI visit report for August 2017 for The Scottish Salmon Company's salmon farm at Inch Kenneth in Loch na Keal on the Isle of Mull detailed "very skinny" fish including one

"deformed with a bent spine" and three out of the five farmed salmon sampled had "deformed hearts".

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Case No:	2017-0350								Date of visit:	23/08/2017	
Time spent on site:	3 hours							Main Inspector:		DJT	
Site No:	fs0593		Site Name:	Inch Kenneth							
Business No:	FB0169		Business Name:	The Scottish Salmon Company							
Case Types:	1	REP	2	MRT	3	DIA	4		5		6
Water Temp (°C):	14.7		Thermometer No:	T173					FHI 045 completed		
Observations:			Region:	ST			Water type:	S	CoGP MA:	M-37	

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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Additional comments:

All fish sampled were very skinny, fish three was deformed with a bent spine. One caligus observed.

Externally: All five fish were lethargic, anorexic with darkened bodies and pale gills.

Internally: All five fish had a lack of fat and splenomegaly, fish 3-5 had deformed hearts and yellow pseudo faeces was evident in fish 4 and 5. The kidney of fish 1 and 2 were slightly granular in appearance.

Disease problems included AGD, PD, Branchiomonas and microspoidean.

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Additional Case Information:

Mortality event started on the 10th July (reported to FHI) and has been ongoing since then. Site inspection triggered due to continued mortality event above reporting thresholds. Initial spike was due to treatment with hydrogen peroxide for AGD and sea lice however stocks had been through a clinical outbreak of PD so were immunosuppressed. AGD gill scores were rising so treatment was deemed necessary.

Due to weather conditions only three cages were treated on the 14th July and the remaining three cages were treated 4th August resulting in two spikes of mortality post treatments. These have all been reported to the FHI.

Mortality event was recorded for week 32 (7-13 Aug), 21.43% (23117 fish @1.7 kg).

Mortalities recorded for week 33 0.40%, 335 fish. Week 34 30 fish so far (0.04%)

Total mortalities since 10th July 44.09% or 62,634 fish in total.

Reports available from the FVG confirm clinical PD on site in February. Additional reports confirm clinical AGD, Branchiomonas, microsporidean. High gill scores for AGD recorded indicating treatment was required.

You can access all the data and FHI visit reports cited above via:
Hard Evidence: Fast-Tracking Disease-Ridden Scottish Salmon
EXPOSED: Early Harvesting at Scottish Salmon Farms Due to Disease & Mortalities

Scottish Salmon Watch is pleased that 'Farmed Fish' is on the agenda of your meeting on 5 June 2018. As background for that discussion you may also wish to read our written submission - 'Hard Evidence: Dossier of Data on Lice, Diseases & Mortalities at Scottish Salmon Farms' - to the Scottish Parliament's salmon farming inquiry.

The deaths, deformities, diseases and flagrant abuse of animal welfare on Scottish salmon farms raise the question whether a prosecution could be made via the Animal Health and Welfare (Scotland) Act 2006. Looking at the legislation is seems clear that given the suffering on Scottish salmon farms and mass mortalities that a strong case against 'Unnecessary Suffering' and 'Cruel Operations' could be made.

Even the most pro-salmon farming proponent would struggle to argue that cramming farmed salmon into disease-ridden cages is 'normal behaviour' or that farmed salmon's "need to be protected from suffering, injury and disease" is currently being met on Scotland's virus-laden and lice-infested salmon farms.

Prevention of harm

19 Unnecessary suffering

(1) A person commits an offence if—

(a) the person causes a protected animal unnecessary suffering by an act, and

(b) the person knew, or ought reasonably to have known, that the act would have caused the suffering or be likely to do so.

(2) A person who is responsible for an animal commits an offence if—

(a) the person causes the animal unnecessary suffering by an act or omission, and

(b) the person knew, or ought reasonably to have known, that the act or omission would have caused the suffering or be likely to do so.

(3) A person ("person A") who is responsible for an animal commits an offence if—

(a) another person causes the animal unnecessary suffering by an act or omission, and

(b) person A—

(i) permits that to happen, or

(ii) fails to take such steps (whether by way of supervising the other person or otherwise) as are reasonable in the circumstances to prevent that happening.

(4) The considerations to which regard is to be had in determining, for the purposes of subsections (1) to (3), whether suffering is unnecessary include—

(a) whether the suffering could reasonably have been avoided or reduced,

(b) whether the conduct concerned was in compliance with any relevant enactment or any relevant provisions of a licence or code of practice issued under an enactment,

(c) whether the conduct concerned was for a legitimate purpose, for example—

(i) the purpose of benefiting the animal, or

(ii) the purpose of protecting a person, property or another animal,

(d) whether the suffering was proportionate to the purpose of the conduct concerned,

(e) whether the conduct concerned was in the circumstances that of a reasonably competent and humane person.

21 Cruel operations

(1) A person commits an offence if the person performs an operation on a protected animal without due care and humanity.

(2) A person ("person A") who is responsible for an animal commits an offence if—

(a) another person performs an operation on the animal without due care and humanity, and

(b) person A—

(i) permits that to happen, or

(ii) fails to take such steps (whether by way of supervising the other person or otherwise) as are reasonable in the circumstances to prevent that happening.

Promotion of welfare

24 Ensuring welfare of animals

(1) A person commits an offence if the person does not take such steps as are reasonable in the circumstances to ensure that the needs of an animal for which the person is responsible are met to the extent required by good practice.

(2) The circumstances to which, for the purposes of subsection (1), regard is to be had include—

(a) any lawful purpose for which the animal is kept,

(b) any lawful activity undertaken in relation to the animal.

(3) For the purposes of subsection (1), an animal's needs include—

(a) its need for a suitable environment,

(b) its need for a suitable diet,

(c) its need to be able to exhibit normal behaviour patterns,

(d) any need it has to be housed with, or apart from, other animals,

(e) its need to be protected from suffering, injury and disease.

In conclusion, Scottish Salmon Watch encourages the Cross-Party Group on Animal Welfare to investigate the issue of welfare abuses on Scottish salmon (in particular the operation of the Thermolicer). You can find out more about the welfare nightmare on salmon farms online here and read today's disclosure via:

EXPOSED: Early Harvesting at Scottish Salmon Farms Due to Disease & Mortalities
Hard Evidence: Fast-Tracking Disease-Ridden Scottish Salmon

If you have any questions please do not hesitate to contact me.

Yours sincerely,

Don Staniford

Director, Scottish Salmon Watch

SCOTTISH SALMON WATCH WELFARE