Case No: 2022-0262 Date of visit: 18/07/2022

Time spent on site: 4.5 hours Main Inspector: [redacted]

Site No: FS1047 Site Name: Loch Creran (D)
Business No: FB0125 Business Name: Scottish Sea Farms Ltd

Case Types: 1 REP 2 DIA 3 WEL 4 5 6

Water Temp (°C): 13.55 Thermometer No: T308 FHI 045 completed

Observations: Region: ST Water type: S CoGP MA: M-36

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	

UNI/REG only - if unable to carry out intended visit detail reason below:

Additional Case Information:

Treatment Timeline:
Wk 9- thermolicer treatment (all pens)
Wk 12- thermolicer treatment (all pens)
Wk 17- thermolicer light treatment (all pens)
Wk24- light thermolicer treatment (all pens)
Wk 27- hydrolicer 10/12 pens
W/b 11/07/2022- hydrolicer remaining two pens

Mortality events:
Wk 19- 2.7%, 12191; following thermolicer treatment in wk 17
Wk20- 2.1%, 9032; continuation of previous week mortality
Wk21- 1.3%, 5429
Wk24- 1.6%, 6826; following thermolicer
Wk25- 2%, 8175
Wk26- 4%, 15943
Wk27- 3.8%, 14441

Inspection of site was conducted in conjunction with APHA, following 3 weeks of notifications of increased mortality above the threshold, as well as a response to investigate claims of a welfare complaint.
Stocking of wrasse on site 24/06/2022; wild caught from Orkney.

Timeline of recent disease:
Routine vet visit conducted in week 9, confirmed PRV +ve results for the whole site (100%), but no increased mortality associated with it seen on site. In Wk 14, histology again confirmed PRV +ve site with moderate levels, and slight increase in mortality seen but still below reporting threshold. Skin lesions seen on site were tested and were found to be a result of secondary bacterial infection; bad weather earlier in the year had affected the fish previously. P. skyensis was tested for during diagnostic taken in Wk 15 but result were negative and mortality remained below reporting threshold until wk 18. Wk 19 samples were positive for furunculosis (5/5). No moribunds were seen at vet visit in Wk 21. As mortality increased from Wk 24 present, PCR samples continued to be positive for furunculosis in Wk 25. As a result, decision to remove leading mort pens through harvest, and as of 18/07/2022 site is potentially fallowing within next 3 weeks. Next pens to harvest out are pen 7, 9 and 11. Site has been using diet with supplementary health ingredients called Assit Skin with Resist Lice from 5th to 25th May. Presently, fish are on Resist lice diet.

Observations on site:
From the first pen, moribunds were observed exhibiting exothalmia and lethargy. Two pens in particular were observed to have the highest mortality; pen 9 and 11, with ~20 moribunds seen upon pen inspection. Fish removed from pen 1 for diagnostic purpose were observed to have enlarged atriums of the heart, and some moderate petechial haemorrhaging on the liver too. Raised scales or ‘furuncle-like' bubbles were also seen in sampled fish from pen 1 and 9. Upon observation of pens 4 and 6, fish were seen with more such skin lesions/boils, none of which were observed to be open or ruptured. Lastly, a few fish were observed to be belly up approx. 3-4m below the water surface hanging on the side of the net.

Case No:	2022-0262	Site No:	FS1047
Date of Visit:	18/07/2022	Inspector(s):	[redacted]

Registration/Authorisation Details

1. Business/site details summary checked by site representative?	Y
2. Changes made to details?	N

Site Details (include cleaner fish for all sections)

Total No facilities	14	Facilities stocked	12	No facilities inspected	12		
Species	SAL	WRS					
Age group	Q3 2021	wild caught					
No Fish	298,038	10,833					
Mean Fish Wt	2.8kg	250g					
Next Fallow Date (Site)	08/08/2022	Next Input Date (Site)	Undecided				
Recent (last 4 wks) disease problems?	Y	Any escapes (since last visit)?	N				
If yes, detail:	PRV, HSMI, Furunculosis (clinical signs in the pens seen first time today)						

Movement Records

1. Movement records available for inspection?	Y
2. Date of last inspection:	08/12/2021
3. Are records complete and correctly entered?	Y
4. Are movement records available for dead fish and waste?	Y
5. Are records complete and correctly entered?	Y
6. Are health certificates for introductions (outwith GB) available?	N/A

Transport Records

1. Are any movements carried out by (or on behalf) of the business (not using a STB)?	
If yes, is there a system in place for maintenance of transportation records?	

Mortality Records

1. Mortality records available for inspection?	Y
2. How are mortalities disposed of?	Other (detail)
If other detail:	Billy Bowie- Dundas, incinerated onsite and increased mortality processed and then ensiled.
3. Mortality records complete and correctly entered?	Y
4. Recent mortality (last 4 wks):	See additional information.
5. Evidence of recent increased/atypical mortalities?	Y

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

Pen 5, 9, 11; HSMI and furunculosis

6. Any other peaks in mortality during period checked?	N
If yes, detail:	
7. Have increased (unexplained) mortalities been reported to vet or FHI?	N/A
If yes, detail action:	
8. Have 'mortality events' been reported to FHI? If no, enter details on mortality events sheet.	Y

Treatments and Medicines Records

1. Recent treatments (see comment)?	N
If yes, detail:	
If other, detail:	Thermolicer and Hydrolicer
2. Medicines records available for inspection?	Y
3. Are records complete and correctly entered?	Y
4. Are fish in a withdrawal period?	N
5. If yes, what treatment(s)?	
If other, detail:	
6. Are medicines stored appropriately?	Y

Biosecurity Records

1. Biosecurity records available for inspection?	
2. Has the manner and frequency of mortality removal, recording and safe disposal been considered?	
3. Has the manner and period in which the APB will notify Scottish Ministers or veterinary professional of any *increased* (*unexplained)* mortality at the site been included?	
4. Has the action that will be taken in the event that the presence or suspicion of the presence of a listed disease is detected been included and *how* and *when* that will be notified to Scottish Ministers?	
5. Has the health status of aquaculture animals being stocked on the farm site been covered (equal or higher health status, certification if required)?	
6. Have the husbandry and biosecurity measures implemented between each epidemiological unit to minimise transmission of disease been covered (movement of staff, visitors, equipment, live or dead fish etc.)?	
7. Is documentation available regarding the measures in place to maintain the physical containment of aquaculture animals held on site?	
8. Have the biosecurity procedures been adequately implemented on site?	
If no, detail:	

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).	See additional Information

Records checked between:	08/12/2021- 18/07/2022

Case no:	2022-0262	Site No:	FS1047	Date of visit/ Sampling:	18/07/2022	18/0							
Priority samples:	VI		BA		PA		MG		HI				
Time sampling starts/ends:	10:20:00	11:55:00	Inspector:		VMD No.	0							
Environmental conditions:	1	Sunny	2	Calm	3		4		5				
Summary samples	HIST	Y	BA	Y	MG	Y	VI	Y	PA		Total Samples		

Add Fish/Pools - click

	Pool/Fish No	F1	F2	F3	F4	F5							
	Fish nos	1	2	3	4	5							
	Pool Group	P1	P1	P1	P1	P1							
Stock Details	Species	SAL	SAL	SAL	SAL	SAL							
	Average weight	2.8kg	2.8kg	2.8kg	2.8kg	2.8kg							
	Sex	N/A	N/A	N/A	N/A	N/A							
	Water Type	SW	SW	SW	SW	SW							
	Stock Origin	Barcaldine Smolt Unit (FS1328)	Barcaldine Smolt Unit (FS1328)	Barcaldine Smolt Unit (FS1328)	Barcaldine Smolt Unit (FS1328)	Barcaldine Smolt Unit (FS1328)							
	Facility No	1	1	1	9	9							

07/2022 Additional Sample Information:

Fish 1-3 were sampled at the same time; sampling began at 10:20 and ended at 11:15. Fish 4-5 were sampled simultaneously at 11: 20 and finished at 11:55.

5 Total Tests assigned 9

Case no: 2022-0262 Site No: FS1047 Method of killing: Anaesthetic

Date of visit: 18/07/2022 Inspector(s): [redacted] 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	M	S	S	S	S					
	Lethargic	M	S	S	M	M					
	Hanging vertical										
	Spiralling										
	Flashing										
	Loss of equilibrium										
Body	Dark										
	Distended abdomen										
	Anorexic		M								
	Scale Oedema					M					
Opercula	Shortened										
	Flared										
Haemorrhaging	Throat										
	Ventrum										
	Base of fins										
	Elsewhere										
Eyes	Exophthalmic		S		S						
	Enophthalmic (sunken)										
	Cataract										
	Haemorrhagic		M								
Gills	Pale			M		W					
	Zoned	W	W	M	W	W					
	Necrotic										
Lesions	Flank										
	Elsewhere										
Vent	Inflamed										
	Trailing faeces										
Lice Load	Estimate numbers										
Internal Signs											
Ascites	Clear	M									
	Bloody		S	S	S	S					
Oedema	In tissues										
Heart	Pale/anaemic										
	Granulomas										
	Deformed										
Liver	Petechial haem		M								
	Gross haem										
	Tissue breakdown										
	Enlarged										
	Colour number(s)										
	Granulomas										
	Lesions										
Pyloric caeca	Petechial haem			W							
	Tubules mauve										
	Lack of fat										
Spleen	Enlarged	W	W	M	W	W					
	Granulomas										
Gut	No food present										
	Yellow pseudo-faeces	S	S	S	S	S					
	External haem										
	Internal haem										
Body wall	Haemorrhaging			W							
Swim bladder	Haemorrhaging										
	Fluid filled										
Kidney	Swollen										
	Grey				W	W					
	Granular										
	Liquefied										
General	Parasites present										
	Anaemia										

Case no: 2022-0262

Date of visit: 18/07/2022

S for strong presence: **M** for medium presence: **W** for w

Fish Number											
Time sampled after death (if > 45 minutes)											
External Signs											
Behaviour	**Moribund**										
	Lethargic										
	Hanging vertical										
	Spiralling										
	Flashing										
	Loss of equilibrium										
Body	**Dark**										
	Distended abdomen										
	Anorexic										
	Scale Oedema										
Opercula	**Shortened**										
	Flared										
Haemorrhaging	**Throat**										
	Ventrum										
	Base of fins										
	Elsewhere										
Eyes	**Exophthalmic**										
	Enophthalmic (sunken)										
	Cataract										
	Haemorrhagic										
Gills	**Pale**										
	Zoned										
	Necrotic										
Lesions	**Flank**										
	Elsewhere										
Vent	**Inflamed**										
	Trailing faeces										
Lice Load	**Estimate numbers**										
Internal Signs											
Ascites	**Clear**										
	Bloody										
Oedema	**In tissues**										
Heart	**Pale/anaemic**										
	Granulomas										
	Deformed										
Liver	**Petechial haem**										
	Gross haem										
	Tissue breakdown										
	Enlarged										
	Colour number(s)										
	Granulomas										
	Lesions										
Pyloric caeca	**Petechial haem**										
	Tubules mauve										
	Lack of fat										
Spleen	**Enlarged**										
	Granulomas										
Gut	**No food present**										
	Yellow pseudo-faeces										
	External haem										
	Internal haem										
Body wall	**Haemorrhaging**										
Swim bladder	**Haemorrhaging**										
	Fluid filled										
Kidney	**Swollen**										
	Grey										
	Granular										
	Liquefied										
General	**Parasites present**										
	Anaemia										

Additional comments:

Fish 1 was found to have mildly pale and frayed gills. Internally, fish 1 was found to appear relatively normal, with the exception of a swollen atrium in the heart and yellow pseudofaeces in the gut.

Fish 2 was found also to exhibit pale and frayed gills. Externally, raised scales were also visible. In addition, the fish exhibited exothalmia with slight haemorhaging on the upper eye surface. Internally, fish 2 also exhibited a heart with a slightly swollen atrium and bloody cavity. The Liver showed medium levels of petechial haemorraghing. The body cavity was found to possess bloody ascites. The gut possessed yellow pseudofaeces also.

Fish 3 also possessed pale and frayed gills. In addition, raised scales and 'bubbles' under the scales/skin layer were observed. Internally, the heart was also found to have an enlarged atrium. The fish's cavity was found to have bloody ascites. Very slight petechial haemorrhaging was found on the liver and in the body cavity/flesh. The pyloric caeca showed very slight haemorrhaging also. The gut possessed yellow pseudofaeces.

Fish 4 exhibited frayed gills, as well as strong exothalmia of the eyes. Raised scales/ bubbles in the skin were evident on the flanks of the fish. Internally, the cavity possessed bloody ascites and the spleen was slightly enlarged. The gut also possessed yellow pseudofaeces.

Fish 5 again was found to have frayed gills. A very larged 'bubble' was found on the left flank of the fish and upon rupturing exhibited a bloody fluid (extra bacteriology sample taken). Internally the fish possessed a slightly greyish kidney and again, the gut possessed yellow pesudofaeces.

Case No: 2022-0262 Date of visit: 18/07/2022

Site No: FS1047 Inspector: [redacted]

Results Summary	Freq.	Date of Notification						
		Database	Insp	Phone	Insp	Writing	Insp	2nd Insp
ASAL	4/5	02/08/2022		02/08/2022		22/08/2022		
AERH	4/5	11/08/2022		12/08/2022		22/08/2022		
GPAT	5/5	11/08/2022		12/08/2022		22/08/2022		
LPAT	5/5	11/08/2022		12/08/2022		22/08/2022		
SPAT	4/5	11/08/2022		12/08/2022		22/08/2022		
MG_AGDQ	1/4	11/08/2022		12/08/2022		22/08/2022		
MG_IHNQ	0/4	11/08/2022		12/08/2022		22/08/2022		
MG_IPN	0/4	11/08/2022		12/08/2022		22/08/2022		
MG_ISA	0/4	11/08/2022		12/08/2022		22/08/2022		
MG_SAV	0/4	11/08/2022		12/08/2022		22/08/2022		
MG_VHS	0/4	11/08/2022		12/08/2022		22/08/2022		
MG_PARA_THER_Q	3/4	11/08/2022		12/08/2022		22/08/2022		
MG_PMCV	0/4	11/08/2022		12/08/2022		22/08/2022		
MG_SAL_POX	4/4	11/08/2022		12/08/2022		22/08/2022		

Report Summary			
Case Type	Date	Insp	2nd Insp
DIAG	22/08/2022		

FISH HEALTH INSPECTORATE VISIT REPORT

SUMMARY FOR INFORMATION OF SITE OPERATOR

BUSINESS NO	FB0125	**DATE OF VISIT**	18/07/2022
SITE NO	FS1047	**SITE NAME**	Loch Creran (D)
CASE NO	20220262	**INSPECTOR**	[redacted]

Section 1: Summary

The above site was inspected following reports of increased mortality by the farm operator. The inspection was conducted in conjunction with a veterinary officer from the Animal and Plant Health Agency (APHA). A separate report will be issued by the Animal and Plant Health Agency. During the physical inspection of all pens, five fish were removed for diagnostic sampling.

Histopathology examination revealed pathology consistent with *Aeromonas salmonicida* (confirmed by bacteriology in F1,3,4,5), and cellular necrosis in the spleen and liver. Gills displayed features of necrosis and mild epitheliocystis.

Gills samples from F1, F3 and F5 tested positive for *Paranucleospora theridion* by qPCR. In addition, all fish samples tested positive for salmon gill pox virus by qPCR.

Aeromonas salmonicida was identified on plates taken from the kidney material of F1, F3, F4, F5. The level and purity of the growth on the plates would suggest that this isolate would be implicated as a source of morbidity.

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

Following 3 weeks of notifications of increased mortality above the reporting threshold a site inspection was conducted. The inspection was also conducted as a response a welfare complaint. On site, a high number of lethargic and moribund fish were observed in all pens. Some fish were observed to exhibit exophthalmia. Two pens in particular were observed to have the highest mortality and approximately 20 moribunds were seen on pen inspection in each pen.

All fish sampled were lethargic and moribund. A few fish were observed to be belly up approximately 3-4m below the water surface, on the side of the nets. Raised scales or furuncles were also seen in some sampled fish from pen 1 and 9. These were also observed in pens 4 and 6. The gills of all fish were zoned and in F3 and F5 were pale.

Internally, all fish displayed enlarged spleens and yellow pseudo faeces was present within the hind gut. In F2-F5 bloody ascites were observed. Some petechial haemorrhaging in F2 on the liver and in F3 on the pyloric caeca.

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

Samples

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

Fish number	Facility number	Species	Stage	Origin
1-3	1	Atlantic Salmon	2.8kg 2021 Q3	Barcaldine Smolt Unit
4-5	9	Atlantic Salmon	2.8kg 2021 Q3	Barcaldine Smolt Unit

Results

Bacteriology: Kidney, gill and lesion material from F1 to F5 inoculated onto appropriate media for the isolation of bacteria.

The following bacteria were isolated:

- *Aeromonas salmonicida* from;
  - Kidney of F1, F3, F4, F5
  - Lesion of F5

From the tests conducted, we have evidence which may indicate resistance to amoxicillin. However, we do not have evidence of resistance to oxytetracycline, sulphamethoxazole/trimethoprim or florfenicol.

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

Four fish were put forward for the analyses due to sampling error.

Salmon gill pox virus

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	19.75	35.99	34.26	34.95	POSITIVE
F2	20.1	33.31	32.81	33.11	POSITIVE
F3	19.33	33.02	33.52	33.12	POSITIVE
F5	20.82	32.79	32.33	31.77	POSITIVE

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

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

Neoparamoeba perurans (AGD)

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	-	-	-	-	NEGATIVE
F2	20.1	33.13	33.18	33.51	POSITIVE
F3	-	-	-	-	NEGATIVE
F5	-	-	-	-	NEGATIVE

Paranucleospora theridion

Fish Number	Endogenous control Cp value	Cp Values			Reported Result (PCR)
F1	19.75	30.54	30.96	30.79	POSITIVE
F2	-	-	-	-	NEGATIVE
F3	19.33	31.35	30.98	30.7	POSITIVE
F5	20.82	32.66	32.24	32.92	POSITIVE

Histology: Tissue samples of gill, skin and skeletal muscle, heart, pyloric caeca, pancreas, hind gut, liver, spleen and kidney taken from F1 to F5. The tissue samples were fixed in 10% neutral buffered formalin.

Histopathological examination revealed the following:

Gill: Several lamellae exhibiting features of necrosis and some display dense aggregates of Gram-negative bacteria. Few sparse lamellae with epithelial thickness (F1-F5). F2-F5 exhibited filament tips with some bluntness and several aneurysmal dilation/telangiectasia. F2 also displayed some lamellar haemorrhage and some influx of neutrophils. One basophilic epithelial inclusion (likely epitheliocystis) observed in F2 and F5.

Skin & Muscle: within the normal range.

Heart: F1 display several small dense aggregates of Gram-negative bacteria in the two chambers and F3 and F5 only in the ventricle.

Gut and pyloric caeca: Some fibrous adhesions (likely associated with vaccine administration) (F2).

Pancreas: Within the normal range.

Liver: Some cutting (F1-F5), small foci of cellular necrosis with aggregates of Gram-negative bacteria associated and several vessels displayed inflammatory cell influx with presence of circulating Gram-negative bacteria (F1). F2 exhibited a focal extended area of cellular necrosis, haemorrhage and inflammatory cell infiltrate (mostly neutrophils granylocytes). F5 displayed several areas of marked presence of inflammatory cell infiltrate (mostly neutrophils granulocytes).

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Kidney: Foci of cellular necrosis and aggregates of Gram-negative bacteria associated (F1), some reduction of haematopoietic tissue and presence Gram-negative bacteria (F3). F5 displayed several areas of marked inflammatory cell infiltrate (mostly neutrophils granulocytes).

Spleen: Cuffing (F1-F5), cellular necrosis and small dense aggregates of Gram-negative bacteria (F1, F3, F5). F2 displayed a pustule-like lesions filled with mostly neutrophil-like granulocytes and aggregates of Gram-negative bacteria.

Signed: Date: 22/08/2022

Fish Health Inspector

The Fish Health Inspectorate Service Charter detailing standards of service is available on the Marine Scotland website at https://www.gov.scot/publications/fish-health-inspectorate-service-charter/

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Figure 1 External image of fish 1 to 3. Exothalmia can be seen in fish 2.

Figure 2 Gills of fish 1. Frayed tips and pale gills observed.

Figure 3 Gills of fish 2; pale and frayed significantly.

Figure 4 Significantly pale gills and frayed tips of fish 3.

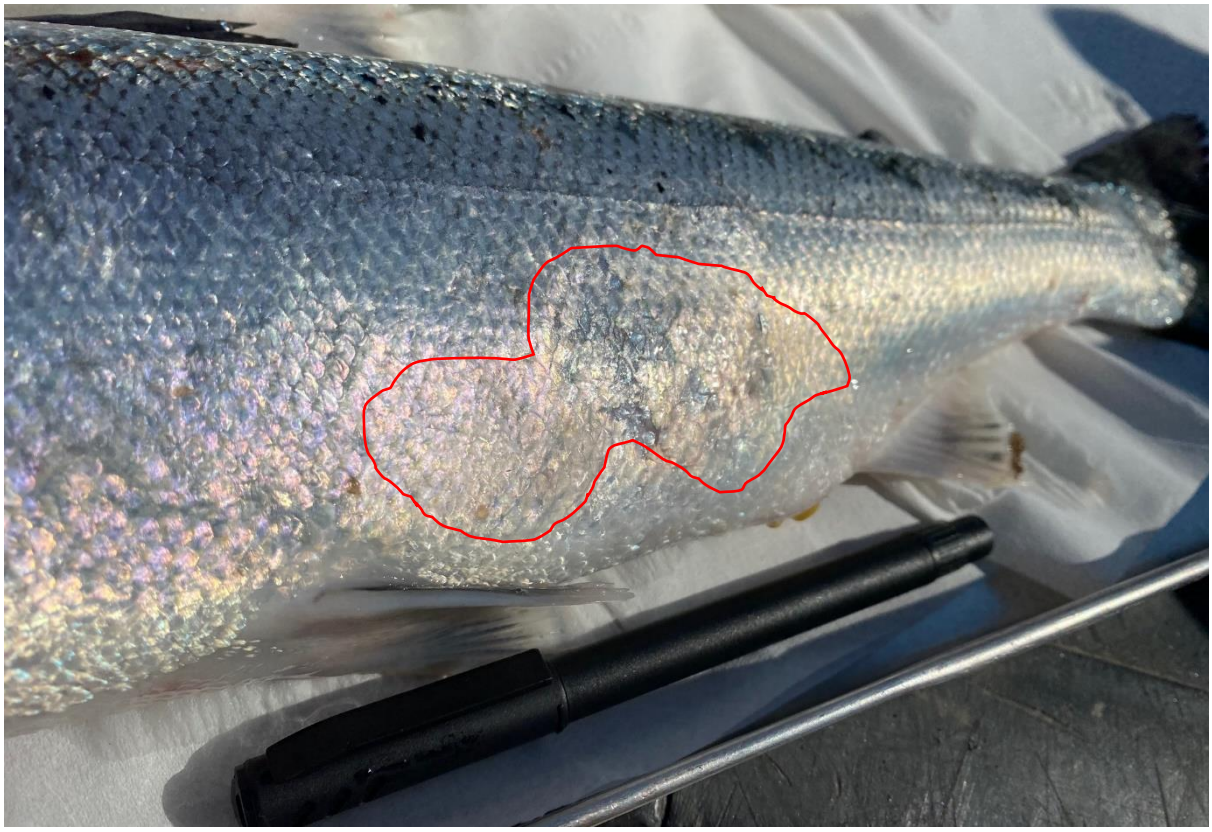

Figure 5 Region of raised scales/ 'bubbles' under the skin on fish 3.

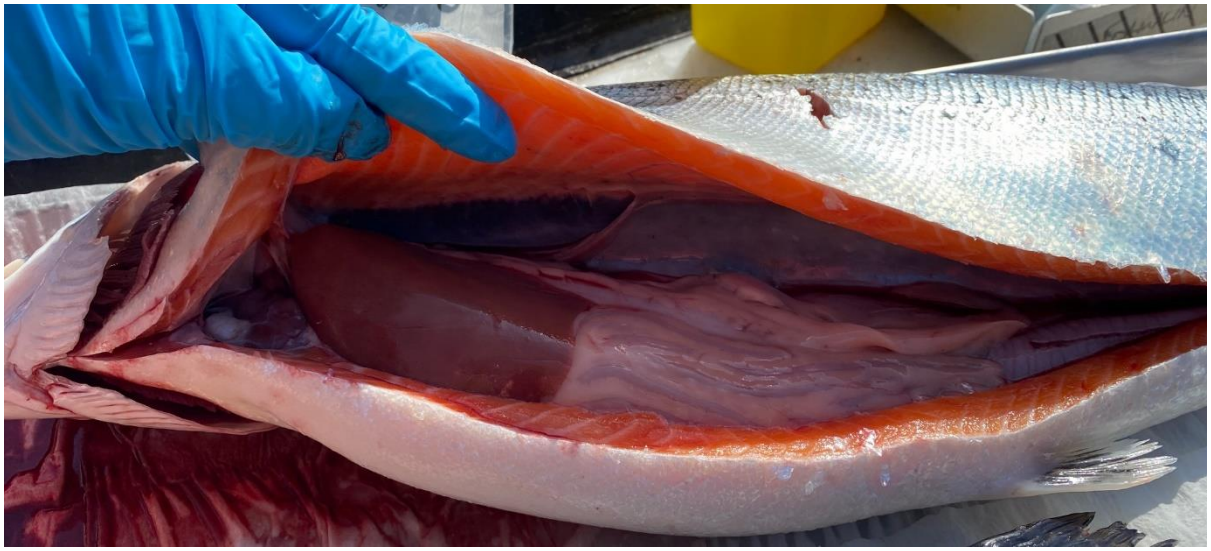

Figure 6 Internal picture of fish 1.

Figure 7 Internal picture of fish 2. Note the petechial haemorrhaging on liver. Bloody ascites observed in the cavity of the fish.

Figure 8 Internal image of fish 3, depicting slight petechial haemorrhaging on liver and on pyloric caeca. Additionally slight haemorrhaging in the flesh was observed.

Figure 9 External image of fish 4 and 5. Evidence of raised scales/'bubble' under skin on fish 5 below the dorsal fin. See figure 12 for closer image.

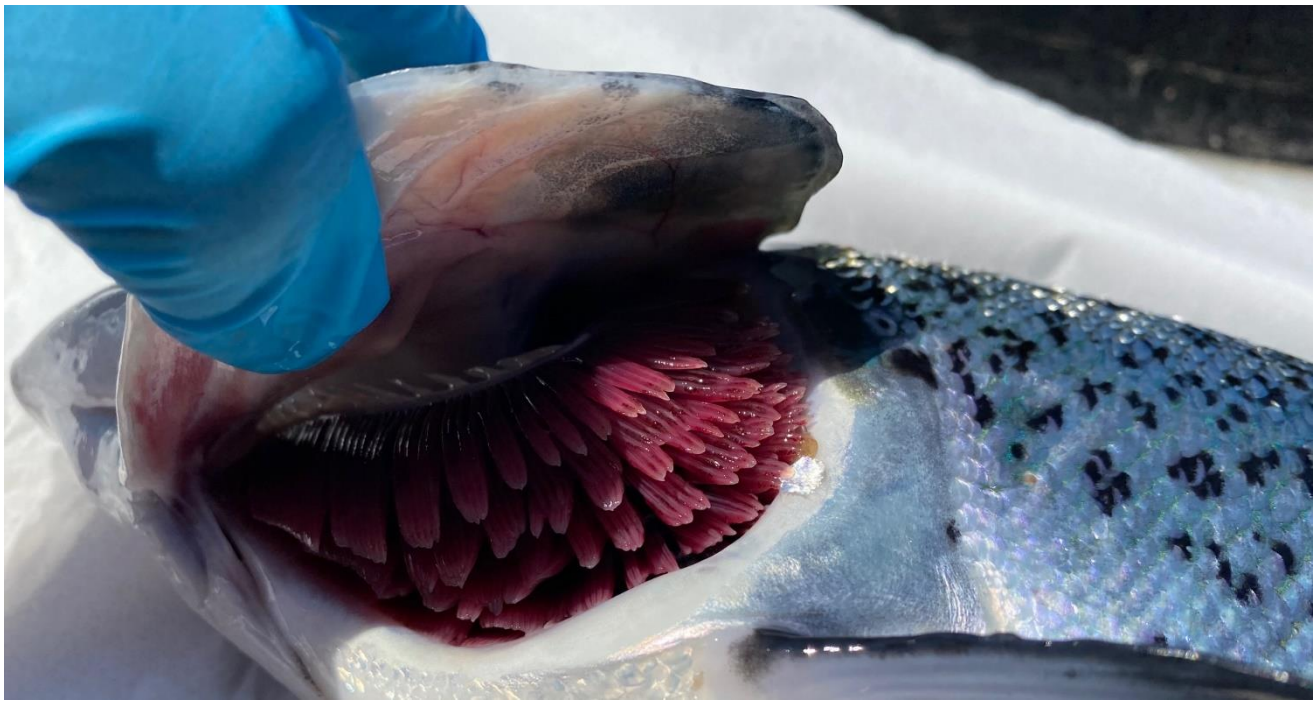

Figure 10 Image of gills from fish 4.

Figure 11 Image of gills from fish 5.

Figure 12 Region of raised scales/ 'bubble' under skin. No open lesion and when ruptured, bloody fluid escapes.