



Inspections of marine salmon farms in Scotland carried out by the Fish Health Inspectorate during 2009 and 2010 – sea-lice and containment issues

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Executive Summary

1. Fish Health Inspectorate reports of inspections of marine salmon farms from 2009 and 2010 were obtained pursuant to the EC Directive on Public Access to Environmental Information (2003/4/EC) as implemented in Scotland by the Environmental Information (Scotland) Regulations 2004.
2. All inspections of salmon farms are pre-arranged with the fish-farms, up to 7-10 days in advance. Unannounced inspections should be introduced to the inspection regime immediately.
3. A significant number of fish-farms inspected by the Fish Health Inspectorate between 2009 and 2010 are recorded as having sea-lice levels above the thresholds recommended in the industry's own Code of Good Practice for Scottish Finfish Aquaculture ("the Code") during the period for which records were inspected.
4. The thresholds in the Code are themselves not necessarily sufficiently stringent to protect wild salmonids from juvenile sea-lice emanating from fish-farms.
5. There is a lacuna in Scottish law which makes it impossible for the public to know for how long sea-lice levels were above thresholds on each fish-farm and the relative severity of sea-lice infestation, a situation that does not exist in Norway where the fish-farming industry has to report weekly sea-lice count data to state authorities, to which the general public then has a right of access.
6. The right of the Scottish public to access such weekly sea-lice count data, bringing Scotland into line with Norway, can be secured through a very simple amendment to the Fish Farming Businesses (Record Keeping) (Scotland) Order 2008 ("the Record Keeping Order").
7. While not having been specifically recorded as breaching Code thresholds, a significant number of the fish-farms were reported by the inspectors as having other sea-lice related issues, such as damage or mortality caused by sea-lice, or high lice loads on sampled fish.
8. Too many fish-farms are reported as not recording sea-lice numbers in accordance with the Code.
9. The Fish Health Inspectorate reports contain concerning evidence of a lack of efficacy of, or tolerance to, or potential resistance to available sea-lice treatments, including unexpectedly low sea-lice clearance rates using licensed treatments and failure to control sea-lice numbers even when using a range of available treatments.
10. There is no co-ordinated farm-specific statutory recording of a lack of efficacy / tolerance to, or resistance to sea-lice treatments in Scotland. The suspected adverse reaction system managed by the Veterinary Medicines Directorate (VMD) does not record such events and Fish Health Inspectorate reports only record anecdotal comments made by the inspected farmers. In contrast, there is

a specific legal requirement in Norway to report such events to state authorities. This also requires an appropriate amendment to the Record Keeping Order to bring Scottish law into line with Norway.

11. In addition to the confirmed farmed fish escapes, recorded and published on-line by Marine Scotland, inspection reports reveal a number of concerns related to the proper containment of fish, including the presence of misshapen cages, nets with holes or tears, either deliberately or otherwise made, and nets sagging at or below the water line.

1. Introduction

The information and data used to compile this report were obtained pursuant to the EC Directive on Public Access to Environmental Information (2003/4/EC) as implemented in Scotland by the Environmental Information (Scotland) Regulations 2004.

The initial request for information was made to Marine Scotland on 9th September 2010 with a subsequent further request on 21st January 2011, leading to the disclosure of all Fish Health Inspectorate reports of marine and freshwater salmon farming operations covering 2009 and 2010.

This report covers only the inspections carried out on marine salmon farm sites. The tabulated summary information in the Appendix is drawn from the reports of those inspections which reveal issues of concern.

2. The Inspections

It is important to understand that there are two types or levels of inspection carried out by the Fish Health Inspectorate, part of Marine Scotland. These are (i) the routine inspections carried out in accordance with EC Directive 2006/88/EEC on animal health requirements for aquaculture animals and products thereof, and on the prevention and control of certain diseases in aquatic animals, and the Aquaculture and Fisheries (Scotland) Act 2007 and (ii) the more detailed 'audits' of sea lice or containment issues, usually conducted when an earlier visit by inspectors has identified a potential problem¹.

Both types of inspection result in written reports which are subject to the public right of access to environmental information. While in March 2010, it had been the stated intention of Marine Scotland, following a decision of the Scottish Information Commissioner², to publish the results of the more detailed audits on-line³, under pressure from the aquaculture industry, this decision was reversed⁴.

Further, Roseanna Cunningham, Minister with responsibility for aquaculture later confirmed that all such audits had been suspended from April 2010⁵. It is not clear when or indeed if the audits will restart but none that post-date April 2010 have been disclosed as part of the information request detailed above, suggesting that none (both containment and sea-lice audits) have been conducted.

The information contained within each of the Fish Health Inspectorate reports is the result of a snap-shot of the operational state of the fish-farm during the inspection itself, usually a few hours, although inspectors will usually also look at the written fish-farm records kept pursuant to the Fish Farming Businesses (Record Keeping) (Scotland) Order 2008 ("the Record Keeping Order").

¹ Aquaculture and Fisheries (Scotland) Act 2007 Guidance to Fish Health Inspectors Enforcing the Provisions in Relation to the Control of Parasites. Version 1.1 issued 02/12/08.

² Decision Notice 001/2010 Argyll District Salmon Fishery Board and Loch Awe Improvement Association – and – Scottish Ministers Ref no 200901276 14 January 2010

³ Marine Scotland letter to Stakeholders 25th March 2010

⁴ Letter from Rob Raynard, Marine Scotland to Phil Thomas of Scottish Salmon Growers Organisation (sic), 9th April 2010

⁵ Letter from Roseanna Cunningham, Minister for the Environment, to Public Petitions Committee, 1st October 2010

The frequency of farm visits appears to be low, usually once or sometimes twice per year. Only those farms with major problems, such as an infectious salmon anaemia (ISA) outbreak, receive more frequent visits.

At the observed frequency of visits, inspectors could not necessarily be expected to pick up all operational issues that may exist at other times in the year. Further, a number of visits that have been made to fallow farms may not pick up any operational issues related to sea-lice treatment or control or the risk of escapes that would be patent if fish were present on site.

It is always important to remember that the Fish Health Inspectorate pre-arranges the inspections with the operators of the fish-farms with from 1-2 days 'up to perhaps 7-10 days' notice being given of an inspection⁶. It is perhaps only to be expected that a degree of preparation for such inspections therefore is likely to occur.

There are no unannounced or 'spot-check' inspections which might normally be expected in such regulatory regimes. Unannounced spot checks should be introduced to the inspection process as soon as practicable.

3. Observations

There are a number of observations and conclusions that can be drawn from the analysis of the Fish Health Inspectorate reports disclosed. These break down into the following categories:

- high sea-lice numbers and other lice-related issues

- sea-lice counts and count data

- resistance and/or tolerance and/or lack of efficacy of sea-lice treatments

- containment issues and escapes

3.1 High sea-lice numbers and other lice-related issues

A significant number of farms inspected by the Fish Health Inspectorate between 2009 and 2010 are recorded by the inspectors as having sea-lice levels above the thresholds recommended in the Code of Good Practice for Scottish Finfish Aquaculture ("the Code") (Table 1).

The Code is an industry document, without statutory effect, which sets down standards of practice against which the industry suggests fish-farms should be judged. The Code "addresses the responsibility of the farmer (and other stakeholders) to the fish under his/her care, to the environment and to the consumer"⁷.

⁶ Email from Marine Scotland to Guy Linley-Adams, 22nd July 2010

⁷ Code of Good Practice for Scottish Finfish Aquaculture, at page 9

“To reduce as far as possible the risk of infection to wild juvenile salmonids”, paragraph 3.4.3.8 of the Code gives treatment thresholds of an average 0.5 adult female lice per fish between February to June (“coinciding with the appearance of wild juvenile salmonids in the sea”) and 1 adult female for the rest of the year.

These thresholds are arbitrary and hold no guarantee that wild fish will be protected from lethal lice infection. A female lice load of only 0.2 lice per fish in a farm of 600,000 fish will contain 120,000 female lice, each capable of producing up to 1000 eggs each. This means that up to 120 million juvenile sea lice will be washed into the surrounding seawater, yet this is in compliance with the Code.

Further, it is obvious that the Code lice thresholds take no account of the size of the fish-farm. For example, all other factors being equal, 800,000 farmed fish with an average of one adult female louse per fish is clearly more of a threat to wild fish than 100,000 farmed fish with the same average rate of infection. As many farm sizes increase across Scotland, the basis of the Code thresholds looks even shakier.

The North Atlantic Salmon Conservation Organisation Best Management Practice Guidance requires “100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms”⁸.

The industry in Scotland is a very long way from achieving the NASCO target. Even allowing for the unsound basis of the Code thresholds, Fish Health Inspectorate reports recorded that the farms in Table 1 had average female sea-lice numbers per fish *above* the Code thresholds during the period that records inspected by the Fish Health Inspectorate covered:

Table 1: Farms with average female sea-lice numbers per fish *above* the Code thresholds during the period that records inspected by the Fish Health Inspectorate covered

<u>Inspection date</u>	<u>Region</u>	<u>Name of fish-farm</u>	<u>Name of fish-farm company</u>
25/02/2009	Shetland	Lee of Burrafirth	Mainstream Scotland Limited
11/03/2009	Shetland	Linga	Westside Salmon
24/03/2009	Western Isles	Bagh Chlann Neill	North Uist Fisheries Limited
08/04/2009	Shetland	Lea Trondra (east of Trondra)	NAFC Marine Centre
19/05/2009	Western Isles	Rossay by Isle of Scalpay	Marine Harvest Scotland Limited
19/05/2009	Western Isles	Scotasay	Marine Harvest Scotland Limited
19/05/2009	Western Isles	Ob Meavag	Marine Harvest Scotland Limited
26/05/2009	Mainland	Rubha Stillaig	Lighthouse Caledonia Limited
26/05/2009	Mainland	Glenan Bay	Lighthouse Caledonia Limited
27/05/2009	Mainland	Meall Mhor Loch Fyne	Lighthouse Caledonia Limited

⁸ NASCO (2010) Guidance on Best Management Practice to address impacts of sea lice and escaped farmed salmon on wild salmon stocks (Adopted in June 2009, Revised in June 2010)

27/05/2009	Western Isles	Trilleachan Mor	Lighthouse Caledonia Limited
02/06/2009	Mainland	Kerrera B	Scottish Sea Farms
08/06/2009	Mainland	Shuna	Scottish Sea Farms
09/06/2009	Mainland	Lismore A	Scottish Sea Farms
10/06/2009	Western Isles	Eilean Dubh Chollaim	West Minch Salmon Limited
10/06/2009	Western Isles	Loch Stocknish	West Minch Salmon Limited
29/06/2009	Mainland	Ardgadden	Lighthouse Caledonia Limited
01/07/2009	Shetland	East Voe Laxfirth	Hjaltland Seafarms Limited
02/07/2009	Shetland	Inner Mangaster	Scottish Sea Farms
21/07/2009	Mainland	Lunga East Side	Lakeland Marine Farm Limited
28/07/2009	Shetland	Olna South	Hjaltland Seafarms Limited
05/08/2009	Shetland	Brindister Crossroads	Hjaltland Seafarms Limited
05/08/2009	Shetland	Brindister	Westside Salmon
26/08/2009	Shetland	Inner Mangaster	Scottish Sea Farms
26/08/2009	Shetland	South Sound	Scottish Sea Farms
30/09/2009	Shetland	Wick of Belmont	Lakeland Unst Seawater
06/10/2009	Western Isles	Loch Stockinish	West Minch Salmon Limited
08/10/2009	Mainland	Shuna Castle	Kames Fish Farming Limited
20/10/2009	Mainland	Nedd	Loch Duart Limited
27/10/2009	Shetland	South Sound	Scottish Sea Farms
10/11/2009	Shetland	Bastavoe North	Mainstream Scotland Limited
10/11/2009	Mainland	Ardmair	Wester Ross Fisheries Limited
25/11/2009	Western Isles	Seaforth	Marine Harvest Scotland Limited
01/02/2010	Shetland	Burrastow	Hoganess Salmon
01/02/2010	Shetland	Cloudin	Hoganess Salmon
04/02/2010	Shetland	Vidlin North	Scottish Sea Farms
08/02/2010	Mainland	Bagh Dail Nan Cean	Lakeland Marine Farm Limited
16/02/2010	Western Isles	Loch Odhairn	Lighthouse Caledonia Limited
16/02/2010	Shetland	Bight of Bellister, Dury Voe	Scottish Sea Farms
17/02/2010	Western Isles	Arbhair	Lewis Salmon Limited
03/03/2010	Western Isles	Loch Odhairn	Lighthouse Caledonia Limited
09/03/2010	Mainland	Loch Spelve A	Scottish Sea Farms
16/03/2010	Mainland	Calva Bay (Calbha Beag)	Loch Duart Limited
16/03/2010	Mainland	Rientraid	Loch Duart Limited
16/03/2010	Mainland	Torgawn	Loch Duart Limited
23/03/2010	Shetland	Bastavoe North	Hjaltland Seafarms Limited
23/03/2010	Shetland	Bastavoe South	Mainstream Scotland Limited
24/03/2010	Shetland	Coleness	Hjaltland Seafarms Limited
25/03/2010	Shetland	Snaranness	Scottish Sea Farms
14/04/2010	Orkney	Bay of Vady	Mainstream Scotland Limited
10/05/2010	Shetland	Geo of Valladale	Hjaltland Seafarms Limited

11/05/2010	Shetland	Wick of Garth	Lakeland Unst Seawater
11/05/2010	Shetland	Wick of Belmont	Lakeland Unst Seawater
08/06/2010	Skye	Cairidh	Marine Harvest Scotland Limited
08/06/2010	Skye	Maol Ban	Marine Harvest Scotland Limited
08/06/2010	Skye	Sconser	Marine Harvest Scotland Limited
15/06/2010	Mainland	Ardmair	Wester Ross Fisheries Limited
16/06/2010	Mainland	Poll Na Gille	Lakeland Marine Farm Limited
16/06/2010	Mainland	Ardmaddy	Lighthouse Caledonia Limited
16/06/2010	Mainland	Nevis A	Scottish Sea Farms
22/06/2010	Shetland	Bight of Foraness	Hjaltland Seafarms Limited
22/06/2010	Shetland	Djubawick	Mainstream Scotland Limited
22/06/2010	Shetland	Bow of Hascosay	Mainstream Scotland Limited
24/06/2010	Shetland	Dales Voe	Dales Voe Salmon Limited
24/06/2010	Shetland	Hamar Sound	Hjaltland Seafarms Limited
28/07/2010	Shetland	Taing of Railsbrough Catfirth	Hjaltland Seafarms Limited
14/09/2010	Mainland	Fishnish B	Scottish Sea Farms
05/10/2010	Shetland	Uyeasound 3 (West site)	Uyeasound Salmon Co

While not having been specifically recorded as breaching Code thresholds, fish-farms in Table 2 were reported by the inspectors as having other sea-lice related issues.

The details of each issue can be found in the Appendix.

Table 2: Farms reported as having other sea-lice related issues

<u>Inspection date</u>	<u>Region</u>	<u>Name of fish-farm</u>	<u>Name of fish-farm company</u>	<u>Issue</u>
06/01/2009	Shetland	Foreholm	Scottish Sea Farms	Sampled fish sea-lice loads. Mortality
07/01/2009	Shetland	East Kallee Ness	NAFC Marine Centre	Mortality
07/01/2009	Shetland	Flotta	Scottish Sea Farms	Sampled fish sea-lice loads
07/01/2009	Shetland	Setter Voe	Skelda Salmon Farms Limited	Sampled fish sea-lice loads
07/01/2009	Shetland	Papa	Hjaltland Seafarms Limited	Sampled fish sea-lice loads
07/01/2009	Shetland	Lea Trondra (east of Trondra)	NAFC Marine Centre	Sea-lice damage
08/01/2009	Shetland	Langa Isle East	Hjaltland Seafarms Limited	Sea-lice damage
08/01/2009	Shetland	West of Burwick	Hjaltland Seafarms Limited	Sea-lice damage.
08/01/2009	Shetland	East of Merry Holm	Hjaltland Seafarms Limited	Mortality
08/01/2009	Shetland	Brunaness	Scottish Sea Farms	Sea-lice problems. Mortality
08/01/2009	Shetland	Teisti Geo	Scottish Sea Farms	Sea-lice problems. Mortality
08/01/2009	Shetland	Holms Geo	Scottish Sea Farms	Sea-lice problems
08/01/2009	Shetland	North of Hoy	Scottish Sea Farms	Mortality
08/01/2009	Shetland	Sound of Hoy	Scottish Sea Farms	Sea-lice problems. Sea-lice damage.
08/01/2009	Shetland	East of Hildasay	Scottish Sea Farms	Sea-lice
08/01/2009	Shetland	Selivoe	Scottish Sea Farms	Sea-lice
08/01/2009	Shetland	Breigeo offshore	Scottish Sea Farms	Sea-lice. Mortality
14/01/2009	Shetland	North Havra	Hjaltland Seafarms Limited	Sea-lice damage
17/01/2009	Shetland	Flotta	Scottish Sea Farms	Sea-lice numbers
27/01/2009	Shetland	Langa Isle East	Hjaltland Seafarms Limited	Sea-lice damage. Sea-lice numbers
04/02/2009	Shetland	Brandy Ayre	Hoganess Salmon	Sea-lice numbers
24/02/2009	Shetland	Boatstroom Voe	Hjaltland Seafarms Limited	Mortality
25/02/2009	Shetland	Lee of Burrafirth	Mainstream Scotland Limited	Mortality. Sea-lice damage
26/02/2009	Shetland	Lee of Burrafirth	Mainstream Scotland Limited	Mortality
18/03/2009	Shetland	North Papa	Hjaltland Seafarms Limited	Sea-lice damage
26/03/2009	Shetland	North Papa	Hjaltland Seafarms	Sea-lice

			Limited	
30/06/2009	Shetland	Swining Voe 3	Hjaltland Seafarms Limited	Sampled fish lice loads
28/07/2009	Shetland	Coleness	Hjaltland Seafarms Limited	Sea-lice
28/07/2009	Shetland	Snaranness	Scottish Sea Farms	Sea-lice
26/08/2009	Shetland	Inner Mangaster	Scottish Sea Farms	Sea-lice problem
26/08/2009	Shetland	South Sound	Scottish Sea Farms	Sea-lice problem
14/09/2009	Shetland	Lee of Burrafirth	Mainstream Scotland Limited	Sea-lice problem
15/09/2009	Mainland	Shuna Castle	Kames Fish Farming Limited	<u>Caligus</u> lice numbers
16/09/2009	Shetland	Geo of Valladale	Green Island Organics Ltd	Sea-lice numbers
27/10/2009	Shetland	Inner Mangaster	Scottish Sea Farms	Sea-lice damage
29/10/2009	Shetland	Cloudin	Hoganess Salmon	Sea-lice problem
29/10/2009	Shetland	Hogan	Hoganess Salmon	Sea-lice problem
29/10/2009	Shetland	Holm of Gruting	Hoganess Salmon	Mortality
12/11/2009	Mainland	Loch Creran B	Scottish Sea Farms	Sea-lice levels
25/11/2009	Mainland	Ardyne	Lighthouse Caledonia Limited	Sea-lice numbers
09/12/2009	Shetland	Hogan	Hoganess Salmon	Mortality
09/12/2009	Shetland	Cloudin	Hoganess Salmon	Sea-lice problem
27/01/2010	Western Isles	Ferramus	Loch Duart Limited	Sea-lice numbers
27/01/2010	Western Isles	Caolas Loch Portain	Loch Duart Limited	<u>Caligus</u> lice numbers
23/03/2010	Mainland	Scallastle	Scottish Sea Farms	Lice treatment problem
24/03/2010	Mainland	Fishnish B	Scottish Sea Farms	Sea-lice
24/03/2010	Mainland	Fishnish A	Scottish Sea Farms	Sea-lice
24/03/2010	Shetland	Olna South	Hjaltland Seafarms Limited	Mortality
13/04/2010	Mainland	Port Bheachan	Lakeland Marine Farm Limited	Sea-lice numbers
14/04/2010	Orkney	Kirk Noust	Mainstream Scotland Limited	Sea-lice numbers
16/06/2010	Mainland	Ardmaddy	Lighthouse Caledonia Limited	Lice treatment problem
23/08/2010	Shetland	Burrastow	Hoganess Salmon	Alleged illegal treatment

Regrettably, as the full on-farm sea-lice monitoring data is not published by the farmers nor held by Marine Scotland, it is not possible to know for how long lice levels on any particular farm have remained above threshold. While the Record Keeping Order requires all fish farmers to keep three years of records at each site including weekly counts of sea lice, treatment used and other relevant data, unfortunately the inspectors merely look at the data covering the period since the last inspection. Their written reports do not record sea-lice levels from week-to-week. That information is held by the fishfarmers themselves. Marine Scotland does not routinely require this data to be copied to or by the inspectors. Although the Aquaculture and Fisheries (Scotland) Act 2007 does give inspectors the powers to require copies of any sea-lice monitoring, the Scottish Government apparently has no plans to require sea-lice data to be supplied⁹.

The EC Directive on Public Access to Environmental Information (2003/4/EC), as implemented in Scotland by the Environmental Information (Scotland) Regulations 2004, does not assist. The Scottish Information Commissioner has ruled that the data kept under the Record Keeping Order is not being "held on behalf of" a statutory body and therefore is not susceptible to public disclosure under the Environmental Information (Scotland) Regulations 2004¹⁰.

This 'keep your own records' approach creates a serious lacuna in Scottish law, one which does not exist in Norway where any member of the public can access on-farm sea-lice data, which must be reported by the fish-farmers to the Food Safety Authority (Mattilsynet)¹¹ and pursuant to Norwegian law on access to information on the environment can be accessed at any of Mattilsynet regional offices^{12 13}.

It is difficult to justify the keeping of Scottish on-farm sea-lice data confidential where there is a legal right to the same information from Norwegian farms. This is all the more so as, in many cases, the Norwegian and Scottish farms have the same parent companies.

A public right of access to the data could easily be achieved in Scotland by a simple amendment to Regulation 2 of the Record Keeping Order such that the records listed in Schedule 1 Paragraphs 2 to 5 of the Order must also be supplied to Marine Scotland and, further, that Marine Scotland be required to place these records on open-access web-based public register pursuant to the UK's duties under Articles 1 and 7 of the EC Directive on Public Access to Environmental Information.

3.2 Sea-lice counts and count data

Of particular concern is the number of farms and operators appearing to fail to ensure that sea-lice records adequately reflect the required standards specified in the Code or recording sea-lice counts or sampling cages in a non-standardised manner. The following farms are reported by inspectors as having failed for a variety of reasons to

⁹ Scottish Government, as reported by Stephen Magee, BBC Scotland Investigates, 25th January 2011

¹⁰ Scottish Information Commissioner (2010) Loch Awe Improvement Association and Argyll District Salmon Fishery Board and the Scottish Ministers: Statutory records kept by a fish farming business. Decision 116/2010 - 5th July 2010

¹¹ Norwegian Regulation No 1095 of 2009 relative to combating lice in aquaculture facilities requires that all on-farm sea-lice count data is reported to the Food Safety Authority on a weekly basis.

¹² Norwegian Environmental Information Act 2003 No 31 of 9th May 2003

¹³ Pers comm. Kristina Landsverk, Director of Department of Controls, Mattilsynet, Oslo 18th January 2011.

record sea-lice numbers and count data in accordance with the Code or to be sampling in a non-standardised manner¹⁴:

Table 3

<u>Inspection date</u>	<u>Region</u>	<u>Name of fish-farm</u>	<u>Name of fish-farm company</u>
04/03/2009	Shetland	Setter Voe	Skelda Salmon Farms Limited
24/03/2009	Western Isles	Bagh Chlann Neill	North Uist Fisheries Limited
29/04/2009	Mainland	Loch Spelve A	Scottish Sea Farms
12/05/2009	Western Isles	Groatay	Marine Harvest Scotland Limited
12/05/2009	Western Isles	Vaccasay	Marine Harvest Scotland Limited
13/05/2009	Western Isles	Loch Boisdale(An Camus Calvay)	Marine Harvest Scotland Limited
13/05/2009	Western Isles	Marulaig Bay	Marine Harvest Scotland Limited
19/05/2009	Western Isles	Rossay by Isle of Scalpay	Marine Harvest Scotland Limited
19/05/2009	Western Isles	Scotasay	Marine Harvest Scotland Limited
19/05/2009	Western Isles	Ob Meavag	Marine Harvest Scotland Limited
26/05/2009	Mainland	Glenan Bay	Lighthouse Caledonia Limited
02/06/2009	Mainland	Kerrera A	Scottish Sea Farms
02/06/2010	Mainland	Creag an T'Sagairt Loch Hourn	Marine Harvest Scotland Limited
25/06/2009	Mainland	Ardintoul	Marine Harvest Scotland Limited
30/06/2009	Mainland	Nevis B	Scottish Sea Farms
30/06/2009	Mainland	Nevis A	Scottish Sea Farms
01/07/2009	Mainland	Kingairloch	Marine Harvest Scotland Limited
07/07/2009	Shetland	Baltasound Harbour	Balta Island Seafare Limited
07/07/2009	Shetland	Swarta Skerry	Balta Island Seafare Limited
30/07/2009	Shetland	Setter Voe	Skelda Salmon Farms Limited
05/08/2009	Shetland	Brindister Crossroads	Hjaltland Seafarms Limited
05/08/2009	Shetland	Brindister	Westside Salmon
17/09/2009	Shetland	Sandwick	Thompson Bros Salmon Limited
28/10/2009	Western Isles	Arbhair	Lewis Salmon Limited
10/11/2009	Shetland	Bastavoe North	Mainstream Scotland Limited
10/11/2009	Mainland	Ardmair	Wester Ross Fisheries Limited
11/11/2009	Mainland	Kishorn A South	Scottish Sea Farms
11/11/2009	Mainland	Kishorn B North	Scottish Sea Farms
25/11/2009	Western Isles	Seaforth	Marine Harvest Scotland Limited
26/01/2010	Western Isles	Bagh Chlann Neill	North Uist Fisheries Limited
08/02/2010	Mainland	Bagh Dail Nan Cean	Lakeland Marine Farm Limited
09/03/2010	Mainland	Loch Spelve A	Scottish Sea Farms

¹⁴ Para 3.4.3.7 of the Code

23/03/2010	Shetland	Bastavoe North	Hjaltland Seafarms Limited
23/03/2010	Shetland	Bastavoe South	Mainstream Scotland Limited
13/04/2010	Mainland	North Moine	Lakeland Marine Farm Limited
13/04/2010	Mainland	Port Bheachan	Lakeland Marine Farm Limited
14/04/2010	Orkney	Kirk Noust	Mainstream Scotland Limited
14/04/2010	Orkney	Bay of Vady	Mainstream Scotland Limited
12/05/2010	Western Isles	Hole Bay	Hebridean Smolts
01/06/2010	Mainland	Camas an Eilean	Lighthouse Caledonia Limited
01/06/2010	Mainland	Kenmore Loch Torridon	Lighthouse Caledonia Limited
09/06/2010	Skye	Gob na Hoe Fish Farm	Kames Fish Farming Limited
15/06/2010	Mainland	Ardyne	Lighthouse Caledonia Limited
15/06/2010	Mainland	Strone Point	Lighthouse Caledonia Limited
16/06/2010	Mainland	Poll Na Gille	Lakeland Marine Farm Limited
21/06/2010	Shetland	Balta Island	Balta Island Seafare Limited
24/06/2010	Shetland	Hamar Sound	Hjaltland Seafarms Limited
06/10/2010	Shetland	Wick of Vatsetter	Mainstream Scotland Limited

It is difficult to understand what excuse for failing to record on-farm sea-lice numbers and categories in the manner stipulated within the Code and it is highly regrettable that no enforcement action appears to have been taken against a single farm in relation to the proper recording of sea-lice data.

Arguably, the discipline that publication by law of farm-by-farm weekly sea-lice counts would impose on operators would end this problem.

3.3 Resistance and/or tolerance to and/or lack of efficacy of sea-lice treatments

There is concerning evidence within the Fish Health Inspectorate reports from 2009 and 2010 of a lack of efficacy of, or tolerance to, or potential resistance to available sea-lice treatments. There are a number of examples of unexpectedly low sea-lice clearance rates using licensed treatments, or indeed a failure to control sea-lice numbers even when using a range of available treatments.

The farms involved are:

Table 4

<u>Inspection date</u>	<u>Region</u>	<u>Name of fish-farm</u>	<u>Name of fish-farm company</u>
06/01/2009	Shetland	Foreholm	Scottish Sea Farms
08/01/2009	Shetland	Sound of Hoy	Scottish Sea Farms
25/02/2009	Shetland	Lee of Burrafirth	Mainstream Scotland Limited
19/05/2009	Western Isles	Rossay by Isle of Scalpay	Marine Harvest Scotland Limited
19/05/2009	Western Isles	Ob Meavag	Marine Harvest Scotland Limited
27/05/2009	Mainland	Strondoir Bay	Lighthouse Caledonia Limited

27/05/2009	Mainland	Meall Mhor Loch Fyne	Lighthouse Caledonia Limited
26/08/2009	Shetland	Inner Mangaster	Scottish Sea Farms
20/10/2009	Mainland	Nedd	Loch Duart Limited
29/10/2009	Shetland	Hogan	Hoganess Salmon
01/02/2010	Shetland	Cloudin	Hoganess Salmon
04/02/2010	Shetland	Vidlin North	Scottish Sea Farms
17/02/2010	Western Isles	Arbhair	Lewis Salmon Limited
03/03/2010	Western Isles	Loch Harport	Marine Harvest Scotland Limited
03/03/2010	Western Isles	Loch Odhairn	Lighthouse Caledonia Limited
16/03/2010	Mainland	Calva Bay (Calbha Beag)	Loch Duart Limited
16/03/2010	Mainland	Rientraid	Loch Duart Limited
16/03/2010	Mainland	Torgawn	Loch Duart Limited
24/03/2010	Shetland	Coleness	Hjaltland Seafarms Limited
15/06/2010	Mainland	Ardmair	Wester Ross Fisheries Limited
06/10/2010	Western Isles	Ornish Island	Marine Harvest Scotland Limited

More generally, there is a problem with the statutory recording of incidents of a lack of efficacy of, tolerance to or resistance to sea-lice treatments.

While the Code¹⁵ refers to the legal requirement - pursuant to EC Directive 2001/82/EC - to report “any suspected adverse reaction” to the VMD, this does not mean that reduced efficacy, or tolerance to, or suspected resistance to sea-lice treatments are required to be reported.

The VMD has confirmed that: “an adverse reaction is described as one that is “harmful and unintended” at Article 1.10 of the Directive and consequently many companies argue that a lack of efficacy does not need to be reported, as a lack of efficacy has not caused harm or created an unintended reaction”¹⁶.

The Record Keeping Order specifically does not require any record to be kept of a suspected lack of efficacy of, tolerance to or resistance to sea-lice treatments. Any notes made by Fish Health Inspectors appear to be anecdotal only and there is no systematic reporting by fish-farmers or recording by inspectors.

As a result, there is no co-ordinated farm-specific statutory recording of a lack of efficacy / tolerance to, or resistance to sea-lice treatments in Scotland.

This is confirmed by a clear mismatch between those few suspected adverse reaction reports held by the VMD and obtained in full following a complaint to the UK Information

¹⁵ At para 3.12.3.1

¹⁶ Letter from David Rayner, Head of Core Services, VMD, to Guy Linley-Adams, 2nd September 2010.

Commissioner¹⁷, and the farms / sites where lack of efficacy has been noted by Fish Health Inspectors in their reports. The VMD disclosed no suspected adverse reaction reports covering 2009 and the first few months of 2010 when these were requested in April 2010.

Contrast this with the legal framework in Norway, where there is clear recognition of the danger posed by the spread of single and multiple resistant sea-lice¹⁸ and where lack of efficacy or suspected resistance must be reported at once to the Food Safety Authority. Further, the results of any investigations into the sensitivity of sea-lice to the various treatments must be recorded¹⁹.

This 'gap' in UK / Scottish law can be plugged by a simple amendment to Schedule 2 of the Record Keeping Order such that any incident of reduced efficacy, tolerance to, or suspected resistance to any sea-lice treatments must be recorded by fish-farmers (in addition to the already proposed amendments to Regulation 2 above, such that the records kept pursuant to Schedule 1 must be supplied to Marine Scotland for placing on a public register).

3.4 Containment issues and escapes

During 2009-2010, Marine Scotland reported on its website²⁰ the following escapes (marine escapes only):

Table 5:

<u>Farm</u>	<u>Company</u>	<u>Date</u>	<u>No of fish</u>
Aird	Lighthouse Caledonia	17/05/09	17,766
Kingairloch	Marine Harvest	01/07/09	1
Marulaig Bay	Marine Harvest	28/06/09	10,534
Groatay	Marine Harvest	10/07/09	315
Loch Linnhe	Marine Harvest	19/06/09	621
Strone Point	Lighthouse Caledonia	14/09/09	58,800
Ardnish	Marine Harvest	12/10/09	7
Loch Hourn	Marine Harvest	27/05/10	200
Lochalsh	Marine Harvest	30/09/10	100
Laxford	Loch Duart Limited	09/11/10	4000
Kingairloch	Marine Harvest	21/11/10	36

There is inevitably a certain degree of inaccuracy in the figures quoted, due to the difficulties both in identifying a 'before escape' figure for each cage and accurately counting the remaining fish.

¹⁷ Email from David Lewsey, Core Services, VMD, to Guy Linley-Adams, 11th February 2011

¹⁸ Marine Harvest data 2009/10 as supplied to the Directorate of Nature Management, Trondheim

¹⁹ Norwegian Regulation No 1095 of 2009 relative to combating lice in aquaculture facilities requires that fishfarmers keep records of the results of any investigation of sensitivity to treatments of sea-lice (Regulation 4a(i)) and that any suspected lack of efficacy or suspicion of resistance is investigated and reported to the Food Safety Authority (Regulation 8).

²⁰ <http://www.scotland.gov.uk/Topics/marine/Fish-Shellfish/18692/escapeStatistics>

Fish will also inevitably be lost during the routine operation of a farm. It has been estimated that the number of fish escaping during the daily handling of fish from all aquaculture facilities may be as large as the large-scale accidents in a few net pens.²¹

In addition to the above registered escapes, a number of other concerns are revealed within the Fish Health Inspectorate reports, including the presence of misshapen cages, nets with holes or tears, either deliberately or otherwise made, and nets sagging at or below the water line.

The farms involved are:

Table 6

<u>Inspection date</u>	<u>Region</u>	<u>Name of fish-farm</u>	<u>Name of fish-farm company</u>
07/01/2009	Shetland	Setter Voe	Skelda Salmon Farms Limited
13/05/2009	Western Isles	Marulaig Bay	Marine Harvest Scotland Limited
25/06/2009	Mainland	Loch Duich	Marine Harvest Scotland Limited
30/06/2009	Mainland	Nevis B	Scottish Sea Farms
30/06/2009	Mainland	Nevis A	Scottish Sea Farms
07/07/2009	Shetland	Baltasound Harbour	Balta Island Seafare Limited
27/10/2009	Shetland	South Sound	Scottish Sea Farms
11/11/2009	Mainland	Kishorn A South	Scottish Sea Farms
12/11/2009	Mainland	Loch Creran B	Scottish Sea Farms
23/11/2009	Mainland	Tanera	Scottish Sea Farms
13/12/2010	Mainland	Lismore A	Scottish Sea Farms

The NASCO Best Management Practice Guidance requires “100% farmed fish to be retained in all production facilities”²².

While the level of recorded escapes remains as high as it is, and while there must be doubt over both the numbers of fish having escaped during recorded events, as well as the ‘operational losses’ that farms are believed to suffer, the industry in Scotland is a very long way from achieving the NASCO target.

²¹ Ferguson A, IA Fleming, K Hindar, O Skaala, P McGinnity, T Cross and P Prodohl (2007) Farm Escapes. Chapter 12 in The Atlantic Salmon; Genetics Conservation and Management. Edited by Eric Verspoor, Lee Stradmeyer and Jennifer L Nielsen. Blackwell Publishing, page 361

²² NASCO (2010) Guidance on Best Management Practice to address impacts of sea lice and escaped farmed salmon on wild salmon stocks (Adopted in June 2009, Revised in June 2010)

Glossary

Alphamax – a deltamethrin-based used to treat sea-lice; a synthetic pyrethroid

Cardiomyopathy syndrome (CMS) – a viral disease of farmed salmon causing mortality due to damage to the heart

Code of Good Practice for Scottish Finfish Aquaculture (“the Code”) - an industry document, without statutory effect, which sets down standards of practice against which the industry suggests fish-farms should be judged

Excis - a cypermethrin-based used to treat sea-lice; a synthetic pyrethroid

Fish Health Inspectorate – appointed by Scottish Ministers as inspectors of aquaculture businesses and part of Marine Scotland Science

‘Gravids’ – egg-bearing sea-lice

Infectious Pancreatic Necrosis (IPN) – a viral disease of farmed salmon capable of causing significant mortalities

Infectious Salmon Anaemia (ISA) - a serious viral disease of farmed salmon capable of causing severe losses to affected farms

Sea-lice – external parasites of salmonids, grazing on the skin of the fish. Two types - *Lepeophtheirus salmonis* (sometimes called ‘Leps’) and *Caligus elongatus*.

Pancreatic Disease – a viral disease of salmon causing mortalities in farmed fish

Record Keeping Order - the Fish Farming Businesses (Record Keeping) (Scotland) Order 2008, also referred to in Fish Health Inspectorate reports as ‘SSI’ (Scottish Statutory Instrument)

Salmosan - an azamethiphos-based used to treat sea-lice; an organophosphate

Slice – an in-feed sea-lice treatment containing the avermectin, emamectin benzoate

Veterinary Medicines Directorate – UK Government agency responsible for the safe and effective use of veterinary medicinal products in the UK

