

**Rhidorroch Estate
Ullapool
Wester Ross
IV26 2UB
Scotland**

Colin Wishart
Countryside, Heritage and Natural Resources section
Planning & Development Service
Highland Council
Glenurquhart Road
Inverness
IV3 5NX
Email: Colin.Wishart@highland.gov.uk

24 May 2013

Dear Sir,

13/01494/FUL - Loch Kanaird Eastern Side Of Isle Martin

Please consider this a formal objection to the above [application](#) by Wester Ross Fisheries for an expansion in Loch Kanaird (the site area will increase from 0.96 hectares to 1.29 hectares with 46 steel cages and a feed barge).

Suffice to say that this application must be refused in the strongest possible terms. If Highland Council grants this application then it will contravene peer-reviewed scientific wisdom and be open to legal challenge.

Authorizing the expansion of salmon farming in a highly sensitive area less than 1km from a salmon river and in a sea trout area is incompatible with recently [published](#) scientific evidence from Marine Scotland Science which states that sea lice impacts can be detected up to 149km away from salmon farms with 31km identified as a 'critical level'.

New evidence from SEPA reveals that Wester Ross Fisheries has already polluted Loch Kanaird with toxic chemicals which kill shellfish and contaminate sediments.

My concerns can be summarized as follows:

- 1) Wester Ross's Appalling Environmental Track Record**
- 2) Sea Lice Infestation**
- 3) Toxic Chemicals**
- 4) Sea-Bed Contamination**
- 5) Genetic Pollution**
- 6) Impact on Freshwater Pearl Mussels**

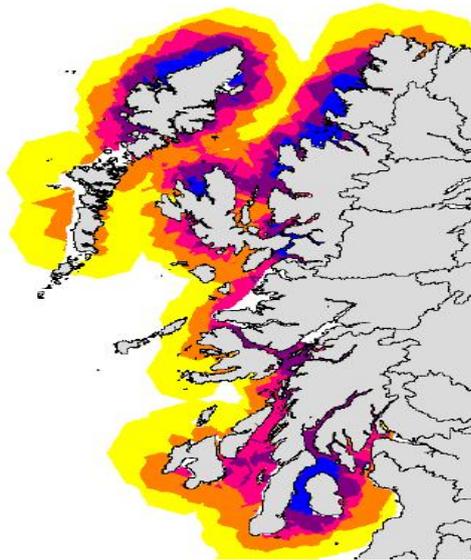
Further information is enclosed below in an Appendix. Please note that further information on salmon farms operated by Wester Ross Fisheries may be obtained

within the next few weeks via FOI from both SEPA and Marine Scotland. I therefore reserve the right to add to this objection by the [deadline for comments](#) of 14th June.

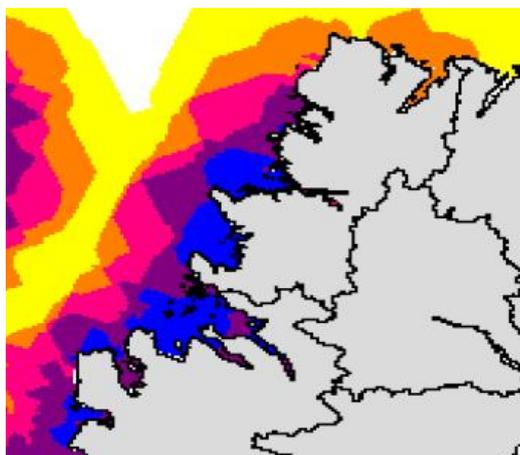
Highland Council is strongly encouraged to access this data directly via SEPA's public register and from Marine Scotland Science's Fisheries Laboratory in Aberdeen. Sea lice data is available directly from Wester Ross Fisheries Trust (WRFT), Wester Ross Area Salmon Fishery Board (WRASFB) and should also be available from Wester Ross Fisheries themselves.

Highland Council is also pointed to a report presented last month by RAFTS to the WRASFB: "[Managing Interactions Aquaculture Project: Briefing Paper for Wester Ross DSFB](#)". The report states very clearly that the West coast of Scotland is already overflowing with salmon farms (hence the sea lice problem). In particular, Wester Ross is currently identified as an area of "high sensitivity" (blue and purple on the map below):

Map 1: v1 Output of River and Fisheries Locational Guidance

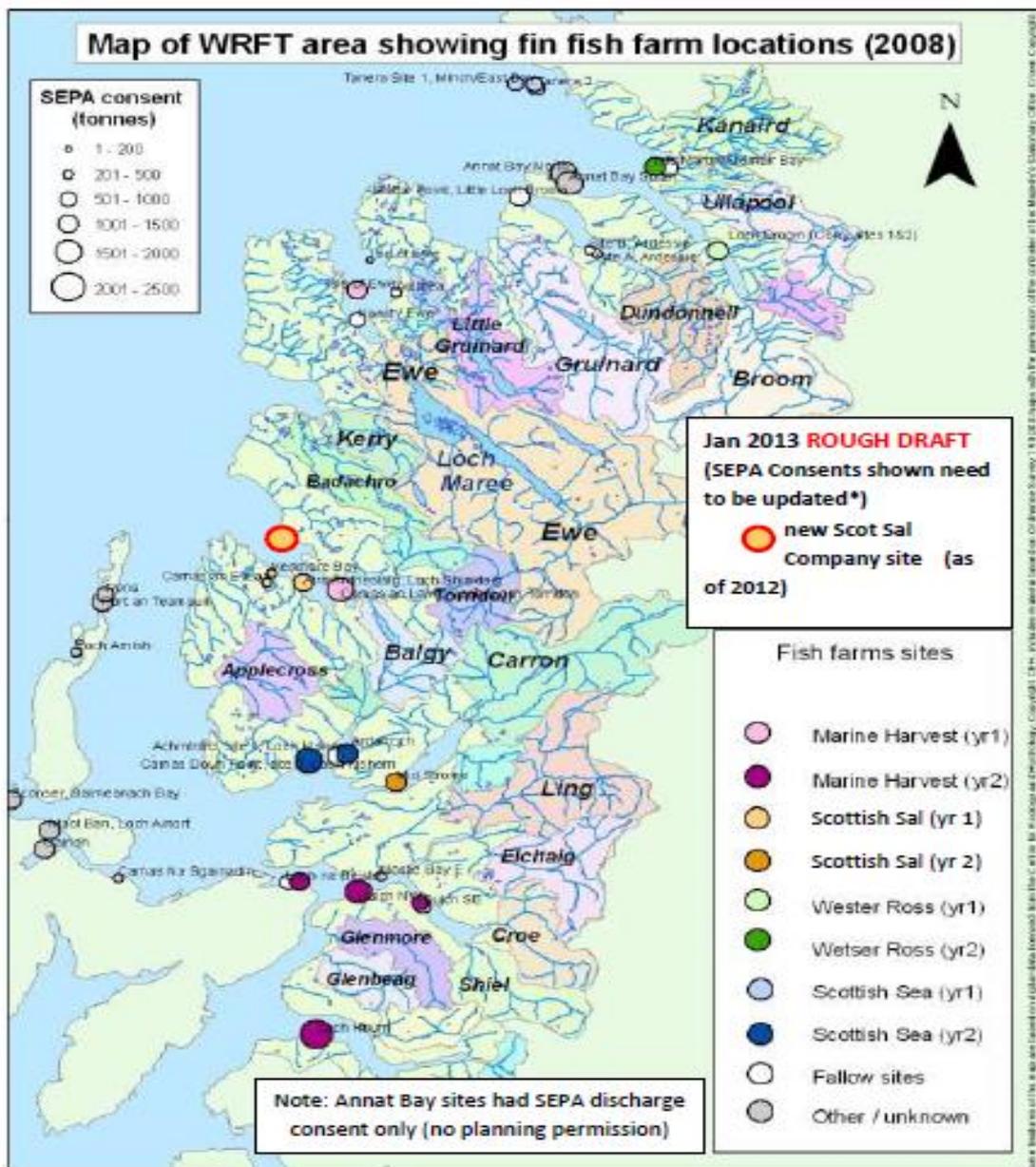


A closer look at Map 1 for rivers in Wester Ross reveals that the majority of rivers and fisheries are judged to be highly sensitive - including the River Kanaird.



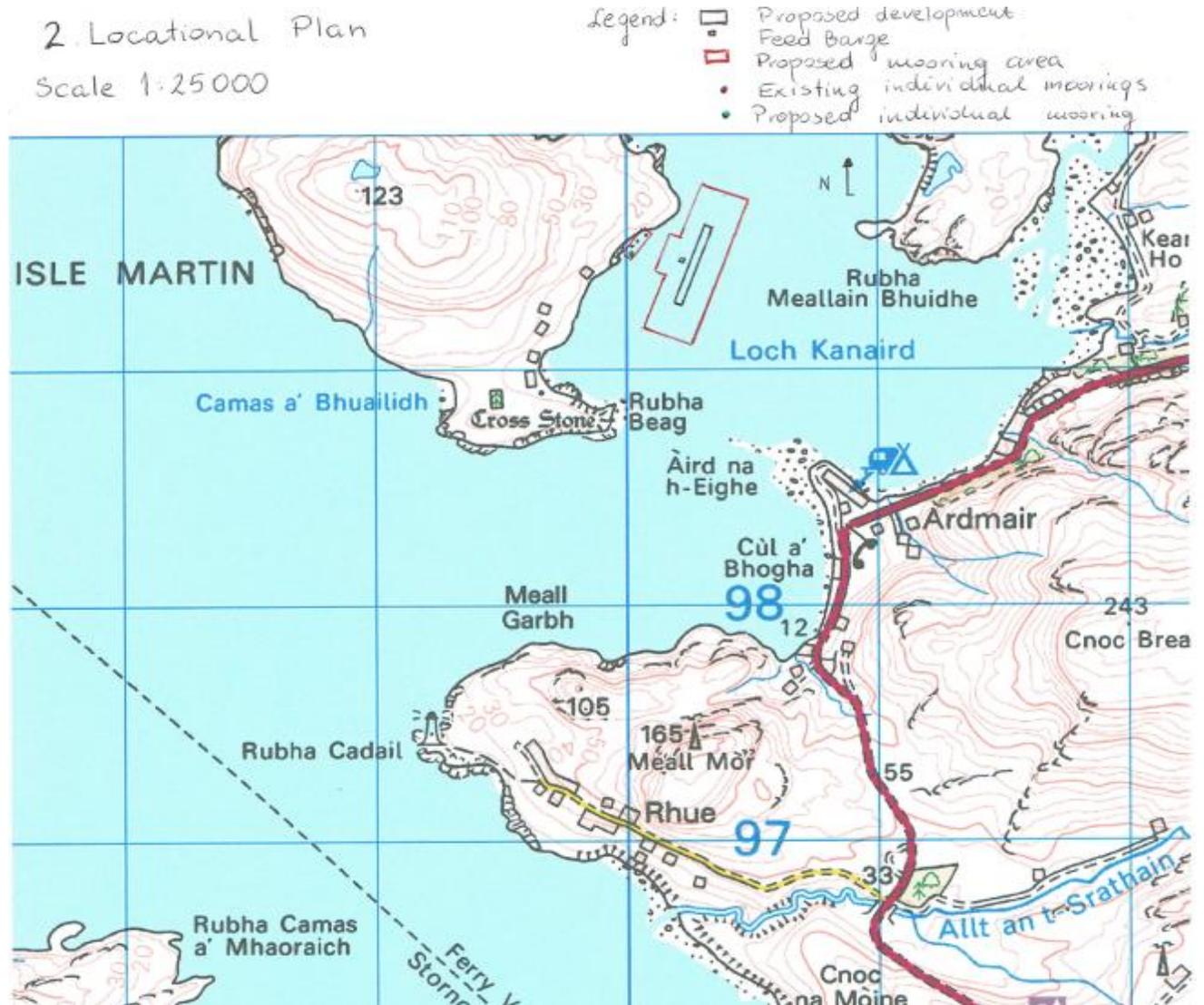
The '[Managing Interactions Aquaculture Project](#)' is a Scottish Government-funded initiative supported by partners including the ASFB, Salmon & Trout Association, Atlantic Salmon Trust, WRFT and WRASFB. Hence the findings of the report – due to be published in final form soon – are worthy of consideration by Highland Council. Please note further information detailed in a [letter](#) to WRASFB dated 18 May 2013 as well a [letter](#) dated 27 April 2013. The latter stated:

“Based upon all the scientific evidence and sea lice data, the only logical policy is to advocate for a blanket ban on salmon farms across the West coast of Scotland..... Faced with increasing sea lice burdens on wild fish stocks, chemical increases degrading west coast waters and Norwegian-origin farmed salmon eroding the genetic diversity of wild salmon, surely the WRASFB should be opposing ALL new salmon farms and campaigning for the removal of ALL existing salmon farms?”

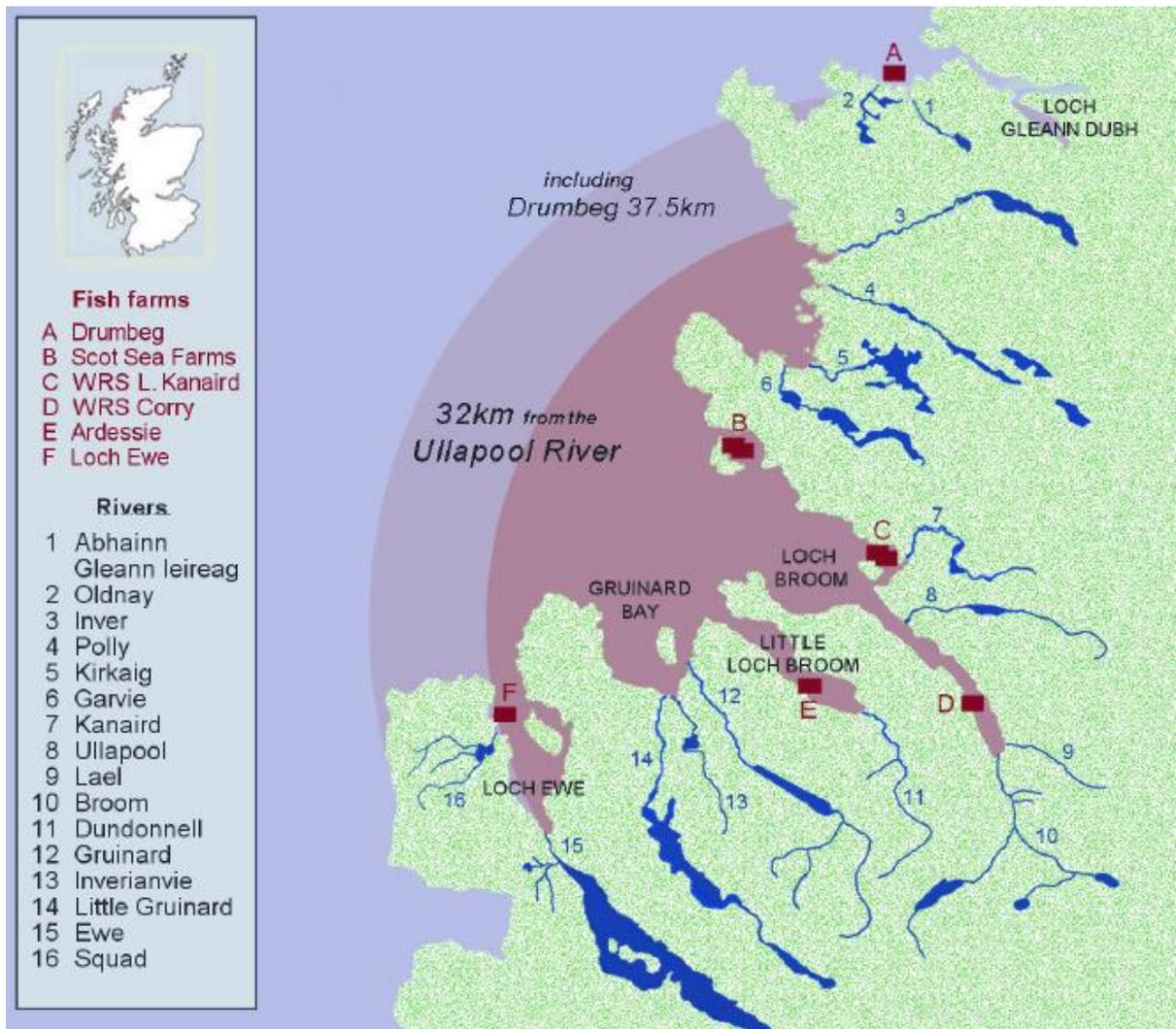


Highland Council should adopt a similar policy and refuse this application.

The application (13/01494/FUL - Loch Kanaird Eastern Side Of Isle Martin) is clearly located in a highly sensitive area for migrating wild salmon and sea trout – and is within 1km of the mouth of the River Kanaird. The [locational plan](#) from Wester Ross Fisheries points out how close the farm is to the River Kanaird. The River Ullapool, which is currently [seeking SAC status](#) via the European Commission, is also in very close vicinity to the Ardmail application:



The River Ullapool is already threatened by five salmon farms within 32km with a sixth salmon farm within 37.5km.

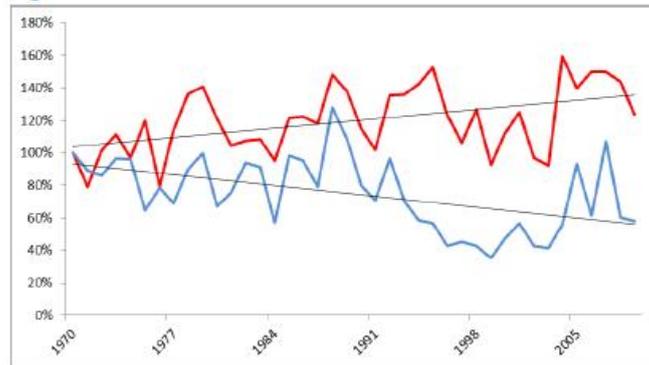


Please see more details in the Appendix below detailing [scientific evidence](#) from Marine Scotland Science concluding that sea lice impacts can be detected up to 149km away from salmon farms with 31km identified as a 'critical level'.

It is important to note that wild salmon and sea trout stocks are particularly vulnerable on the West coast of Scotland. A report – "[Salmon Farming and Wild Salmon Catches: Let's Focus on the Real Facts](#)" – published in 2011 by RAFTS, Fish Legal, the Salmon & Trout Association and the Association of Salmon Fishery Boards illustrates how wild salmon stocks have crashed on the West coast coincident with the expansion of salmon farming.

"Figure 2 demonstrates the true difference between the two fisheries," states the [report](#). "Despite the issues with marine survival, the east coast rod catches have in fact increased by over 20% between 1970 and 2009. In the same period the rod catch on the aquaculture coast has decreased by over 40%. We can see a clear trend of declining wild salmon catches in areas where the Scottish salmon farming industry operates, compared with catches on the East coast."

Figure 2



Decline in Scottish wild salmon catches by rod (1970 = 100%) for east coast (Tweed to Cape Wrath) and aquaculture coast (Cape Wrath to the Mull of Kintyre, including the Hebrides). Data taken from the Marine Scotland annual catch statistics (Red Line – East Coast, Blue Line – Aquaculture Coast).

Finally, Highland Council surely has a duty of care to investigate this application thoroughly and it is incumbent upon you to access all the latest information from SEPA and Marine Scotland Science. The information presented in the Appendix below raises such serious concerns that the only sensible conclusion is to refuse the application. Has Highland Council even considered the ecological and economic impact of Teflubenzuron use by Wester Ross Fisheries on shellfish populations in Loch Kanaird?

Wester Ross Fisheries has sadly been allowed to pursue a reckless policy of 'slash and burn' aquaculture and has fouled its own nest in Loch Kanaird. Such shifting cultivation should not be permitted. Land-based farm operations are open to the public eye and therefore highly regulated – can this "pollute and move on" mentality be acceptable in the sea? It now appears abundantly clear that consents have been granted in areas that are not in the first place suitable for salmon farming. This needs to be rectified immediately if there is to be responsibility for the future.

In conclusion, please refuse this planning application and send the signal to Wester Ross Fisheries that sea-lice infested salmon farming, increased use of toxic chemicals, risk to crustaceans, farmed salmon escapees breeding with wild Atlantic salmon, benthic pollution and contaminated coastal waters is not acceptable. Wester Ross Fisheries should be punished for their pollution by losing their licence to operate in Loch Kanaird not rewarded by granting another site.

Yours sincerely,

Jenny Scobie
Rhidorroch Estate

Cc: James Bromham (Aquaculture Development Officer):
james.bromham@highland.gov.uk

Appendix:

1) Wester Ross's Appalling Environmental Track Record

Wester Ross Fisheries is more a pariah than a paragon of environmental virtue. In fact, Wester Ross Fisheries has an appalling track record of environmental pollution over the last two decades. The Sunday Herald [reported](#) in 2011:

YET ANOTHER RSPCA FREEDOM FOOD SALMON FARM INFESTED WITH LICE



RSPCA FREEDOM FOOD SALMON FARM INFESTED WITH LICE



A HIGHLAND salmon farm that was granted £630,000 of taxpayers' money, given an environmental prize and labelled as a "Freedom Food" producer has been accused of lice infestation and pollution that breach official guidelines.

Wester Ross Fisheries near Ullapool is under investigation by Government and voluntary agencies following complaints from a local landowner, Jenny Scobie. She says sea lice from caged salmon are contaminating wild fish on the River Ullapool, which flows through her land on the Rhidorroch Estate.

“Wester Ross Fisheries near Ullapool is under investigation by Government and voluntary agencies following complaints from a local landowner, Jenny Scobie. She says sea lice from caged salmon are contaminating wild fish on the River Ullapool, which flows through her land on the Rhidorroch Estate.

Reports from Government inspectors, released under freedom of information laws, show sea lice concentrations at three of the firm's sites on Loch Broom and Little Loch Broom have exceeded levels recommended in the industry's good practice code six times this year. Evidence released by the Scottish Environment Protection Agency (Sepa) also shows that pollution of the sea bed beneath the three sites – Corry, Ardmail and Ardessie – has been rated “unsatisfactory” 20 times in last 10

years, and “borderline” eight times. The weight of caged fish licensed under environmental rules was also breached five times at Ardesie in 2006 and 2007.”

Documents obtained from SEPA in April 2013 via FOI also reveal “poor” environmental performance at Wester Ross Fisheries following “gross or repeated” breaches of pollution at Ardmair in Loch Kanaird in July 2010.



1. Assessment Summary

Licence reference number: CAR/L/1003889
 ELC assessment: Significant / > 1 Gross or Repeated Minor Breaches
 Overall interim assessment: Poor

2. Assessment Details

Date and time of assessment: 29/07/2010 10:00
 Site name: Isle Martin MCFF, Loch Kanaird
 Site address: Loch Kanaird, East of Isle Martin , Ardmair, by Ullapool,

Another SEPA report in November 2010 detailed “significant” non-compliance and another “poor” assessment following an “Unsatisfactory” sea-bed survey at Ardmair, Loch Kanaird:

1. Assessment Summary

Licence reference number: CAR/L/1003889
 ELC assessment: Significant / > 1 Gross or Repeated Minor Breaches
 Overall interim assessment: Poor

2. Assessment Details

Date and time of assessment: 25/11/2010 03:00
 Site name: Isle Martin MCFF, Loch Kanaird
 Site address: Loch Kanaird, East of Isle Martin , Ardmair, by Ullapool
 Assessment type: Desk based assessment

Licence condition number	ELC assessment - (compliant, minor, repeated minor, gross or significant)	Description of non-compliance with E actions to rectify non-compliance, time requirements) - Where several breach first condition number and associated
5.1.1 and MPS/CAR/L/1003889	Significant	Seabed survey 2010: unsatisfactory

SEPA reported similar “poor” performance by Wester Ross Fisheries at Ardmair, Loch Kanaird, during 2012 (documents available from SEPA via FOI and SEPA’s public register).

Fish Update [reported](#) in 2004:

The screenshot shows the FISHupdate.com website interface. At the top, the logo "FISHupdate.com" is in large red letters, with a red box containing the word "FISH" to its right. Below the logo is a navigation bar with links: Home, News Alerts! - Get it free!, FISHupdate Directory, Forums, and Fish Farmer Magazine. On the left side, there is a "Please login:" section with a "You are not logged in." message, an email and password login form, a "Remember me" checkbox, a "Log in" button, and links for "Forgot Password?" and "Sign up / Renew". Below this is a search bar for "FISHupdate.com" and another for "FISHupdate Magazine". A "News" sidebar on the left lists categories: Aquaculture, Catching, Processing, Retail, and Current Issues. The main content area features a green header for "AQUACULTURE" and a news article titled "Wester Ross firm fined for licence breach" from "Fish Farming Today", published on 01 September, 2004. The article text states: "WESTER Ross Salmon Hatcheries Ltd was fined £12,000 on 26 August at Dingwall Sheriff Court for massively over-producing salmon smolt at its fish farm on Loch Tollaidh, Wester Ross over a 4-month period last year. The company pled guilty to allowing too much waste water from its fish farm into Loch Tollaidh, a popular freshwater angling loch near Gairloch between 7 July 2003 and 3 November 2003. The case was reported to the Procurator Fiscal by the Scottish Environment Protection Agency (SEPA). Following an anonymous complaint from an angler surprised by the number of helicopter flights moving smolt from the freshwater site to marine cages offshore, SEPA visited the farm to check that its operation met the conditions placed on it by SEPA for water quality protection. These conditions relate to the maximum weight of fish to be held at the site and the maximum annual production of fish. It was found that the company exceeded the conditions set by SEPA and that the farm was growing more than five times as many fish as it should have been. Geraldine Wight, an environment protection officer based in SEPA's Dingwall office said: "I hope the result of this case sends a clear message to the industry that this level of over-production will not be tolerated. Discharge consent limits are set in order to protect the environment from any adverse impact and therefore should not be flouted by the discharger."

In 1993, Wester Ross Salmon was [fined](#) for the illegal use of ivermectin in Loch Glencoul.

In 1993 another Scottish salmon farm company, Wester Ross Salmon, was fined for the unauthorized use of ivermectin in Loch Glencoul. Following raids by the enforcement agency, farmed salmon was found to be contaminated with ivermectin at a concentration twelve times above the detection limit. Wester Ross Salmon admitted feeding fish pellets containing ivermectin in a trial that ended in the death of thousands of fish. The company pleaded guilty to breach of the Control of Pollution Act and was fined a paltry £500.²²⁷

2) Sea Lice Infestation

It is common knowledge that sea lice infestation of salmon farms in Wester Ross is unacceptably high. Last month the WRASFB wrote to Marine Scotland following reports of high sea lice counts on salmon farm sites operated by Wester Ross Fisheries and Marine Scotland was scheduled to visit sites operated by Wester Ross Fisheries as part of their routine inspections (this data is now subject to a FOI request and will be passed on if made available before the 14th June deadline for public comments).

Wester Ross Fisheries has a poor record not synchronising salmon farm production with other farms in Loch Broom and Little Loch Broom and therefore not co-ordinating sea lice treatments a basic management requirement. Wester Ross Fisheries applied and gained planning permission to operate their Ardesie salmon farm without synchronised production or co-ordinated sea lice treatment with the other farms in the area. Wester Ross Fisheries put forward the assurance that the site would be farmed in a way to virtually eliminate sea lice. In a short space of time sea lice contaminated farm salmon were moved from site to site therefore exacerbating the sea lice problem into Loch Little Loch Broom (close to the Little Gruinard SAC) from Loch Broom.

It is now evident the sea lice are out of control at all sites operated by Wester Ross Fisheries. For example, the biologist from WRFT visited the Ardmair site in April 2012. The biologist's report from the WRFT annual meeting on 31st May 2012 reads:

8. Proposed Fish farm visits.

I visited WRF farms at Corry and Ardmair on 20th April. A report was drafted following the visit and agreed with WRF. This report is now available upon request (to be posted on website?). I've also contacted Scottish Sea Farms to request a visit to farms in the Summer Isles.

Just last month, the WRFT biologist reported a continuing sea lice problem at Wester Ross Fisheries with levels "too high for wild fish":

— Original Message —

From: [Wester Ross Fisheries Trust](#)

To: ['Rhidorroch Estate'](#); admin@wrasfb.org.uk; ['Donald Rice'](#); ['Iain McFadyen'](#); ['Stephen Sellers'](#); ['Hugh Whittle'](#); ['Jamie Crawford'](#); ['Gordon Crawford'](#); ['Frank Buckley'](#); ['Raymond Dingwall'](#); ['Bill Whyte'](#); ['Iain Russell'](#); ['Brian Fraser'](#); pat_wilson@btconnect.com; ['John Mackenzie'](#); ['WRFT Administrator'](#)

Sent: Monday, April 15, 2013 12:22 PM

Subject: RE: Current sea lice problem at WRF

Good morning Jenny & all,

Thanks for copying this to me.

I visited the WRF Corry fish farm a couple of weeks ago – and indeed the sea lice levels on the farms were above CoGP levels. The first of the Ardessie fish will be transferred from Corry later this month. That's about as much as I'll be able to say in the site visit report, other than that I made it very clear that levels were too high for wild fish and please could they take action to reduce lice levels. So over to WRASFB.

At least we've got some rain at last!

Best wishes,

Peter

The above e-mail was received after a recent site visit by the WRFT's biologist to the Corry salmon farm operated by Wester Ross Fisheries in Loch Broom. These site reports should be available to Highland Council via WRFT. However it should be noted that in order to be able to gain access to the farms there is an agreement with WRFT that the information inside these reports has to be accepted by Wester Ross Fisheries prior to there being any distribution of information.

Wester Ross Fisheries will also keep site specific sea lice records and admitted to "a lot of lice" at the Ardmair site in a letter to SEPA in 2011 (in relation to their use of Salmosan – the toxic organophosphate Azamethiphos):

To: Gregson, Lucy
From: Hugh Richards
Cc: Aneta Tabaczynska; Colin Milne
Subject: Ardmair treatments.
Sent: Fri Aug 19 14:43:03 2011
Importance: Normal

Hi Lucy,

Just to let you know that I will be putting through a notification that we may treat at Ardmair with Salmosan next week. I am not too sure whether we will need this follow up treatment or not, but there are a lot of lice pre-adults around at the moment, and Colin and I want to ensure we are ready to go in with a follow up treatment after the AMX round, if we have to.

Best regards

Hugh

Hugh Richards
Wester Ross Fisheries Ltd.
Ardmair
Ullapool
Ross-shire
IV26 2TN
Scotland
Registered in Scotland No. SC 297376

Tel 01854 612121
Fax 01854 612812
Website www.wrs.co.uk<<http://www.wrs.co.uk/>>

In fact, a [report](#) published earlier this month by the Salmon & Trout Association revealed 67 breaches of sea lice levels at salmon farms across the West coast of Scotland including at many Wester Ross sites. Wester Ross Fisheries performed particularly badly – with five breaches at every one of the three sites it operates in Wester Ross (Ardmair, Ardessie and Corry):

Annex A

The following farms were noted during Fish Health Inspectorate inspections in 2011 and 2012 as having breached Code of Good practice thresholds of sea-lice during the period for which records were inspected:

2. Ardessie B, Wester Ross Fisheries Limited
3. Ardessie A, Wester Ross Fisheries Limited
4. Oldany, Loch Duart Limited
5. Loch Laxford, Loch Duart Limited
14. Corry, Wester Ross Fisheries Limited
15. Ardessie A, Wester Ross Fisheries Limited
27. Tanera, Scottish Sea Farms Limited
29. Torridon, Marine Harvest (Scotland) Limited
45. Badcall Bay, Loch Duart Limited
46. Calva Bay, Loch Duart Limited
56. Ardmair, Wester Ross Fisheries Limited
57. Loch Duich, Marine Harvest (Scotland) Limited
58. Loch Alsh, Marine Harvest (Scotland) Limited

The specific details obtained via FOI by the Salmon & Trout Association included:

Ardessie Site B, Wester Ross Fisheries Ltd, Date of visit: 07/06/11

Lice levels on fish appeared above suggested threshold in CoGP, which corresponds to lice count data.

Ardessie A, Wester Ross Fisheries Ltd, Date of inspection: 07/06/11

Sea-lice levels not below the suggested threshold in the CoGP during the period records are inspected.

Corry, Wester Ross Fisheries Ltd, Date of visit: 21/03/11

High lice load observed in stocks especially 2009 stocks (2-3 adult lice per fish) ...

lice records show lice numbers rising since February 2011, Salmosan bath treatment given to site 28/02/11.

Lice counts following [Salmosan](#) treatment showed a small drop in lice numbers.

Site representative believes [Salmosan](#) treatments are becoming less effective.

[Alphamax](#) treatment (full enclosure) being conducted at the time of inspection.

Sea-lice levels not below the suggested threshold in the CoGP during the period that records are inspected.

02/08/2011 Wester Ross Fisheries Limited Ardessie A

Sea lice levels not below the suggested threshold in the COGP during the period that records are inspected.

02/08/2011 Wester Ross Fisheries Limited Ardessie B

Previous Slice treatment appears to have reduced efficacy

02/08/2011 Wester Ross Fisheries Limited Ardair

"Since February 2011 site has had two Slice treatments (May and July) and an Alphamax treatment.

Lice levels were circa. 8.4 adult females, this has reduced to circa. 6.7 the day after treatment finished and is expected to drop further"

Other sea lice inspections in 2009 and 2011 also showed breaches of sea lice limits at Ardair, Corry and Ardessie – all sites operated by Wester Ross Fisheries.

Loch Broom and Little Loch Broom

Summary of inspections by fish health inspectorate

Ardair

The Fish Health Inspectorate inspected Wester Ross Fisheries' Ardair farm on 10th November 2009 and recorded that adult female sea lice counts were above the suggested threshold in the Code of Good Practice (CoGP).

Subsequent inspection of Ardair, on 15th June 2011, also recorded that sea lice levels were above CoGP thresholds, with the site manager reporting that Alphamax treatments were not as effective as in the past.

A further inspection on 2nd August 2011 recorded that before an Alphamax treatment on 28th July, adult female lice levels were at 8.4 per fish, reducing to 6.7 the day after the treatment, but still way over the CoGP thresholds.

During 2011, the farm had also treated with Slice in May and July, which does not therefore appear to have controlled lice levels.

Corry

The Fish Health Inspectorate inspected the Corry farm on 21st March 2011 and reported "high lice loads observed in stocks especially the 2009 stocks (2 to 3 adult lice per fish), lice records showed lice numbers rising since February 2011".

The site representative at Corry reported that, this time, Salmosan treatments were becoming less effective than in the past, suggesting resistance.

A subsequent inspection of the same farm on 6th June 2011 showed that sea-lice counts conducted on 3rd June 2011 were still above the suggested threshold of the CoGP.

Ardessie

On 7th June 2011, the Ardessie farm was inspected and the inspectors recorded that lice levels on the fish recently delivered from Corry still appeared to be above the suggested threshold in the CoGP during the period for which records were inspected.

Repeat inspection on 2nd August 2011 showed that the farm had reported that Slice appeared to have reduced efficacy and that the "sea lice record indicates that whilst treatments have reduced lice loads, recorded numbers are still above suggested threshold".

Read the report in full [online here](#) and read all the FOI data obtained by the Salmon & Trout Association via "[Sea-lice parasite numbers above industry's own 'threshold' level at over 30% of Scottish salmon farms inspected in second half of 2011](#)".

Data obtained via FOI from Marine Scotland in February 2013 revealed sea lice infestation at the Ardmair site during 2012. The 'Sea Lice Inspection' report dated July 2012 detailed "sea lice problems" and a breach in the SSPO's Code of Good Practice suggested threshold:

Fisheries Research Services RECORD SHEET	FHI 050	Page 1 of 2
	Issue No	2.00
Sea Lice and Containment Inspection Checklist	Issued By	Sonia Duguid
	Date of this Issue:	02/03/2011

Case No: Site No: Site Name:
Date of Visit: Inspector:
Records checked between: Start Date: Finish Date:

Sea Lice Inspection (Seawater Sites Only)

1. Has the site experienced sea lice problems in the previous 4 years?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
2. Is the CoGP Farm Management Area (or equivalent) followed synchronously?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
3. Does the site have treatment discharge consents relevant to sea lice?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
4. Is there a signed documented farm management agreement relevant to the site and CoGP Farm Management Area (or equivalent)?	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
5. Are sea lice count records available for inspection? (Legal SSI ¹ , CoGP 3.4.3.7 vi)	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
6. Do records adequately reflect the required standard specified in the SSI and the CoGP? (Legal SSI, CoGP 3.4.3.7)	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>

7. Are sea lice (<i>L. salmonis</i>) record levels below the suggested threshold in the CoGP during the period that records are inspected? (0.5 adult females (Ls) Feb to June, 1 adult females (Ls) July to January)	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
8. Is <i>C. elongatus</i> infestation at a level which is considered to cause significant welfare problems?	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
9. Have therapeutic treatments been administered when lice levels <i>L. salmonis</i> have exceeded the trigger level or where <i>C. elongatus</i> is considered to have welfare implications? (CoGP 3.4.3.8 – should, NB lice level triggers are suggested)	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
10. Has any other action been taken? (Other action may include evidence of veterinary advice or consultation – which may not advise, recommend or allow treatment. FHI should inspect documentation where this exists)	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
11. Have therapeutic treatments or the actions taken had a significant impact upon the lice levels recorded? (Analysis of records required)	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>

Read the report from Marine Scotland in full [online here](#)

The latest regional sea lice data [published](#) by the Scottish Salmon Producers' Organisation details significant breaches of lice thresholds across Scotland – including a 263% breach in [North Mainland](#) region which includes 41 active salmon farms (including all Wester Ross sites).

North Mainland

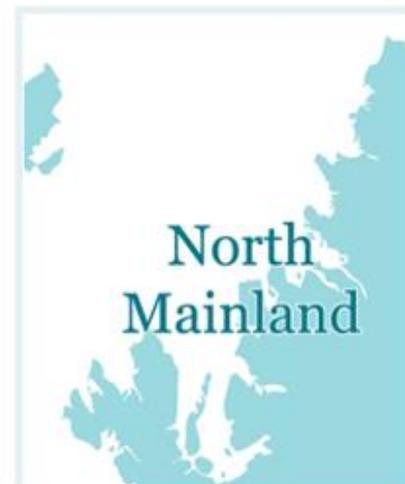
September to December 2012

The North Mainland region encompasses the coastline (and associated islands) from Loch Eriboll in the north to Rubh' Arisaig, near Loch nan Ceall on the west coast.

The region accounts for approximately 18% of all Scottish farmed salmon production¹ and contains 41 active farming sites². During the present reporting period 36 of these active sites were stocked with fish, with the remaining sites being left fallow as part of an established and pre-determined production plan.

Sea Lice & Area Management

The SSPO manage a dedicated system that has been specifically designed to assist the industry, through the generation and exchange of information on fish health management across Scotland. Information gathered through the application of the system indicates that, during the present reporting period lice numbers across the North Mainland region were, on average, 263% above the suggested lice treatment threshold set out in the NTS and CoGP (i.e. 1.0 adult female lice per fish). Similar to all areas of Scotland, various lice management practices are adopted throughout the North Mainland region, some examples of which are given below:



During 2011, high sea lice levels were [reported](#) at salmon farms across Scotland: with North Mainland region breaching the thresholds by 149% in July 2011. During 2012, sea lice levels on Scottish salmon farms continued to be a problem. RAFTS [reported](#) in January 2013:

The SSPO reports indicate that in the period of May 2012 the Western Isles had lice numbers across these the region, on average, remained below the suggested lice treatment threshold set out in the National Treatment Strategy for the Control of Sea Lice on Scottish Salmon Farms (NTS) and the Code of Good Practice (CoGP). However, the North Mainland and South Mainland, lice numbers across this region were, on average, 152% and 70% respectively above the suggested treatment threshold set out in the NTS and CoGP (Figure 21A). In June 2012 the SSPO reports indicate that again the Western Isles, lice numbers across this region, on average, remained below the suggested lice treatment threshold set out in the NTS and CoGP. Whilst in the North Mainland and South Mainland regions the lice numbers across this region, on average, which were 458% and 22% respectively above the suggested lice treatment threshold set out in the NTS and CoGP (Figure 21B). Finally in July 2012 the SSPO reports indicated that the Western Isles and the South Mainland, lice numbers across these two regions, on average, remained below the suggested lice treatment threshold set out in the NTS and CoGP. Whilst the North Mainland during July, lice numbers were, on average, 233% above the suggested lice treatment threshold set out in the NTS and CoGP (Figure 21C).

Sea lice data obtained in February 2013 via FOI also details infestation of wild salmon and sea trout across Scotland: infestation levels of up to 145 sea lice per fish were recorded in Shieldaig in Wester Ross in 2012 and a staggering 1001 sea lice on a salmon sampled in Kanaird in Wester Ross in 2008. Out of over 11,000 wild salmon and sea trout sampled since 1997 there were 2,750 fish with 10 or more sea lice; 913 fish with 50 or more sea lice and 367 fish with 100 or more sea lice. By far the worst area was Dundonnell in Wester Ross which reported 40 out of the top 50 infestation rates (read the sea lice data in full [online here](#)).

A RAFTS report [published](#) in January 2013 detailed increased sea lice infestation levels on wild sea trout during 2012 compared to 2011. The report referred to an “increasing infestation pattern” and “[detrimental lice loads above critical thresholds](#)” with five monitoring sites experiencing extensive heavy sea lice infestations (epizootics).

Another RAFTS report - [Managing Interactions Aquaculture Project: Sea Trout Post Smolt Monitoring Project Regional Report 2011](#) - published in April 2012 showed high levels of sea lice infestation of sea trout sampled in the vicinity of salmon farms. Infestation levels of up to 130 sea lice per sea trout were recorded at Camas na Gaul; up to 126 sea lice per sea trout at Laxford and up to 120 sea lice per sea trout at Kanaird. Sea lice infestation was reported over 40 km away from the nearest salmon farm.

Scottish Government research [published](#) in February 2013 revealed that sea lice from salmon farms impact wild sea trout up to 149km away with 31km away considered a ‘critical level’. The data for this research was taken from Fishery Trusts, including Wester Ross, along the west coast of Scotland. The [scientific paper](#) stated:

The maximum range of effect of lice from farms predicted by the critical threshold model is about 31 km (range 13–149 km), and the intensity of infection falls progressively within this range (Fig. 3). The estimate is similar to that reported by Gargan *et al.* (2003) with reference to bays in Ireland and matches the distribution presented graphically by Butler and Watt (2003). The distance over which any effect can be detected will be due to a combination of both dispersal of lice from the farms and movement of trout. Available data suggest that many sea trout remain close to their source river (within 6 km) during their first weeks at sea, although some individuals disperse more rapidly (Pemberton 1976; Thorstad *et al.* 2007; Middlemas *et al.* 2009).

Furthermore, the paper stated:

While the pattern of decreasing probability of sea trout having lice levels over the critical threshold with distance to farm is highly significant, there is considerable uncertainty around the fitted values. This uncertainty is due to a number of factors, including the effect of averaging across sites, which does not take account of local differences in salinity and currents; it has been shown from Norway that incorporation of currents gives a much better description of risk of Pancreas Disease than does distance (Viljugrein *et al.* 2009). However, the main cause of the uncertainty in fitted values is the uncertainty in the estimate of δ , which is itself due to the low number of sites sampled at larger distances. The data analysed in this study were originally collected to support discrete local investigations into sea lice infestation of sea trout rather than as a larger-scale strategic investigation of the problem, which here relies on *post hoc* best-fit to available information rather than use of a well-structured experimental design. To overcome this issue, a range of sites at increased distances from farms would need to be sampled. In the Scottish context, this would involve sampling on the Ayrshire coast, the north coast or on some of the remoter parts on the west coast.

Until such research has been conducted, the precautionary principle dictates that 149km is the zone of effect or 'end point'.

Even the Scottish Government's own scientific advisers – Marine Scotland Science – concede the scale of the problem in a review report (obtained via FOI in March 2013).

Summary of information relating to impacts of sea lice from fish farms on Scottish sea trout and salmon.

Sea lice infest both farmed and wild salmonids to the potential detriment of aquaculture and angling interests. Several reviews have recently considered information concerning interactions between salmon farms and wild salmonids (e.g. Revie *et al.* 2009; Costello 2009; Whelan, 2010). Here, the evidence available to assess the likelihood and scale of impact of sea lice from salmon farms on Scottish wild salmonids is summarised. The aim is not to repeat extensive review but to focus on key issues relevant to locating fish farms in the Scottish coastal zone.

Are salmon farms a significant source of lice?

Yes, salmon farms have been shown to be a more important contributor than wild fish to the total lice in the environment (Penston & Davies, 2009; Revie *et al.*, 2009).

Is there an association between levels of lice on salmon farms and in the surrounding environment?

Yes, there is a strong correlation between levels of lice on fish farms and in the local environment (Penston *et al.*, 2008).

Is there an association between levels of lice on salmon farms and on sea trout?

Yes, stage of farm cycle relates to level of lice infestation on sea trout with higher levels of infestation during the second year of production (Butler 2002; Hatton-Ellis *et al.* 2006; Middlemas *et al.* 2010), when lice numbers are known to be greater on farms (Revie *et al.* 2002; Lees *et al.* 2008). Examination of data collected throughout the West Coast during 2003-2009 showed that the proportion of individual sea trout with louse burdens above a level known to cause major physiological stress increased with the mean weight of salmon on the nearest fish farm (a measure of where they are in their production cycle), and decreased with distance from that farm (Middlemas *et al.* in press).

Is there an effect of sea lice on wild trout at the individual level?

Yes, individual wild trout sampled on the west coast of Scotland have been shown to have infestations above a level known to cause major physiological stress (Well *et al.* 2006; Middlemas *et al.* 2010, in press).

The Marine Scotland Science report – dated February 2013 – concluded:

SUMMARY

Scientific evidence from Norway and Ireland indicates a detrimental effect of sea lice on sea trout and salmon populations. There is increasing scientific evidence that this is also the case for sea trout in Scotland although scientific studies investigating the case for Scottish salmon are lacking. Salmon aquaculture results in elevated numbers of sea lice in open water and hence is likely to have an adverse effect on populations of wild salmonids in some circumstances. The magnitude of any such impact in relation to overall mortality levels is not known. However, concerns that there may be a significant impact of aquaculture have been raised due to declines in catches of both salmon and sea trout on the Scottish west coast.

The report cited the following scientific references:

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One of the scientific papers cited by Marine Scotland Science was published online in November 2012 by the Royal Society. The paper - "[Impact of parasites on salmon recruitment in the Northeast Atlantic Ocean](#)" - showed that "between 18% and 55% of adult salmon in the Northeast Atlantic Ocean are lost to parasites each year". The authors (including Professor Christopher Todd from the University of St. Andrews) [concluded](#):

It is rare to identify and quantify the factors that affect population dynamics of marine fishes [15] as well as the role of infectious disease in conservation [59]. Our results indicate that parasite-associated mortality may cause the closure of some fisheries when conservation targets of return adult abundances are not being met. However, the implications of our results may be most acute for small populations in small river systems. Due largely to the fidelity to their natal rivers, populations of Atlantic salmon typically show substantial genetic structuring and variability that is considered adaptive [60]. Small river systems that support salmon populations of low effective population size [61] will be especially vulnerable. The concern therefore is not only for a 39 per cent loss in salmon abundance, but also the loss of genetic variability and its associated potential for adaptation to other environmental changes. More broadly, and in contrast to the conclusions from two of the original studies [40,46], our results supply manipulative field experimental evidence at a large spatial scale that parasitism may be a significant limiting factor for marine fishes, fisheries and conservation.

Professor Chris Todd stated in a [press release](#) from St. Andrews University (7 November 2012):

“This high per cent mortality attributable to sea lice was unexpected. The salmon aquaculture industry has long placed a high priority on controlling sea lice on their captive salmon – but these results do emphasise the need for the industry to not only maintain the health of their own stocks, but also to minimise the risk of cross-infection of wild fish.”

3) Toxic Chemicals:

Data obtained via FOI from SEPA reveals the alarming use of toxic chemicals by Wester Ross Fisheries. The data for 2009 to 2012 includes use of the shellfish-killing chemicals Teflubenzuron (Calicide), Emamectin benzoate (SLICE) and Azamethiphos (Salmosan) in Loch Kanaird:

2012 – Chemical Use by Wester Ross Fisheries:

Site Name	Site ID	SEPA Team Area	Calicide (grams)	Teflubenzuron (kgs) Threshold = 0.001kg	Slice (grams)	Emamectin salts and derivatives (kg) Threshold = 0.001kg
Isle Martin, Ardmair Bay	KAN2	DING	5323	5.323	0	0
River Kanaird, Ardmair Bay	KAN1	DING	0	0	0	0
Loch Broom (Corry1&2)	BRO1	DING	0	0	234371	0.468742
Ardessie Site A	LIT1	DING	0	0	0	0
Ardessie Site B	LIT2	DING	0	0	0	0

2011 - Chemical Use by Wester Ross Fisheries:

Site Name	Site ID	SEPA Team Area	Excis (litres)	Cypermethrin (kgs) Threshold = 0.005kg	Salmosan (grams)	Azamethiphos (kgs) Threshold = 0.001kg	Calicide (grams)	Teflubenzuron (kgs) Threshold = 0.001kg	Slice (grams)	Emamectin salts and derivatives (kg) Threshold = 0.001kg
Isle Martin, Ardmair Bay	KAN2	DING	0	0	9960	4.98	14000	14	140996	0.281992
River Kanaird, Ardmair Bay	KAN1	DING	0	0	0	0	0	0	0	0
Loch Broom (Corry1&2)	BRO1	DING	0	0	5040	2.52	0	0	44432	0.088864
Ardessie Site A	LIT1	DING	0	0	240	0.12	0	0	21382	0.042764
Ardessie Site B	LIT2	DING	0	0	2040	1.02	0	0	45086	0.090172

Also included 26235 litres of Hydrogen Peroxide

2010 - Chemical Use by Wester Ross Fisheries:

Site Name	Site ID	SEPA Team Area	Excis (litres)	Cypermethrin (kgs) Threshold = 0.005kg	Salmosan (grams)	Azamethiphos (kgs) Threshold = 0.001kg	Calicide (grams)	Teflubenzuron (kgs) Threshold = 0.001kg	Slice (grams)	Emamectin salts and derivatives (kg) Threshold = 0.001kg
Isle Martin, Ardmair Bay	KAN2	DING	0	0	3180	1.59	0	0	0	0
River Kanaird, Ardmair Bay	KAN1	DING	0	0	0	0	0	0	0	0
Loch Broom (Corry1&2)	BRO1	DING	0	0	4500	2.25	0	0	175392	0.350784
Ardessie Site A	LIT1	DING	0	0	0	0	0	0	0	0
Ardessie Site B	LIT2	DING	0	0	600	0.3	0	0	83815	0.16763

2009 - Chemical Use by Wester Ross Fisheries:

Site Name	Site ID	SEPA Team Area	Excis (litres)	Cypermethrin (kgs) Threshold = 0.05kg	Salmosan (grams)	Azamethiphos (kgs) Threshold = 0.001kg	Calicide (grams)	Teflubenzuron (kgs) Threshold = 0.001kg	Slice (grams)	Emamectin salts and derivatives (kg) Threshold = 0.001kg
Isle Martin, Ardmair Bay	KAN2	DING	0	0	8920	4.46	0	0	0	0
River Kanaird, Ardmair Bay	KAN1	DING	0	0	0	0	0	0	0	0
Loch Broom (Corry1&2)	BRO1	DING	0	0	900	0.45	0	0	0	0
Ardessie Site A	LIT1	DING	0	0	0	0	0	0	0	0
Ardessie Site B	LIT2	DING	0	0	1080	0.54	0	0	0	0

Data obtained from SEPA via FOI in May 2013 reveals that Wester Ross is one of only four companies using Teflubenzuron in 2012 and the first quarter of 2013 and accounted for two out of only thirteen cases.

1	Company	Consent	Month	Teflubenzuron (g)
2	Scottish Sea Farms Ltd	CAR/L/1004988	Jul-12	90000
3	Scottish Sea Farms Ltd	CAR/L/1004988	Dec-12	59999
4	Loch Duart Ltd	CAR/L/1001808	May-12	14280
5	Loch Duart Ltd	CAR/L/1003895	May-12	14280
6	Loch Duart Ltd	CAR/L/1003895	Nov-12	11250
7	Loch Duart Ltd	CAR/L/1001808	Nov-12	10500
8	Loch Duart Ltd	CAR/L/1001832	Nov-12	9200
9	Wester Ross Fisheries Ltd	CAR/L/1003889	Feb-13	7747
10	Loch Duart Ltd	CAR/L/1001826	Nov-12	5820
11	Wester Ross Fisheries Ltd	CAR/L/1003889	Dec-12	5323
12	Loch Duart Ltd	CAR/L/1001832	May-12	4050
13	Marine Harvest (Scotland) Ltd	CAR/L/1002346	Jul-12	95

In fact, the above data shows that Wester Ross's site in Loch Kanaird used a further 7747g of Teflubenzuron in February 2013.

Further data obtained by SEPA in May 2013 reveals the following chemical use (and mortalities) at all active Wester Ross Fisheries sites during 2012 and the first quarter of 2013 - including use of Teflubenzuron, Emamectin benzoate and Deltamethrin:

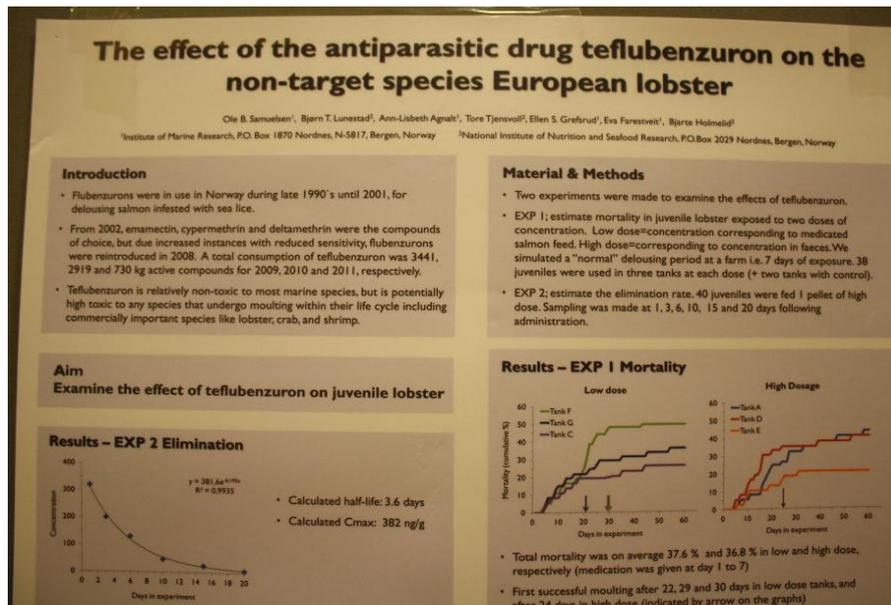
Site ID	Site Name	Month	Mortalities (Fish)	Teflubenzuron (g)	Emamectin Benzoate (g)	Deltamethrin (g)
BRO1	Corry, Loch Broom	Jan-12	505	0	0	0
BRO1	Corry, Loch Broom	Feb-12	171	0	0	0
BRO1	Corry, Loch Broom	Mar-12	442	0	0	0
BRO1	Corry, Loch Broom	Apr-12	428	0	0	0
BRO1	Corry, Loch Broom	May-12	527	0	120.992	0
BRO1	Corry, Loch Broom	Jun-12	299	0	0	0
BRO1	Corry, Loch Broom	Jul-12	132	0	347.75	0
BRO1	Corry, Loch Broom	Aug-12	103	0	0	0
BRO1	Corry, Loch Broom	Sep-12	142	0	0	0
BRO1	Corry, Loch Broom	Oct-12	1359	0	0	37.8
BRO1	Corry, Loch Broom	Nov-12	336	0	0	1.4
BRO1	Corry, Loch Broom	Dec-12	1979	0	0	0
BRO1	Corry, Loch Broom	Jan-13	0	0	0	0
BRO1	Corry, Loch Broom	Feb-13	0	0	0	36.4
BRO1	Corry, Loch Broom	Mar-13	0	0	0	30.8
KAN2	Ardmair (Isle Martin)	Jan-12	823	0	0	0
KAN2	Ardmair (Isle Martin)	Feb-12	597	0	0	0
KAN2	Ardmair (Isle Martin)	Mar-12	396	0	0	0
KAN2	Ardmair (Isle Martin)	Apr-12	547	0	0	13.5
KAN2	Ardmair (Isle Martin)	May-12	605	0	0	0
KAN2	Ardmair (Isle Martin)	Jun-12	137	0	0	0
KAN2	Ardmair (Isle Martin)	Jul-12	215	0	0	0
KAN2	Ardmair (Isle Martin)	Aug-12	119	0	0	0
KAN2	Ardmair (Isle Martin)	Sep-12	0	0	0	0
KAN2	Ardmair (Isle Martin)	Oct-12	783	0	0	0
KAN2	Ardmair (Isle Martin)	Nov-12	1545	0	0	0

KAN2	Ardmair (Isle Martin)	Dec-12	115	5323	0	0
KAN2	Ardmair (Isle Martin)	Jan-13	0	0	0	0
KAN2	Ardmair (Isle Martin)	Feb-13	0	7747	0	0
KAN2	Ardmair (Isle Martin)	Mar-13	0	0	60.978	0
LIT1	Ardessie A	Jan-12	8	0	0	3.72
LIT1	Ardessie A	Feb-12	2	0	0	0
LIT1	Ardessie A	Mar-12	0	0	0	0
LIT1	Ardessie A	Apr-12	2	0	0	0
LIT1	Ardessie A	May-12	107	0	0	0
LIT1	Ardessie A	Jun-12	94	0	0	0
LIT1	Ardessie A	Jul-12	99	0	0	0
LIT1	Ardessie A	Aug-12	165	0	0	0
LIT1	Ardessie A	Sep-12	238	0	0	0
LIT1	Ardessie A	Oct-12	8	0	0	2.48
LIT1	Ardessie A	Nov-12	0	0	0	0
LIT1	Ardessie A	Dec-12	0	0	0	0
LIT1	Ardessie A	Jan-13	0	0	0	0
LIT1	Ardessie A	Feb-13	0	0	0	0
LIT1	Ardessie A	Mar-13	0	0	0	0
LIT2	Ardessie B	Jan-12	22	0	0	3.72
LIT2	Ardessie B	Feb-12	60	0	0	0
LIT2	Ardessie B	Mar-12	10	0	0	0
LIT2	Ardessie B	Apr-12	0	0	0	0
LIT2	Ardessie B	May-12	339	0	0	0
LIT2	Ardessie B	Jun-12	252	0	0	0
LIT2	Ardessie B	Jul-12	267	0	0	0
LIT2	Ardessie B	Aug-12	321	0	0	0
LIT2	Ardessie B	Sep-12	903	0	0	0
LIT2	Ardessie B	Oct-12	317	0	0	9.92
LIT2	Ardessie B	Nov-12	223	0	0	0
LIT2	Ardessie B	Dec-12	364	0	0	0
LIT2	Ardessie B	Jan-13	0	0	0	2.48
LIT2	Ardessie B	Feb-13	0	0	0	0
LIT2	Ardessie B	Mar-13	0	0	0	0

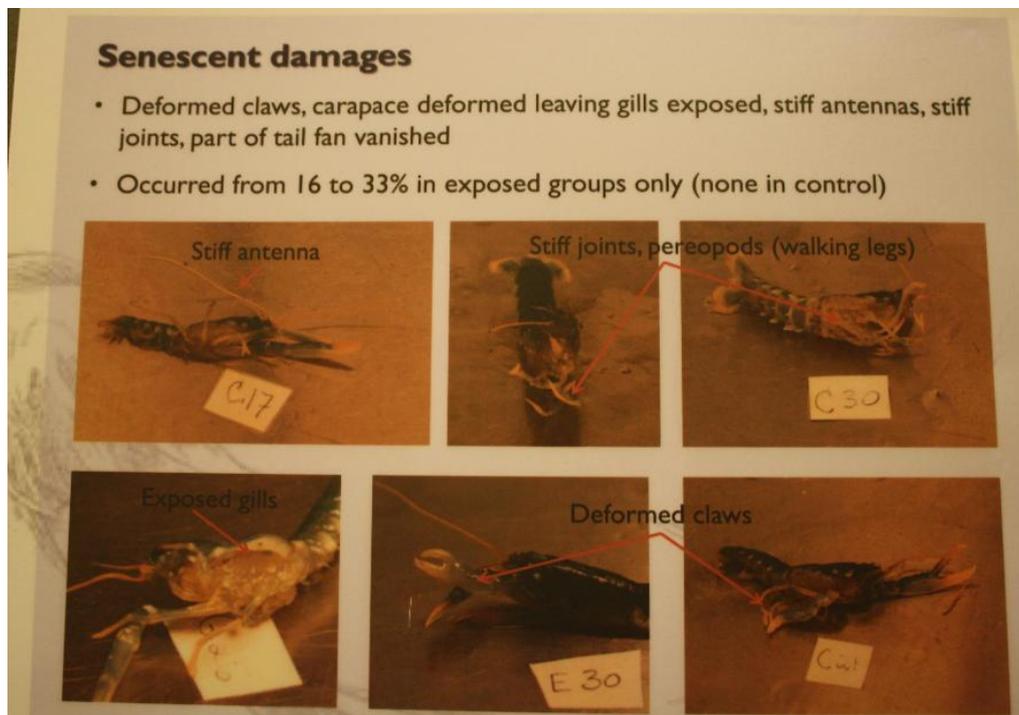
Data for the second quarter of 2013 will be requested and should also be available to Highland Council via a FOI request to SEPA and a search of the '[Scottish Pollutant Release Inventory](#)'.

Scientific research has shown that [Azamethiphos](#) and [Cypermethrin](#) are lethal to lobsters and [Emamectin benzoate](#) can induce premature moulting in lobsters. [Deltamethrin](#) is also lethal to both shrimp and lobsters.

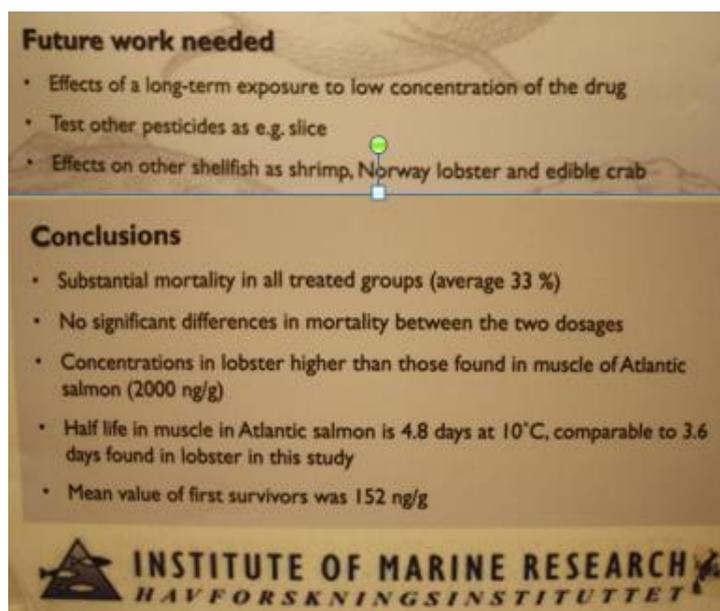
Highland Council ought also to be aware of new scientific research detailing the impact of Teflubenzuron on lobsters (read more details via '[Media Backgrounder: Chemical Culture in Scotland](#)'). Scientific research presented at the [Sea Lice 2012](#) conference in Norway in May revealed that Teflubenzuron killed lobsters.



The research led by [Dr. Ole Samuelson](#) at the Institute of Marine Research in Bergen showed that Teflubenzuron “is potentially high toxic to any species that undergo moulting within their life cycle including commercially important species like lobster, crab and shrimp.” Teflubenzuron killed over a third of lobsters tested – at both high and low doses. Teflubenzuron was so toxic it could premature ageing in lobsters including deformities in the claws and carapace with tail damage:



Further work was recommended to test the effects on other shellfish species such as shrimp and crab – and other chemicals such as SLICE (Emamectin benzoate):



Download the poster presentation in full [online here](#)

In January 2013, the Norwegian Government's Climate & Pollution Agency [reported](#) that Teflubenzuron concentrations near salmon farms "could be harmful to crustaceans such as crabs and shrimp up to a mile away from the fishery". Detectable concentrations of Teflubenzuron were measured in sediment, particulates, amphipods, brown crab, blue mussel and shrimp where sea lice treatment had occurred. The report concluded:

6. Conclusions

Diflubenzuron and teflubenzuron were detected in particle, water, sediment and biota samples collected from around selected fish farms known to have used these chemicals for sea lice control.

The levels of teflubenzuron detected in sediments at certain locations are sufficiently high to exceed UK environmental quality standards and thus be of potential risk to sediment dwelling organisms. It was not possible to evaluate the risks associated with the levels of diflubenzuron detected due to a lack of pertinent ecotoxicity data.

The dissolved levels of diflubenzuron detected in water samples collected at the farms, and up to 1 km away, are also sufficiently high to exceed UK environmental quality standards and pose a risk to aquatic organisms. There is also some risk to aquatic organisms from dissolved concentrations of teflubenzuron.

The levels of both chitin inhibitors in shrimp and crab suggest that shrimp, crab and other moulting species are at potential risk at specific locations where the chemicals are being used.

Read the report in full [online here](#)

"Pesticides killed my business" reported [The Sunday Herald](#) in 2011 following reports by SEPA of chemical contamination near salmon farms: "I'm convinced that the prawns were killed by the chemicals used by fish farmers to treat sea lice," said

creel fisherman Donald Macleod. "There's hardly any prawns to be found in Loch Shell any more unless you go some distance from the salmon cages, he claims," continued The Sunday Herald. "And prawns aren't that different from the sea lice that the chemicals are designed to kill."

The Guardian subsequently [reported](#) earlier this month: "Sampling tests around salmon cages on Loch Shell in the Outer Hebrides by the Scottish Environment Protection Agency (Sepa) found that levels of [Teflubenzuron](#), used to kill sea lice parasites which affect hundreds of thousands of caged fish each year, were up to 450 times higher than recommended levels. The agency could now cut back Marine Harvest's operations on Loch Shell where the firm has three fish farms, including one which was already under Sepa investigation, after it launched a review of its operations there."

Read more on the shocking rise in the use of chemicals on Scottish salmon farms via ["Scottish fish farmers use record amounts of parasite pesticides"](#) and ["Chemicals to control salmon parasites"](#).

The use of Teflubenzuron in Scotland has also attracted controversy for over a decade. A critical review written by 'Deep Trout' in 2000 pointed out that: "the manufacturers state that teflubenzuron is: 1. Dangerous for the environment; 2. Very toxic to aquatic organisms; 3. May cause adverse long term effects in the environment" (read more via ['Calicide - a critique of its proposed licence by SEPA as a sea lice control agent in salmonid aquaculture'](#)).

The Sunday Herald also reported in 2001: "A controversial pesticide approved for use on 61 salmon farms in Scotland is classed as a highly toxic marine pollutant and can still be found in sediment on the sea bed nearly two years after use, according to documents revealed this week. The previously unpublished reports also reveal that the chemical teflubenzuron - administered to fish in a coating on their feed - is hugely inefficient, with as little as 5% being absorbed by the fish. The remaining 95% is excreted straight into the sea. Teflubenzuron, marketed under the name Calicide by aquaculture company Nutreco, was approved for use in 1998 by the Scottish Environment Protection Agency" (read more via ["'Dynamite' report reveals fish pollution"](#) and ["Shellfish at risk from sea louse 'cure'"](#)).

A report - ["Ecological effects of sea lice medicines in Scottish sea lochs"](#) - published by the Scottish Association of Marine Science in 2005 stated that Teflubenzuron was "highly toxic to aquatic crustacean invertebrates". The project, however, was [blocked](#) by salmon farming companies who refused to co-operate with the scientific research. New Scientist [reported](#) in 2002 on "the possibility of a large-scale effect that may be related to the use of chemicals on the fish farms."

The Sunday Herald reported in 2007: "Salmon farmers are again using a toxic pesticide years after it was thought to have been phased out. The chemical, teflubenzuron, known commercially as Calicide, is given to salmon to kill sea lice

parasites. A 1999 report by the Scottish Environment Protection Agency (Sepa) found teflubenzuron to be "potentially highly toxic to any species which undergo moulting within their life cycle. This will therefore include some commercially important marine animals such as lobster, crab, shrimp and some zooplankton species." Safety reports commissioned by the manufacturer, Nutreco, revealed Calicide can still be found in sediment on the sea bed nearly two years after use" (read more via "[Toxic pesticide again in use on salmon farms](#)").

Has Highland Council considered the ecological and economic impact of Teflubenzuron contamination on shellfish populations in Loch Kanaird?

4) Sea-Bed Contamination

The sea lice problem is clearly out of control as is the overuse of chemicals due to sea lice resistance and now resulting in "[super lice](#)". Given the increase in the use of toxic chemicals and their persistent nature it is sadly not surprising that testing by [SEPA](#) has revealed chemical contamination of the seafloor under salmon farms.

For more information from SEPA read the following survey reports: "The Occurrence of Chemicals used in Sea Lice Treatments In Sediments Adjacent to Marine Fish Farms"

[Results of Screening Surveys During 2009](#) 📄(459k)

[Results of Screening Surveys During 2008](#) 📄(557k)

[Results of Screening Surveys During 2006](#) 📄(260k)

[Results of Screening Surveys During 2005](#) 📄(597k)

[Results of Screening Surveys During 2004](#) 📄(124k)

[Results of Screening Surveys During 2003](#) 📄(191k)

Available online via SEPA's [web-site](#)

Based on the information above, the Sunday Herald detailed "[The Lochs Contaminated by Pesticides](#)" in 2011 - including Loch Kanaird, Loch Ewe and the Summer Isles in Wester Ross:

Loch Linnhe, Fort William: teflubenzuron and emamectin

Loch Ewe, Poolewe: diflubenzuron and emamectin

Loch Nevis, near Mallaig: diflubenzuron and emamectin

Loch Kanaird, near Ullapool: teflubenzuron, diflubenzuron and emamectin

Summer Isles, Achiltibuie: teflubenzuron, diflubenzuron and emamectin

Loch Fyne. Lochgilphead: emamectin

Portree Bay, Skye: teflubenzuron and emamectin

Loch Slapin, Skye: teflubenzuron and emamectin

Loch na Keal, Mull: teflubenzuron and emamectin

Read more details via [“Revealed: the toxic pesticides that pollute our lochs”](#) and [“Beauty-spot Lochs Contaminated by Toxic Chemicals”](#)

A SEPA survey published in 2011 (based upon surveys in 2008) detected Teflubenzuron and Emamectin benzoate in all six areas sampled: Loch Kanaird, Summer Isles, Loch Fyne, Portree Bay, Loch Slapin and Loch na Keal. The results for Loch Kanaird included:

4 Results

4.1 Loch Kanaird

A trace amount of teflubenzuron was found in one of the replicates from each of the two sampling sites from Loch Kanaird. The average teflubenzuron concentrations for the two sampling sites were calculated as 0.45 µg/kg and 0.16 µg/kg (dry weights), respectively (full details are shown in Table 2).

Diflubenzuron was not detected in any sample replicate from site 1. However, it was detected in a single sample replicate from sample site 2 (0.95 µg/kg, dry weight). The average concentration for this substance at site 2 was thus calculated as 0.48 µg/kg (dry weight).

Emamectin benzoate was detected in all three sample replicates from site 1, yielding an average concentration of 0.28 µg/kg (wet weight). It was not detected in any sample from site 2 (Table 2).

Ivermectin was not detected in any of the samples from this loch.

Appendix 1 – Site details and locations

Table 1 - Site details

Site Name	Water	Grid Reference	Date Sampled	Sample No.
Loch Kanaird Site 1	Loch Kanaird	NH 104 995	11/06/08	981686
Loch Kanaird Site 1	Loch Kanaird	NH 104 995	11/06/08	1034942
Loch Kanaird Site 1	Loch Kanaird	NH 104 995	11/06/08	1034941
Loch Kanaird Site 2	Loch Kanaird	NH 109 993	11/06/08	1035119
Loch Kanaird Site 2	Loch Kanaird	NH 109 993	11/06/08	1035140
Loch Kanaird Site 2	Loch Kanaird	NH 109 993	11/06/08	981697

Read SEPA report in full via [Results of Screening Surveys During 2008](#)

The contamination of Loch Kanaird by Wester Ross Fisheries prompted a letter in 2011 from SEPA asking for an explanation.

Mr Hugh Richards
 Wester Ross Fisheries Ltd
 Ardmair
 Ullapool
 Ross-Shire
 IV26 2NT

If telephoning ask for:
 Lucy Gregson

7 July 2011

Dear Mr Richards

**WATER ENVIRONMENT (CONTROLLED ACTIVITIES) (SCOTLAND) REGULATIONS 2011
 SEA LOUSE CHEMICAL RESIDUE SURVEY 2008**

SEPA undertakes sampling and analysis of sediments close to marine cage fish farms in order to assess the condition of the biological communities, the chemical quality of the sediment and the concentration of sea louse chemical residues.

During 2008 SEPA sampled at a number of sites around the Scottish coast including the site at Loch Kanaird, Isle Martin operated by your company. The results of the analysis of these samples indicate that residues of Cypermethrin, Teflubenzuron and Emamectin Benzoate were detected as set out in the table below.

Site Name	Sample No.	Cypermethrin Concentration $\mu\text{g}/\text{kg}^*$	Deltamethrin Concentration $\mu\text{g}/\text{kg}^*$	Teflubenzuron Concentration $\mu\text{g}/\text{kg}^*$	Diflubenzuron Concentration $\mu\text{g}/\text{kg}^*$	Ivermectin Concentration $\mu\text{g}/\text{kg}^*$	Emamectin Concentration $\mu\text{g}/\text{kg}$ (wet wt)	Organic Carbon (%)
Loch Kanaird MCFE, CE	981686	0.18	<0.01	<0.2	<0.5	<0.2	9.02	2.49
Loch Kanaird MCFE, CE	1034942	0.41	<0.08	<0.2	<0.5	<0.2	9.11	
Loch Kanaird MCFE, CE	1034941	0.64	<0.03	1.16	<0.5	<0.2	1.43	
Average concentration		0.41	<0.04	0.38	<0.5	<0.2	6.52	

* corrected for % moisture content

At the time of sampling, although the release of Emamectin Benzoate was authorised at your farm, the use of the substance at the fish farm has resulted in concentrations of the substance in the environment in excess of the Environmental Quality Standard (EQS).

SEPA intends to publish the sea louse chemical residues survey report on its website shortly and will be in touch with your company regarding this matter in due course. In the meantime SEPA would appreciate if you are able to offer any explanation for the presence of this substance in the sediment at the above site during 2008.

Data published earlier this month by SEPA also indicate a significant problem with chemicals contaminating sediments and shellfish in the vicinity of salmon farms. The Guardian newspaper [reported](#) (10 May) that Marine Harvest breached chemicals limits by over 450 times in Loch Shell.

If a similar survey was performed in Loch Kanaird during 2013 would the results be any better? Given the high use of Teflubenzuron (Calicide) by Wester Ross Fisheries in Loch Kanaird during 2012 the continuing contamination of sediments (and shellfish) would sadly seem inevitable.

In fact, documents obtained from SEPA via FOI in April 2013 reveal ongoing contamination at Ardmair. Testing by SEPA in 2011 detected Teflubenzuron (Calicide) in sediments at concentrations 220 times higher than the EQS (Environmental Quality Standard)!

From: Mackenzie, Morag
Sent: 16 November 2011 14:07
To: Gregson, Lucy
Subject: WRS calicide residues

Attachments: 110724-HR-CalicideResidues.txt; WRF Calicide sampling Ardmair April 2011.doc; ffm_anx_A.pdf

Hi Lucy

These are the Calicide residue results sent in by Hugh in July.

The results are reported in mg/kg

Steel group	cage edge	100m
a	2000	440
b	2600	20
c	6100	30

Teflubenzuron EQS:-
near field: 10000µg/kg
far field: 2µg/kg

The steel group results exceed the far-field EQS.

Highland Council and SEPA should surely investigate benthic and shellfish contamination of Loch Kanaird as a matter of urgency.

“Are we sure that these residues are having no effect on local populations of other crustaceans, such as prawns and lobsters, upon which many inshore fishermen rely for their livelihoods?” [reported](#) The Sunday Herald in 2011 (read more details via [“Revealed: the toxic pesticides that pollute our lochs”](#)).

Further information obtained from SEPA by the [Salmon & Trout Association](#) in 2012 via Freedom of Information revealed:

- The failure of fish-farmers to report to SEPA self-monitored data concerning sea-lice chemical residues in the sea-bed of Scottish sea lochs: SEPA recorded approximately 16% of fish-farms as failing to supply Slice residue data between 2005 and 2010 in accordance with regulations
- Sea-lice chemical residues in excess of Environmental Quality Standards: Approximately 13% of fish-farms reported self-monitored samples to SEPA of sea-bed residues in excess of EQS between 2005 and 2010

Read more via [“Salmon & Trout Association exposes sea-bed pollution of Scottish sea-lochs”](#)

SEPA inspections of salmon farms in Wester Ross reveal significant breaches of pollution limits. "Evidence released by SEPA also shows that pollution of the seabed underneath the three sites - Corry, Ardair and Ardessie - has been rated as "unsatisfactory" 20 times over the last ten years, and "borderline" eight times," [reported](#) The Sunday Herald in 2011.

Documents on chemical contamination of sediments were also obtained last month from SEPA including damning data on Wester Ross Fisheries. For example, the Wester Ross Fisheries salmon farm at Ardessie in Little Loch Broom was deemed "Unsatisfactory" with SEPA noting that: "It is of concern that the area of enrichment has developed after only six months of use."



MARINE FISH FARM MONITORING REPORT

REPORT FROM: MARINE SCIENCE DINGWALL
REPORT TO: OPERATIONS STAFF

SITE DETAILS

COMPANY:	Wester Ross Fisheries Ltd
LOCATION:	Ardessie A
RECEIVING WATER:	Little Loch Broom
CAGE GROUP:	
CONSENT NUMBER:	CAR/L/1003012
NGR:	NH 0466 9021
TEAM:	North Highland
SITE ID:	LIT1

SURVEY DETAILS

MONITORING METHOD:	Benthic		
SURVEY TYPE:	Self Monitoring		
SURVEY DATE:	16/09/2011		
DATE RECEIVED:	31/12/2011		
REPORT DATE:	06/02/2012		
EVALUATED BY:	MW/AP	BIOMASS:	90 (t)
SUBMISSION NO:	N 3466	MAX BIOMASS:	262 (t)

CLASSIFICATION: Unsatisfactory

Read the SEPA report in full [online here](#)

Another Wester Ross Fisheries site at Corry in Loch Broom was also classified as "Unsatisfactory" - with SEPA reporting that the site was "degraded" with "poor species richness":

MARINE FISH FARM MONITORING REPORT

SITE ID BRO1 SUBMISSION NO: N 3364

SUMMARY

Evaluated against quality criteria stated in SEPA's Fish Farm Manual Annex F according to NWM/MAR/010

The sediment at the cage edge was described as Black smelly mud with shell. No waste or fungus was noted.

The sediment at the AZE & Ref stations consisted of brown mud with shell & stones.

Biology:

There was an obvious enrichment effect at the cage edge & 51m (AZE-10) stations, which showed little similarity to the other AZE & Ref stations. These stations had poor species richness & were dominated by the enrichment polychaetes, Capitella & Malacoceros. The resulting ITI scores indicated degraded communities. The cage edge station meets SEPA's criteria within the AZE, but the 51m station fails all of SEPA's criteria outwith the AZE.

The 61m (AZE) & 71m (AZE+10m) stations had quite good species richness & diversity values. However, these too were dominated by Capitella (along with Lumbrineris), & while their ITI scores were higher than at the 51m station, they still indicated degraded communities. These stations met 2 & failed 2 of SEPA's criteria outwith the AZE.

Due to the presence of enrichment at the AZE stations, this survey is classed as unsatisfactory based on the faunal data.

Read the SEPA report in full [online here](#).

SEPA also wrote to Wester Ross Fisheries in June 2012 following an "Unsatisfactory" report from Ardmair Bay, Loch Kanaird.

Wester Ross Fisheries Ltd
Ardmair
Ullapool
Ross-Shire
IV26 2NT

If telephoning ask for:
Lucy Gregson

14 June 2012

FAO Hugh Richards

Dear Mr Richards,

THE WATER ENVIRONMENT (CONTROLLED ACTIVITIES) (SCOTLAND) REGULATIONS 2011

SEPA MARINE FISH FARM MONITORING REPORTS ARDMAIR (ISLE MARTIN) CAR/L/1003889

I am writing with reference to the results of analysis from SEPA's audit survey carried out at the Isle Martin, Marine Cage Fish Farm Site, Ardmair Bay. Below are the details of the survey and the classification (report enclosed):-

Site	Survey Date	Tonnage	Classification
Isle Martin Wooden Group	24/01/2012	404	Borderline
Isle Martin Steel Group	25/01/2012	230	Unsatisfactory

The enclosed survey is for information only.

SEPA await the outcome of the review that Wester Ross Fisheries Ltd has carried out and will assess revisions to existing practices and remedial measures on site proposed to reduce the benthic impacts evident.

Should you have any queries on this matter, please do not hesitate to contact me at the Dingwall Office on (01349 862021).

The SEPA report dated May 2012 included:



MARINE FISH FARM MONITORING REPORT

REPORT FROM: **MARINE SCIENCE DINGWALL**
REPORT TO: **OPERATIONS STAFF**

SITE DETAILS

COMPANY:	Wester Ross Fisheries Ltd
LOCATION:	Ardmair (Isle Martin)
RECEIVING WATER:	Loch Broom
CAGE GROUP:	Steel
CONSENT NUMBER:	CAR/L/1003889
NGR:	NH 1012 9920
TEAM:	North Highland
SITE ID:	KAN2

SURVEY DETAILS

MONITORING METHOD:	Benthic		
SURVEY TYPE:	Self Monitoring		
SURVEY DATE:	25/01/2012		
DATE RECEIVED:	14/05/2012		
REPORT DATE:	28/05/2012		
EVALUATED BY:	MW/AP	BIOMASS:	230 (t)
SUBMISSION NO:	N 3524	MAX BIOMASS	1050 (t)

CLASSIFICATION: Unsatisfactory

Biology:

There was an obvious enrichment effect at the cage edge & 25mN stations, which showed little similarity to the other stations. These stations had poor species richness & diversity, & were dominated by enrichment polychaete, *Capitella*. Due to the high numbers of enrichment polychaetes, the cage edge station met SEPA's criteria within the AZE, by the 25mN station failed the criteria outwith the AZE.

Some enrichment was also evident at the 25mS station. This station was dominated by the polychaetes, *Mediomastus* & *Lumbrineris*; the resulting ITI score indicated a changed community (but very close to the degraded border). This station failed 2 of the criteria outwith the AZE (& partially failed the other 2 criteria).

The 50m stations showed signs of slight enrichment. These stations were dominated by *Lumbrineris*, *Mediomastus* & *Edwardsia*, & the ITI scores indicated changed communities (only slightly higher than 25mS station, but met the criteria outwith the AZE).

Based on the faunal data, this survey is classified as borderline/unsatisfactory.

Chemistry:

Redox potential (Eh): No surface readings were taken, readings were taken from 1 cm down to 5cm depth. This survey failed the SEPA action level for redox for values lower than -125mV in the surface sediments (0 - 3 cm). Failure occurred in the first replicates at the CE, 25m NNE, and 25m SSW stations. Values were negative from the surface down at the CE station, the 25m NNE station (1st replicate), and the 50m NNE station. Values at the remaining stations were negative with depth; the only station with positive readings throughout was at the 300m SE station (rep 2). Values were on the whole higher at the 50m SSW and 300m reference stations.

Loss on ignition (LOI)%: All stations passed the SEPA action level for LOI, however LOI was highest at the CE and 25m NNE stations at 12%. At the remaining stations, LOI ranged from 4.2% at the 300m SE rep station to 7.5 at the 50m NNE station.

Particle size analysis (PSA): According to the UKSeaMap reclassification of the Folk Triangle, the sediment was classified as mixed sediment at the CE and 300m reference stations; the coarsest sediment in this category and overall was at the 300m E station with 41% gravel. Sediment at the 25m NNE, 50m NNE and 25m SSW stations was classified as mud and sandy mud, and at the 50m SSW station was classified as sand and muddy sand although the sediment only differed to the previous three stations by containing slightly less silt and clay and slightly more sand.

Marine chemistry would classify this survey as unsatisfactory based upon the redox

Read the SEPA report in full [online here](#)

Further FOI documents on salmon farms in the Wester Ross area will be made available over the coming months. In view of the concerning reports highlighted above, Highland Council is encouraged to access specific information from SEPA on the Wester Ross Fisheries site in Loch Kanaird in particular.

5) Genetic Pollution

Genetic pollution is already pushing wild salmon to the brink of extinction. The scientific evidence detailing detrimental impacts of escaped farmed salmon on wild salmon is even more conclusive than for sea lice. A [complaint](#) filed by Guy Linley-Adams on behalf of the Rhidorroch Estate to the European Commission in 2011, included:

The impacts of salmon farming on wild salmonids

That aquaculture, more specifically the growing of farmed Atlantic salmon in floating cage farms in coastal waters on the west coast of Scotland, has had a negative impact on stocks of wild salmonid fisheries (wild Atlantic salmon and sea trout) is no longer contested, even by the Scottish Government, which concedes that "it is likely that impacts of aquaculture, and most probably the effects of sea lice and escapes of farmed fish, have contributed to the decline in stocks and may have slowed recovery of stocks in some rivers"⁵⁰.

⁵⁰ Scottish Government Marine Directorate (2008) Ad Hoc Review Group Implementation Plan for Meeting the Objectives of North Atlantic Salmon Conservation Organisation (NASCO) Resolutions and Agreements

A scientific paper published in 2003 by the Royal Society of London – "[Fitness reduction and potential extinction of wild populations of Atlantic salmon, *Salmo salar*, as a result of interactions with escaped farm salmon](#)" - detailed the "extinction vortex" precipitated by escapees.

Fitness reduction and potential extinction of wild populations of Atlantic salmon, *Salmo salar*, as a result of interactions with escaped farm salmon

Philip McGinnity¹, Paulo Prodöhl², Andy Ferguson^{2*}, Rosaleen Hynes², Niall Ó Maoiléidigh¹, Natalie Baker², Deirdre Cotter¹, Brendan O’Hea¹, Declan Cooke¹, Ger Rogan¹, John Taggart³ and Tom Cross⁴

¹*Aquaculture and Catchment Management Services, Marine Institute, Newport, Co Mayo, Ireland*

²*School of Biology and Biochemistry, Queen’s University, Belfast BT7 1NN, Northern Ireland*

³*Department of Biological and Molecular Sciences, University of Stirling, Stirling FK9 4LA, UK*

⁴*Department of Zoology and Animal Ecology, National University of Ireland, Cork, Ireland*

The high level of escapes from Atlantic salmon farms, up to two million fishes per year in the North Atlantic, has raised concern about the potential impact on wild populations. We report on a two-generation experiment examining the estimated lifetime successes, relative to wild natives, of farm, F₁ and F₂ hybrids and BC₁ backcrosses to wild and farm salmon. Offspring of farm and ‘hybrids’ (i.e. all F₁, F₂ and BC₁ groups) showed reduced survival compared with wild salmon but grew faster as juveniles and displaced wild parr, which as a group were significantly smaller. Where suitable habitat for these emigrant parr is absent, this competition would result in reduced wild smolt production. In the experimental conditions, where emigrants survived downstream, the relative estimated lifetime success ranged from 2% (farm) to 89% (BC₁ wild) of that of wild salmon, indicating additive genetic variation for survival. Wild salmon primarily returned to fresh water after one sea winter (1SW) but farm and ‘hybrids’ produced proportionately more 2SW salmon. However, lower overall survival means that this would result in reduced recruitment despite increased 2SW fecundity. We thus demonstrate that interaction of farm with wild salmon results in lowered fitness, with repeated escapes causing cumulative fitness depression and potentially an extinction vortex in vulnerable populations.

A decade later in 2013, a [report](#) from RAFTS detailed how farmed salmon genes from Norway had polluted a quarter of Scotland’s wild Atlantic salmon – in rivers across Argyll, Lochaber, Outer Hebrides, Skye, Wester Ross and West Sutherland. The genetic pollution includes the following rivers in Wester Ross:

Table 2. Sample sites with the number of individuals classified as Scottish, farmed ('Norwegian') or admixed. For admixed individuals, values in parentheses indicate if the level of admixture is significantly higher than expected by the estimated error rate.

Trust	River	Site	Scottish	Norwegian	admixed
Wester Ross	Balgy River	2006	15	3	39 (Y)
		2007	8	7	6 (Y)
	River Carron	River Lair	21	0	11 (Y)
	Loch Carron	Tullich burn	0	6	1 (N/A)
	Gruinard River	Lower river	19	0	2 (N)
		Mid river	17	0	3 (Y)
		Upper river	19	0	2 (N)
	River Kerry	Mid river	24	0	9 (Y)
	River Kishorn	Lower river	19	0	8 (Y)
	River Torridon	Mainstem	31	0	11 (Y)

As can be seen from the table above most sites had a signature of hybridization that was significantly higher than expected by chance. Across all sites, 369 out of 1472 (25.1%) individuals were identified as hybrids, which is significantly higher than that seen for the east coast 'wild' baseline. Furthermore, the three cases of putative escapees that were sampled (Loch Frisa, Loch Lochy & Tullich Burn), all but one individual were identified as pure Norwegian fish. Otherwise, very few pure Norwegian fish were identified. The 2006 samples from the Balgy showed most individuals (39 out of 57) to be admixed. However, for some of these fish, they were confirmed in the field as being farmed fish (e.g. presence of injection marks). However, it is known that some wild fish used in the hatchery broodstock were subsequently determined to be of farm origin and therefore it is possible that these escapees could have a mixed ancestry. A similar genetic signature has been found for these samples using microsatellites (Cauwelier et al., in prep, Marine Scotland Science).

Scientific references cited in the RAFTS report are available [online here](#)

WRFT [reported](#) (4 March 2013):

“For samples collected in the West of Scotland, the presence of Norwegian genetic signatures was identified from most sites. Several cases of putative direct aquaculture escapees were genetically consistent with field-based identification, including samples from the River Balgy (2006 and 2007) and the Tullich burn near

Lochcarron (2011). It was also possible to distinguish individuals of mixed ancestry versus those of either pure Scottish or Norwegian origin. For rivers sampled in Wester Ross, juvenile salmon of mixed ancestry represented the following % of the samples from respective rivers (where n = number of fish in the sample): Gruinard 2005, 15% (n=20); Kerry 2011, 27% (n=33); Torridon 2007, 26% (n=44); Kishorn 2011, 30% (n=27); and Carron [River Lair] 2011, 34% (n=32).

Concerns about the genetic impacts of escaped and deliberately released farm salmon spawning in the wild in Scotland date from the 1980s. Following a large escape of farmed salmon in Loch Eriboll in Sutherland in 1989, [Webb et al 1991](#) demonstrated spawning by escaped farmed female salmon in the nearby River Polla by identifying the artificial pigment canthaxanthin (used in salmon feed) in salmon eggs taken from redds located in the river. Subsequently canthaxanthin was found in salmon fry in many rivers in the west of Scotland in 1991 ([Webb et al 1993](#)). Within the WRFT area, canthaxanthin was found in samples of salmon fry taken from respective rivers, as follows: Gruinard, in 9.6% of sample (n=180); Kerry, 17.8% (n=45); Torridon, 11% (n=144); Elchaig, 1.9% (n=160). This study demonstrated that female farmed salmon had spawned successfully in 1990 (and noted that any contribution to spawning by escaped males would not have been detected). Between 1990 and 1995, the proportion of 'reared' salmon recorded in samples of salmon taken in nets at Red Point near Loch Gairloch varied from 14.5% to 37.5% ([Youngson et al 1992](#)). Rod catches of salmon in many Wester Ross rivers fell to their lowest levels at the end of the 1990s by which time recorded escaped farm salmon were in some years 30% more of the rod catch of salmon. For example, of just 13 salmon that were caught in the River Carron in 1999, 8 were recorded as 'escaped farm fish'.

"As many as one in four wild Atlantic salmon from Scotland has been genetically "tainted" by Norwegian fish, a study suggests," reported [The Sunday Times](#) (3 March 2013). "Analysis of almost 1,500 wild salmon from the west coast found 369 possessed genetic markers unique to the Scandinavian fish."

Read more via "['Norwegian' genes found in wild salmon populations in Wester Ross](#)" and "[Invasion of the Viking Salmon Hits Scotland!](#)"

A 2005 scientific study authored by Dr. James Butler (a former biologist with the WRFT) [detailed](#) how escapees constituted at least 27 percent of potential spawning salmon in the River Ewe in Scotland. Another scientific paper published in 2011 - "[Temporal change in genetic integrity suggests loss of local adaptation in a wild Atlantic salmon \(*Salmo salar*\) population following introgression by farmed escapees](#)" - detailed how escapees in Eastern Canada resulted "in significant alteration of the genetic integrity of the native population, including possible loss of adaptation to wild conditions".

6) Impact on Freshwater Pearl Mussels:

Not only are a number of rivers affected by the salmon farm in Loch Kanaird from reduced salmon and sea trout runs but two of these rivers are host to a surveyed population of freshwater pearl mussels with juvenile recruitment. These mussels require a healthy population of salmonids as the mussels early life stages relies on the presence of very young salmon and pure clean water.

The freshwater pearl mussel is now extinct or there is no evidence in recent juvenile recruitment in 2/3 of 155 Scottish rivers occupied 100 years ago. Most of the remaining populations have also suffered substantial declines as a result of pollution and habitat loss and salmonids in decline largely due to the sea lice infestations on the salmon farms.

Hence it is vitally important to protect the remaining populations. More information is available from [Scottish Natural Heritage](#) and via the [legal complaint](#) on behalf of the Rhidorroch Estate to the European Commission.