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Dear European Commissioner for the Environment,

Increasing Use of Toxic Chemicals on Salmon Farms

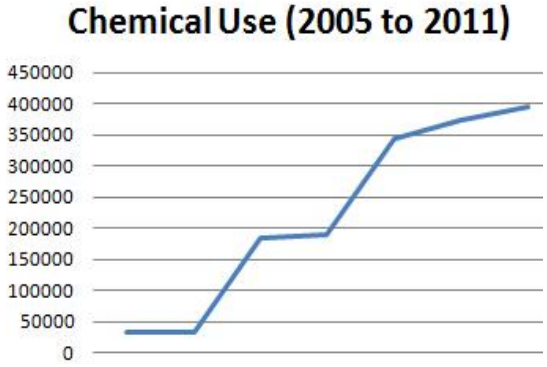
The Global Alliance Against Industrial Aquaculture (GAAIA) wishes to bring to your attention the increasing use of toxic chemicals by the salmon farming industry – including a potential breach of the EU Habitats Directive by Scotland which is permitting salmon farming companies to discharge toxic chemicals into Special Areas of Conservation.

This information has been made available online via 'FishyLeaks' and is available in full via 'Dossier of Chemical Use on Scottish Salmon Farms 2008-2011'.

Please find enclosed a formal complaint filed with the OSPAR Commission against the United Kingdom and Norway for failure to adhere to PARCOM Recommendation 94/6 on Best Environmental Practice for the Reduction of Inputs of Potentially Toxic Chemicals from Aquaculture Use (read complaint in full online here).

Since Contracting Parties ceased reporting to the OSPAR Commission (the latest data submitted was for the year 2004) there has been a twelve-fold increase in the use of toxic chemicals by salmon farms in Scotland and a staggering 34-fold increase by salmon farms in Norway. Moreover, data relating to the use of toxic chemicals in Ireland also raises alarm bells although more recent chemical use data needs to be accessed.

In Scotland, data obtained from the Scottish Environment Protection Agency reveals that the alarming rise in chemical use from 2008 to 2011 is five times more than the percentage increase in salmon farming production: Whilst Scottish farmed salmon production steadily increased by 22% between 2008 and 2011 (up from 128,606 tonnes to 157,385 tonnes) the use of toxic chemicals increased by a shocking 110% - more than doubling from 188076g to 394631g). Using data back to 2005 the increase in the use of chemicals is a staggering 1094% - a twelve-fold increase up from 33060g in 2005 to 394631g in 2011. That's over fifty times the percentage increase in Scottish farmed salmon production (which rose 21%)!



The use of toxic chemicals includes the following discharges into Loch Laxford Special Area of Conservation by Loch Duart:

Azamethiphos (g):

Site Name	Company	Month	Azamethiphos (g)
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Jan-09	1300
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	May-11	1050
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Jul-11	1050
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Feb-09	700
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Aug-11	550
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Jun-11	350
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Sep-11	1000
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Oct-10	600
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	May-11	600
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Jul-11	500
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Aug-11	500
Foindle East (Laxford Site 1)	Loch Duart Ltd	Oct-10	600
Foindle East (Laxford Site 1)	Loch Duart Ltd	Sep-11	350
Foindle East (Laxford Site 1)	Loch Duart Ltd	May-11	250
Foindle East (Laxford Site 1)	Loch Duart Ltd	Jun-11	250
Foindle East (Laxford Site 1)	Loch Duart Ltd	Aug-11	250
Foindle East (Laxford Site 1)	Loch Duart Ltd	Jan-09	200
Foindle East (Laxford Site 1)	Loch Duart Ltd	Jul-11	150

Emamectin benzoate (g):

Site Name	Company	Month	Emamectin Benzoate (g)
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Aug-11	157.5
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Mar-11	146.698
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Aug-08	137.64
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Apr-08	130.51
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Jan-08	85.684
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Jul-11	164.5
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Jan-08	151.996
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Mar-11	147.342
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Apr-08	135.004
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Sep-10	59.42
Foindle East (Laxford Site 1)	Loch Duart Ltd	Aug-11	164
Foindle East (Laxford Site 1)	Loch Duart Ltd	Apr-08	140.762
Foindle East (Laxford Site 1)	Loch Duart Ltd	Aug-08	133.302
Foindle East (Laxford Site 1)	Loch Duart Ltd	Jan-08	91.2
Foindle East (Laxford Site 1)	Loch Duart Ltd	Mar-11	86.148
Foindle East (Laxford Site 1)	Loch Duart Ltd	Sep-10	57

Deltamethrin (g):

Site Name	Company	Month	Deltamethrin (g)
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Oct-08	30
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Sep-08	27.5
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Dec-08	25
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Jul-11	21
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Apr-09	11.25
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Aug-11	11
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Sep-08	25
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Sep-11	20
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Jul-11	10
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Aug-11	10
Foindle East (Laxford Site 1)	Loch Duart Ltd	Oct-08	30
Foindle East (Laxford Site 1)	Loch Duart Ltd	Sep-08	22.5
Foindle East (Laxford Site 1)	Loch Duart Ltd	Dec-08	15
Foindle East (Laxford Site 1)	Loch Duart Ltd	Sep-11	7
Foindle East (Laxford Site 1)	Loch Duart Ltd	Aug-11	5
Foindle East (Laxford Site 1)	Loch Duart Ltd	Jul-11	3

Cypermethrin (g):

Foindle East (Laxford Site 1)	Loch Duart Ltd	Jan-08	60
Foindle East (Laxford Site 1)	Loch Duart Ltd	Apr-08	60
Foindle East (Laxford Site 1)	Loch Duart Ltd	May-08	60
Foindle East (Laxford Site 1)	Loch Duart Ltd	Jul-08	55
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Jan-08	65
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Apr-08	65
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	Jul-08	65
Eilean a Mhadaidh (Laxford Site 2)	Loch Duart Ltd	May-08	60
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Jan-08	70
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	May-08	67
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Apr-08	45
Eilean Ard (Laxford Site 3)	Loch Duart Ltd	Jul-08	45

Teflubenzuron (g):

Foindle East (Laxford Site 1)	Loch Duart Ltd	Dec-11	5250

Read about Loch Duart's use of chemicals online here

A similar exercise could be conducted for Loch Roag Lagoons Special Area of Conservation. However, there are so many salmon farms and so much use of toxic chemicals that it would take up too much space to list here. You can read all the data online via 'Dossier of Chemical Use on Scottish Salmon Farms 2008-2011' and via FishyLeaks. And obviously the Scottish Government can assist you in listing all the salmon farms which discharge toxic chemicals into Loch Roag Lagoons Special Area of Conservation – and other SAC's including the Firth of Lorn, Loch Creran and Lochs Duich, Long & Alsh Reefs.

Scottish Natural Heritage has expressed concern over the use of toxic chemicals by salmon farms within or near SACs. For example, an objection filed by Scottish Natural Heritage in 2011 against a salmon farm in Seil Sound included:

"1 Position Statement
We advise Argyll and Bute Council that this proposal will have a likely significant effect on the qualifying interest of the Firth of Lorn Special Area of Conservation (SAC). We therefore recommend that Argyll and Bute Council undertakes an appropriate assessment (AA) for the proposal in view of the site's conservation objectives. This assessment should be based on an appraisal of the following:

a) The transport of organic waste by tidal currents from the proposed development site to its eventual resting place or area of dispersal and therefore its effect on the interest of the Firth of Lorn SAC
b) The transport of chemo-therapeutants by tidal currents from the proposed development site to their eventual resting place and therefore any resulting effect on the interest of the Firth of Lorn SAC"

Read more details via "Will wildlife have to pay the price for salmon farming?"

Sea lice resistance means that the lethal chemical cocktail includes five toxic pesticides. Almost twice every day for the last four years (2008-2011), toxic chemicals were used on salmon farms in Scotland. Chemicals were used 2,756 times including Emamectin (1,028); Deltamethrin (914); Azamethiphos (487); Cypermethrin (315) and Teflubenzuron (12). Site-specific data is not yet available for Norway or Ireland but could be accessed by the European Commission. In view of the alarming data for Scotland, GAAIA encourages DG Environment to demand the information for other countries.

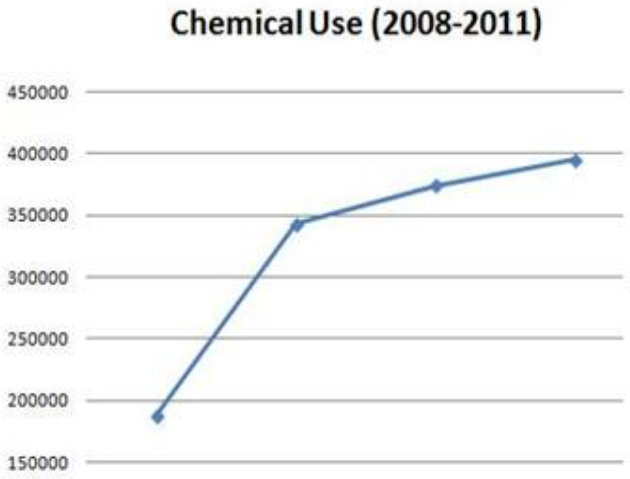
The following data (2005-2009) was obtained from Marine Scotland:

PESTICIDE Trade Name (active ingredient)	2005 Amount Reported (kg)	2006 Amount Reported (kg)	2007 Amount Reported (kg)	2008 Amount Reported (kg)	2009 Amount Reported (kg)
Alpha Max (Deltamethrin)	0	0	0	0	13.2
Calicide (Teflubenzuron)	0	0	84.7	0	61.8
SLICE (Emamectim Benzoate)	28.6	22.1	61.8	63.5	51.8
EXCIS (Cypermethrin)	4.46	9.08	37.8	21.4	11.9
SALMOSAN (Azamethiphos)	0	0	0	100	203
TOTAL PRODUCTION (TONNES)	129,588	131,847	129,930	128,606	144,247

And data obtained from the Scottish Environment Protection Agency reveals that chemical use increased further in both 2010 and 2011 (read more via 'FishyLeaks'):

Total chemical use (Cypermethrin, Azamethiphos, Teflubenzuron, Emamectin benzoate & Deltamethrin) on Scottish salmon farms increased by 110% between 2008 and 2011

2008: 188076.07g
2009: 342847.8462g
2010: 373757.8495g
2011: 394630.5414g



Read the Scottish data obtained from the Scottish Environment Protection Agency in full via online here and a summary via 'Dossier of Chemical Use on Scottish Salmon Farms 2008-2011'

In Norway, official figures published by the Government in cooperation with the industry reveal that the use of Teflubenzuron, Diflubenzuron and Azamethiphos in Norwegian salmon farming sky-rocketed in 2009 due to sea lice resistance (read online here).

Tabell 2. Midler mot lakselus (kg aktiv substans)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
azametifos							66	1884[1)]	3346	2437
cypermetrin	62	59	55	45	49	30	32	88	107	48
deltametrin	23	16	17	16	23	29	39	62	61	54
diflubenzuron	-	-	-	-	-	-	-	1413	1839	704
emamektin	20	23	32	39	60	73	81	41	22	105
teflubenzuron	-	-	-	-	-	-	-	2028	1080	26
Totalt	**105**	**98**	**104**	**100**	**132**	**132**	**218**	**5516**	**6454**	**3374**
hydrogen-peroksid (tonn)								308	3071	3144[2)]

Despite such increases in the use of toxic chemicals, there is a lack of reporting. According to the OSPAR Commission's 'Hazardous Substance Series' report (2006): "Overview assessment: Implementation of PARCOM Recommendation 94/6 on Best Environmental Practice (BEP) for the Reduction of Inputs of Potentially Toxic Chemicals from Aquaculture Use":

"OSPAR 2006 agreed that, for the time being, implementation reporting on PARCOM Recommendation 94/6 could cease for all Contracting Parties, but that if there were significant developments in the aquaculture industry in the future, the need for implementation reporting should be revisited" (download report in full online here).

The OSPAR report also identifies EC legislation relevant to the control of hazardous substances used in aquaculture:

1.2 EC legislation

There are a number of instruments of the European Community and the European Economic Area that are relevant to the control of hazardous substances used in aquaculture (as antifouling, biocides or veterinary medicines) and which apply to all OSPAR Contracting Parties relevant to mariculture. This includes for example:

a. the Biocides Directive (Directive 98/8/EC): it provides for approval systems for the use of chemicals as biocides;

b. the Directive of Veterinary Preparations (Directive 2001/82/EC): it provides for approval systems for the use of drugs;

c. Commission Directive 2002/62/EC which bans the use of TBT as an antifouling agent on cages, floats, nets and other appliances and equipment used for fish or shellfish farming,

d. the Sixth EU Framework Programme for Fisheries and Aquaculture which provides for a project on "Collective Research on Aquaculture Biofouling (CRAB)";

e. other EU legislation on chemicals, such as the existing chemicals legislation.

Has the situation changed since 2006? Are other EC instruments available to tackle the alarming increase use in toxic chemicals on salmon farms?

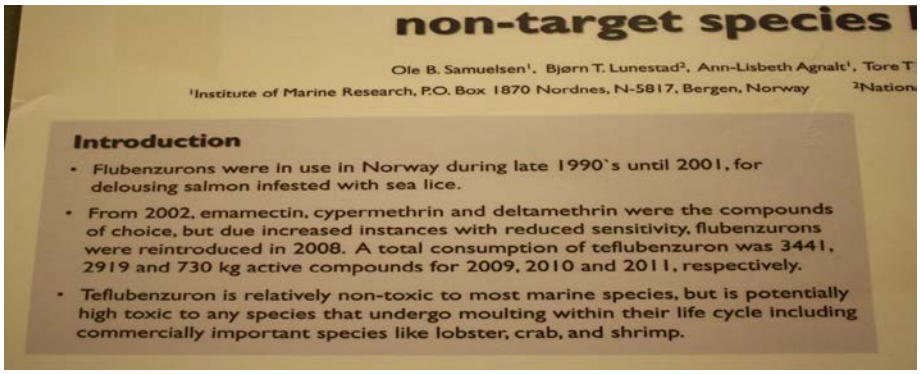
GAAIA's complaint to OSPAR concludes:

"In conclusion, the evidence presented here clearly illustrates that the decision to cease reporting was abused by the UK and Norway who have polluted with impunity ever since. Both the United Kingdom and Norway have flagrantly breached PARCOM Recommendation 94/6 on Best Environmental Practice for the Reduction of Inputs of Potentially Toxic Chemicals from Aquaculture Use. The Global Alliance Against Industrial Aquaculture (GAAIA) urges the OSPAR Commission to re-institute reporting of chemical use on salmon farms and to implement measures to reduce chemical use. Please send a signal to the UK and Norway that increasing use and discharge of toxic chemicals will no longer be tolerated by the international community."

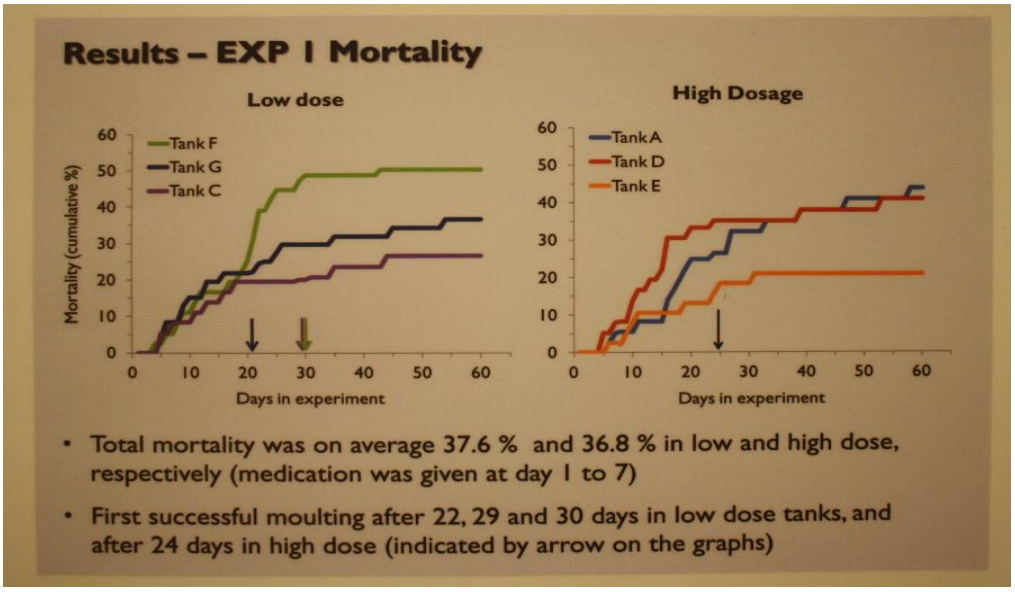
Deltamethrin, Cypermethrin, Emamectin, Teflubenzuron and Azamethiphos are designed to kill sea lice (which are members of the crustacean family) but scientific papers also show lethal consequences for other crustaceans such as lobsters and shrimp. Scientific research has shown that Azamethiphos and Cypermethrin are lethal to lobsters and Emamectin benzoate can induce premature moulting in lobsters. Deltamethrin is also lethal to both shrimp and

lobsters. For more background on the toxic chemicals used on salmon farms via 'Silent Spring of the Sea' – more details online here

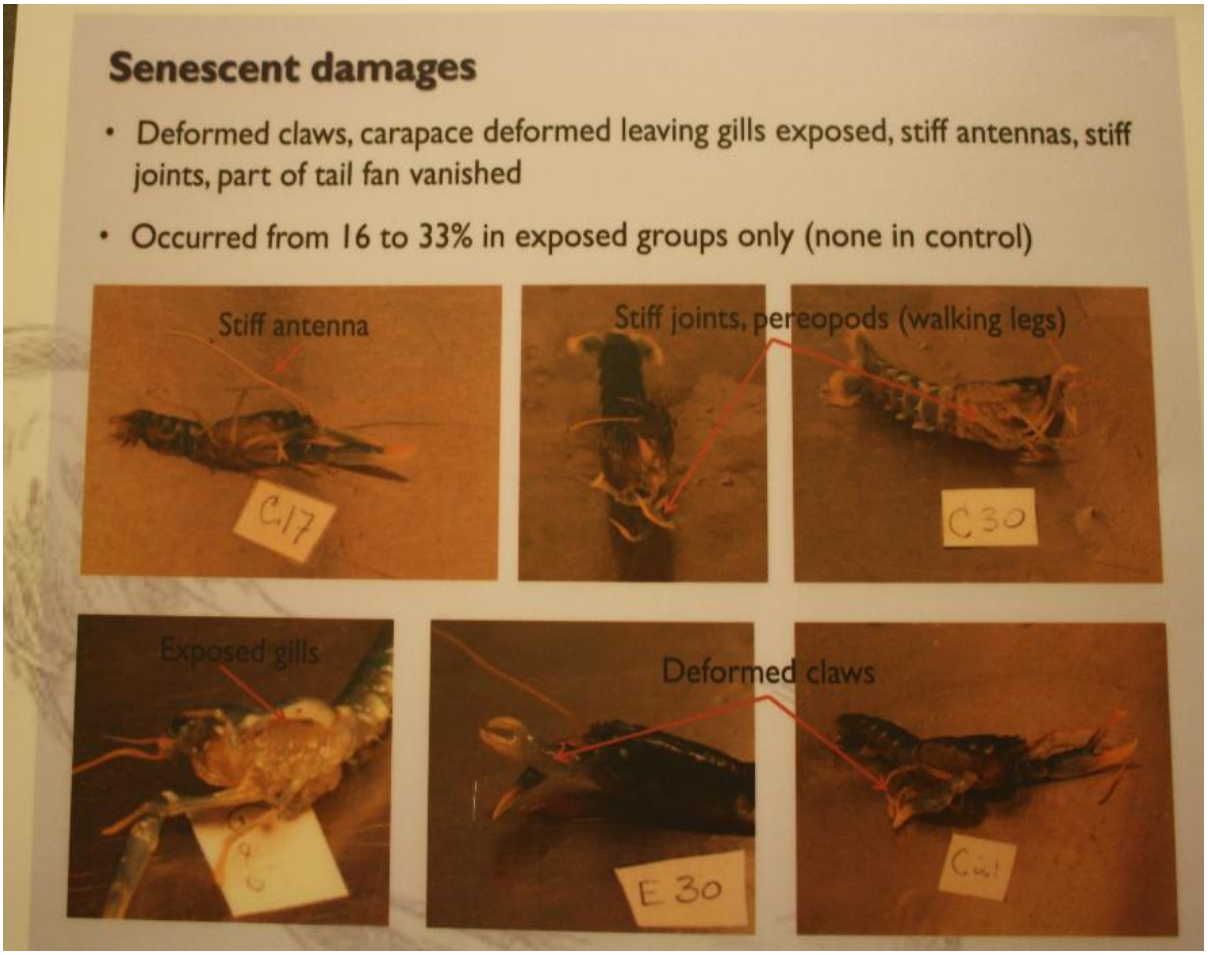
Scientific research presented at the Sea Lice 2012 conference in Norway in May revealed that Teflubenzuron killed lobsters. The research led by Dr .Ole Samuelsen at the Institute of Marine Research in Bergen showed that Teflubenzuron "is potentially high toxic to any species that undergo moulting within 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:



Download the poster presentation in full online here

Further information is available (in Norwegian via): Samuelsen, Ole Bent, Arne Ervik og Frank Nilsen (2009): Bruk av flubenzuroner i lakseoppdrett: En evaluering.

The Green Warriors of Norway have warned about the use of Teflubenzuron since the 1990s. In Norway, there was a deal signed in 1999 by the salmon farmers and Norwegian Government pledging not to use Teflubenzuron (due to concerns that it was carcinogenic). However, in 2009 the Norwegian Minister of Fisheries (herself a salmon farm owner) broke the deal (read more details via a report from the Green Warriors of Norway – online here).

The use of Teflubenzuron in Scotland has 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").

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. The latest SEPA survey published in 2011 detected Teflubenzuron in Loch Linnhe with Diflubenzuron detected in Loch Ewe and Loch Nevis. Another SEPA survey published in 2011 detected Teflubenzuron and Emamectin benzoate in all six areas sampled: Loch Kanaird, Summer Isles, Loch Fyne, Portree Bay, Loch Slapin and Loch na Keal.

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:

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"

Further information in relation to Scotland is detailed in a letters to SEPA – online here – and to Scottish Natural Heritage – online here

In Irish salmon farming there are also concerns regarding the use of toxic chemicals. A Parliamentary Answer in Ireland in 2006 stated:

"**5. The amount of emamectin benzoate, cypermethrin and teflubenzuron used on salmon farms**
In relation to the use of sea lice treatments Teflubenzuron is not used. There are three licensed treatments which are used. These are SLICE, EXCIS and ALPHAMAX. The Department or its agencies do not have data on the quantities used, that is a matter for the prescribing vets."

However, a report - "Dangerous Substance Usage in Finfish Aquaculture" – published by Ireland's Marine Institute in 2006 included some data:

> Overall use of sea lice treatments as volume active ingredient during the 2004-2006 period were:
>
> Teflubenzuron > Emamectin > Cypermethrin > Deltamethrin
>
> However, that hides the changing usage pattern over the 3 years with teflubenzuron only becoming available in 2006 and deltamethrin in 2005. The use of cypermethrin has greatly diminished as it has become less effective. In 2006 the estimated quantities of sea lice active ingredient were:
>
> Teflubenzuron(177kg)>> Emamectin(6.4kg) > Deltamethrin(3.26L) >> Cypermethrin(0.04L)

Further information in the report detailed the following data:

Table 5: Percentage active ingredients and quantities of medicines used in finfish aquaculture in Ireland 2004 – 2006 (AR 16 – exceptional temporary license issued by Dept. of Agriculture, cascade – refers to process veterinarians may use under the Animal Remedies Regulations 2005 where there is no authorised animal remedy, MA – marketing authorisation, POM – prescription only medicine, POM (E) – prescription only exempt medicine).

Medicine	Percentage Active Ingredient	Quantity '04 – '06 (litres or kg)	Quantity active '04 – '06 (l or kg)	Authorisation status*
Alphamax	1	341	3.41	AR16
Betamox LA	15	2.4	0.36	Cascade(full MA for terrestrial animals)
Ektobann	100	177	177	AR16
Excis	1	415.2	4.15	Full MA for salmon – POM (E)
Florocol	50	45	22.5	AR16 & cascade (full MA in UK)
Maracycline	100	2,465	2,465	Full MA for salmon – POM
MS 222	100	159	159	MA pending
Pyceze	50	69	34.5	Cascade (full MA in UK)
Slice	0.2	11,865	23.7	Full MA for salmon – POM
Sulfatrim	50	98	49	License expired and medicine no longer available

**The status of all medicines is subject to change but the status of listed medicines at the time of writing is given.*

Table 7: Quantities (litres or kilograms) of medicines (and active ingredients) used in finfish aquaculture in Ireland 2004 – 2006.

	Quantity of Active Ingredient					
Medicine	*2004*	*2005*	*2006*	*2004*	*2005*	*2006*
Alphamax	0	14.5	326	0	0.15	3.26
Betamox LA	0	2.4	0	0	0.36	0
Ektobann	0	0	177	0	0	177
Excis	182.8	228.8	3.6	1.83	2.29	0.04
Florocol	15	17.5	12.4	7.5	8.75	6.2
Maracycline	251.5	949	1264.5	251.5	949	1264.5
MS 222	56.7	66.9	35.2	56.7	66.9	35.2
Pyceze	16	28	25	8	14	12.5
Slice	4,169	4,500	3,193	8.34	9	6.39
Sulfatrim	67	31	0	33.5	15.5	0

Read more via "Dangerous Substance Usage in Finfish Aquaculture" (Marine Institute, 2006)

In 2008, the Pure Salmon Campaign responded to the 'Draft Programme of Measures' proposed by the Department of Agriculture, Food and Marine in Ireland. The response raised the following concerns:

"**Cypermethrin** (Excis):

The discharge of Cypermethrin by salmon farms, especially in the vicinity of wild salmon and sea trout, is of serious concern. Appendix 4 - "Dangerous Substance Usage in Finfish Aquaculture" (Report prepared by the Marine Institute for the SWRBD, March 2006) – states that:

"Cypermethrin is very toxic for fish (96-h LC50s were generally within the range of 0.4 – 2.8µg/litre in laboratory tests) and aquatic invertebrates (LC50s in the range of 0.01 - 5µg/l)".

However, the report does not cite other scientific references linking Cypermethrin to impacts on wild salmon's sense of smell and reproduction[1]. In April 2006, the UK Government announced a ban on the use of Cypermethrin as a sheep dip on sheep farms due to its impact on wild fish. Dr Andy Moore, based at Cefas' Lowestoft laboratory, said: "These chemicals are seriously toxic: one part per billion has a serious effect on fish reproduction. The chemical significantly reduces the sperm produced by the spawning male salmon, and the chances for egg survival. Such harm has serious implications for the survival of salmon, seas trout and wild brown trout populations"[2].

Scientific papers have also shown that Cypermethrin has impacts on marine plankton communities such as copepods[3] and effects on shellfish species such as mussels, lobsters and crabs[4]. A scientific study in Canada concluded that even a single cage application of Cypermethrin has the potential to create a plume of up to 1 km2 that may retain its toxicity for several hours[5].

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[1] "The effects of a synthetic pyrethroid pesticide on some aspects of reproduction in Atlantic salmon (Salmo salar L.)" (Aquatic Toxicology, March 2001): http://www.ingentaconnect.com/search/expand?pub=infobike://els/0166445x/2001/00000052/00000001/art00133&unc=
"Exposure to insecticides inhibits embryo development and emergence in Atlantic salmon (*Salmo salar* L.)" (Fish Physiology and Biochemistry, Volume 28, Numbers 1-4, 2003): http://www.ingentaconnect.com/content/klu/fish/2003/00000028/F0040001/05264623#search=%22cypermethrin%20Moore%22

[2] "Silent killer stopped by science" (CEFAS, 5th April 2006): http://www.cefas.co.uk/news/2006/news2006-04-05.htm

[3] Barata, M M et al (2004) Effects of cypermethrin on marine plankton communities: a simulated field study using mesocosms. Ecotoxicological Environmental Safety 58 (2), 236-45.
Willis, K J and Ling, N (2004) Toxicity of the aquaculture pesticide cypermethrin to planktonic marine copepods. Aquaculture Research 35, 263-270.

[4] Gowland, B et al (2002) Uptake and effects of the cypermethrin-containing sea lice treatment Excis in the marine mussel. Environmental Pollution 120 (3), 805-811.
Gowland, B et al (2002) Cypermethrin induces glutathione S-transferase activity in the shore crab. Marine Environmental Research 54 (2), 169-177.
Burridge, L E et al (2000) The lethality of the cypermethrin formulation Excis to larval and post-larval stages of the American lobster, Homarus americanus. Aquaculture 192, 37-47: http://www.scirus.com/search_simple/?query_1=cypermethrin+salmon&dsmem=on&offset=2

[5] Ernst, W et al (2001) Dispersion and toxicity to non-target aquatic organisms of pesticides used to treat sea lice on salmon in net pen enclosures. Marine Pollution Bulletin 42 (6), 433-444: http://www.elsevier.com/gej-ng/10/32/47/34/30/25/abstract.html

Based upon the scientific evidence, the discharge of such a dangerous substance near wild salmon and sea trout areas must therefore be prohibited.

Yet despite this, the report (p35) concedes that the EQS for Cypermethrin is potentially exceeded in wild fish areas:

"Typically when sea lice levels have reached a defined level, the Marine Institute will issue a direction to all farms in the bay to treat their stock with a prescribed veterinary medicine for Sea Lice. From a fish health (wild and farmed) this is the most effective method of dealing with the issue. In such situations and for a short period there exists the potential for exceeding the Environmental Quality Standard for Cypermethrein (sic)".

Whilst it is pleasing to read that "the use of cypermethrin has greatly diminished as it has become less effective" (Appendix 4, p5) what is the use in 2007 and 2008 of Cypermethrin?

From the figures listed in Appendix 4, 0.04 litres of Cypermethrin was used in 2006 with 4.15 litres used between 2004 and 2006.

Deltamethrin (Alphamax):

Concerns also exist regarding Deltamethrin – a chemical similar in toxicity to Cypermethrin.

Appendix 4 - "Dangerous Substance Usage in Finfish Aquaculture" (Report prepared by the Marine Institute for the SWRBD, March 2006) - states that Deltamethrin is "widely used in terrestrial ectoparasite control in Ireland for cattle and sheep". However, Deltamethrin (together with Cypermethrin) is classified as a 'Marine Pollutant' and hence toxic to the aquatic environment when used in salmon farming. Deltamethrin should therefore not be used in the vicinity of shellfish farms or shellfish harvesting areas:

"The product is toxic to crustaceous animals, and it is not recommended that it be used close to installations where crabs and lobsters are kept (< 200m), or where local sea currents lead to risk of exposure" (Pharmaq (2005) Alphamax Material Data Sheet. Pharmaq, 21 November 2005).

From the figures listed in Appendix 4, 3.26 litres of Deltamethrin was used in 2006 with 3.41 litres used between 2004 and 2006. Clearly, the use of Deltamethrin is increasing rapidly – what are the figures for 2007 and 2008?

And what new scientific information is available on the ecological impacts of Deltamethrin? Does Deltamethrin, like Cypermethrin, impact on Irish wild salmon and sea trout stocks for example?

In 2008, the Scottish Environment Protection Agency carried out a consultation on the use of Deltamethrin in Scottish salmon farming stating that: "The product is designed to kill small crustaceans and therefore potentially poses a risk to other types of marine creature" and that "The new product is chemically very similar to an existing medicine "Excis" based upon the active ingredient cypermethrin"[6].

[6] http://www.sepa.org.uk/consultation/closed/2008/deltamethrin/index.htm

It is clear that new scientific research on the enviromental impacts of both Cypermethrin and Deltamethrin is being conducted. Papers presented at Sea Lice 2008 in Chile in March, for example, included:

B. Martinsen: "Residues of the sea lice bath treatment deltamethrin following exposure in target and non-target species"

M.H. Medina: "Environmental hazard involved in the utilisation of cypermethrin for the control of sea lice infestations"

B. Fossum: "Monitoring environmental impact following use of the sea lice bath treatment deltamethrin"

These papers may be published later this year or in 2009 in the Journal of Fish Diseases[7].

Further information on how the Irish Government is addressing the use and discharge of Deltamethrin would therefore be much appreciated.

Emamectin benzoate (SLICE):

The use of Emamectin benzoate also warrants concern. Appendix 4 - "Dangerous Substance Usage in Finfish Aquaculture" (Report prepared by the Marine Institute for the SWRBD, March 2006) – cites a non-peer reviewed technical report from the chemical manufacturer dated in 2002:

"The available data indicate that the use of emamectin benzoate to treat lice infestations in salmon should create no risk of adverse impacts on sensitive pelagic life, vertebrate or invertebrate" (Schering-Plough Animal Health (2002) Potential environmental impacts of emamectin benzoate, formulated as Slice, for salmonids. Technical Report, Union, NJ, USA).

What about other scientific reports and peer-reviewed papers which detail significant environmental impacts of Emamectin benzoate?

For example, studies by SEPA show that the small mysid shrimp is poisoned by emamectin benzoate at concentrations equivalent to only half a drop in an Olympic sized swimming pool[8]. Research by the Scottish Association of Marine Science also concluded that both emamectin benzoate and teflubenzuron cause "mortality and deformities are very low concentrations" to non-target planktonic copepods[9]. Another Scottish study reported in 2003 that experiments showed that emamectin benzoate significantly reduced moulting success, reduced fecundity and caused deformities in copepods[10].

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[7] http://epi.cis.strath.ac.uk/SeaLice2008/

[8] Scottish Environment Protection Agency (1999) Emamectin benzoate use in marine fish farms: an environmental risk assessment. SEPA Board Paper 65, Stirling: http://www.sepa.org.uk/aquaculture/policies/emamectin_benzoate.pdf

[9] Scottish Association of Marine Science (2001) The toxicity of sea lice chemotherapeutants to non-target planktonic copepods. Scottish Association of Marine Science, Oban

[10] Willis, K J and Ling, N (2003) The toxicity of emamectin benzoate, an aquaculture pesticide, to planktonic marine copepods. Aquaculture 221, 289-297

Canadian Government researchers proved in a paper published in 2002 that emamectin benzoate can cause premature molting, failure to reproduce, and death in lobsters on the east coast of Canada. The studies "confirm the molt-producing effect of emamectin benzoate on female American lobster". Furthermore, the: "Results provide conclusive proof that emamectin benzoate is disrupting the endocrine system that controls molting in the American lobster. The results are the first example of a crustacean molting prematurely in response to chemical exposure, the first example of an arthrapod molting in response to an avermectin, and the first report that GABAergic pesticides can induce proecysis in crustaceans"[11].

From the figures listed in Appendix 4, 6.4 kg of Emamectin benzoate was used in 2006 with 23.7 kg used between 2004 and 2006. What are the figures for 2007 and 2008?

And what scientific research has the Irish Government conducted to assess the environmental impact of the use of Emamectin benzoate on Irish salmon farms?

Teflubenzuron (Ektobann):

The use of Teflubenzuron (phased out in both Norway and Scotland due to environmental and public health concerns) also raises concerns.

Scientific papers have detailed the toxic effects of Teflubenzuron on marine species living in sediments under salmon farms[12].

From the figures listed in Appendix 4, 177 kg of Teflubenzuron was used in 2006 (zero use was reported in 2004 and 2005). What are the figures for 2007 and 2008?

What scientific research is the Irish Government conducting on the impacts of Teflubenzuron?"

The Irish Government currently claims that: "Chemicals are rarely used on today's Irish fish farms. The only chemicals used would be medicines which, if needed, are administered by a veterinary surgeon and detailed in records that are routinely inspected by the Department of Agriculture, Food and the Marine". However, unlike in Norway, chemical data is not published.

In conclusion, in light of the new data revealing an alarming use in toxic chemicals on salmon farms across Europe GAAIA urges the European Commission to tackle this issue. Are there any legal instruments, for example, which DG Environment can enforce to reduce the discharge of toxic chemicals into European waters and into Special Areas of Conservation in particular?

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[11] Waddy, S L et al (2002) Emamectin induces moulting in the American lobster. Canadian Journal of Fisheries and Aquatic Sciences 59 (7), 1096-1099

[12] "Effects of teflubenzuron on sediment processing by members of the *Capitella* species-complex" (Environmental Pollution, January 2006): http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VB5-4GSTPKY-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_version=1&_urlVersion=0&_userid=10&md5=37e5f7e2c1461ea652417cd1864c4478

GAAIA notes that there have been several complaints filed with the European Commission with respect to salmon farming and the failure to comply with the Habitats Directive in particular.

For example, a complaint filed by Salmon Watch Ireland in 2009 stated that the Irish Government: "has failed to take a precautionary approach as regards measures to alleviate the impact of heavy concentrations of sea lice on migrating juvenile wild salmon (smolts) and has failed to apply *inter alia* Article 6 of the Habitats Directive (as amended) and Articles 2 and 4 of the Environmental Impact Assessment Directive (as amended) to the management of smolts migrating from and adult fish returning to Special Areas of Conservation."

Read more via 'Complaint to the Commission of the European Communities on the Government of Ireland's Failure to Comply with Community Law as regards the Habitats Directive and the Environmental Impact Assessment Directive for the species, Atlantic Salmon for and on behalf of the Delphi Fishery, the Newport Fishery and the Ballynahinch Fishery'

A complaint filed by Friends of the Irish Environment in 2008 stated that: "Ireland has breached Article 6(2) and Article 6(3) of the Habitats Directive (92/43/EEC) regarding the cumulative impacts of marine salmon farms on Natura 2000 sites for the Atlantic salmon Salmo salar [Annex II]. In respect of Article 6(2), infestation of farmed salmon by the sea louse Lepeophtheirus salmonis has led to a significant disturbance of wild Salmo salar in Natura 2000 sites. And in respect of Article 6(3), the Irish government has failed to ensure that 'appropriate assessments' are carried out before licensing fish farm projects."

Read more via 'Ireland's failure to protect the Atlantic salmon *Salmo salar* and its Irish habitat from the adverse impact of the infestation of farmed salmon by the sea louse *Lepeophtheirus salmonis*'

Another complaint filed in 2010 by Guy Linley-Adams on behalf of Mr Ewen and Mrs Jenny Scobie of the Rhidorroch Estate in Scotland (and supported by organizations including the Salmon & Trout Association and Association of District Salmon Fishery Boards) addressed:

The failure of the UK, pursuant to Article 4, to designate an adequate number and coverage of SACs for Atlantic salmon on the north-west coast of Scotland
The failure of the UK, pursuant to Article 4, specifically to designate the Ullapool River as an SAC for Atlantic salmon
The failure of the UK, pursuant to Article 6(2) and (3), sufficiently to protect those SACs already designated for Atlantic salmon from the impacts of marine salmon farming
The failure of the UK, pursuant to Article 6(2) and (3), to ensure that marine salmon farming activity does not threaten the integrity of the Little Gruinard and Langavat SACs

The complaint included reference to the increasing use of toxic chemicals: "Even with greater access to effective sea lice treatment agents, it is uncertain that total lice numbers can be brought down to low enough levels to protect wild salmonids. Existing sea lice treatments are becoming less effective as tolerance and resistance to these treatments increases. There have been increasing reports of reduced efficacy in all sea-lice treatments, ranging from full-blown resistance to significant tolerance or reduced clearance of sea-lice after treatment."

The complaint also stated:

“The Scottish Government is aware from its own research that “even with greater access to effective sea lice treatment agents it is uncertain that total lice numbers can be brought down to low enough levels to fully protect wild salmonids. This is a consequence of the continuously increasing numbers of fish entering culture: the numbers of farmed fish far exceeds the collective size of wild populations. Any decrease in lice numbers occurring through a lowering of acceptable lice levels on farmed fish is likely to be compensated for through future increases in production..... if tolerance and resistance to existing lice treatments increases, and the biomass of farmed fish per farm and number of farms also increases, the threat of sea lice to wild fish can only grow.”

Read more via ‘COMPLAINT TO THE COMMISSION OF THE EUROPEAN COMMUNITIES CONCERNING THE FAILURE OF THE UNITED KINGDOM (UK) TO COMPLY WITH THE HABITATS DIRECTIVE (92/43/EEC) IN RESPECT OF ATLANTIC SALMON (*Salmo salar*)’

A petition was also filed with the European Parliament by Allan Berry in 2002 regarding the Scottish Government’s failure to conduct credible environmental assessment for any Scottish sea cage fish farm projects.

GAAIA is now seeking sea lice data from the Scottish Government and has filed appeals with the Scottish Information Commissioner following refusals by Marine Scotland to provide adequate levels of information on sea lice. It is becoming abundantly clear by the 12-fold increase in the use of toxic chemicals since 2005 that the Scottish salmon farming industry is suffering from a significant sea lice problem caused by chemical resistance.

In Scotland, the Scottish Salmon Producers’ Organisation make some sea lice information available via 'Regional Health Management Reports'. It is clear that there is a huge sea lice infestation problem and consequent sea lice burden and pressure on wild salmon and sea trout.

For example, the report for West Shetland region (December 2011 to February 2012) included: “Lice numbers across the West Shetland region were, on average, 253% above the suggested lice treatment threshold set out in the NTS and CoGP (*i.e.* 1.0 adult female lice per fish). During February, when the suggested lice treatment threshold is considerably lower (*i.e.* 0.5 adult female lice per fish), lice numbers were, on average, 584% above the suggested lice treatment threshold.”

In East Shetland region: “During February [2012], when the suggested lice treatment threshold is considerably lower (*i.e.* 0.5 adult female lice per fish), lice numbers were, on average, 236% above the suggested lice treatment threshold.”

In South Mainland region: “During December 2011 and January 2012, lice numbers across the South Mainland region were, on average, 4% above the suggested lice treatment threshold set out in the NTS and CoGP (*i.e.* 1.0 adult female lice per fish). During February, when the suggested lice treatment threshold is considerably lower (*i.e.* 0.5 adult female lice per fish), lice numbers were, on average, 106% above the suggested lice treatment threshold”:

In North Mainland region: “During December 2011 and January 2012, lice numbers across the North Mainland region, on average, were 151% above the suggested lice treatment

threshold set out in the NTS and CoGP (*i.e.* 1.0 adult female lice per fish). During February, when the suggested lice treatment threshold is considerably lower (*i.e.* 0.5 adult female lice per fish), lice numbers were, on average, 94% above the suggested lice treatment threshold."

Finally, can this issue be raised in your discussions with DG Maritime Affairs & Fisheries? Can you raise this important issue with Scotland, Ireland and Norway?

GAAIA will certainly be attempting to add 'Toxic Chemical Use by Salmon Farms' on the agenda of a forthcoming Advisory Committee on Fisheries & Aquaculture at the European Commission.

Yours sincerely,

Don Staniford

Global Alliance Against Industrial Aquaculture

Cc: Maria Damanki, European Commissioner for Maritime Affairs & Fisheries
Lisbeth Berg-Hansen, Norwegian Minister of Fisheries
Richard Lochhead, Scottish Secretary for Rural Affairs & Environment
Stewart Stevenson, Scottish Secretary for Environment & Climate Change
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