

Environment, Climate Change and Land Reform Committee

Environmental impacts of salmon farming

Written submission from Friends of the Sound of Jura

The SAMS report lays out many environmental impacts of open-cage salmon farming: on wild salmon and sea trout populations, by sea lice, disease transfer and gene introgression, on seabed and other marine animals through pollution, disturbance of cetaceans, over-exploitation of wrasse and the shooting of seals. These harm the industry's profits, Scotland's reputation for quality, and the health of our seas. It would be best to solve these problems before contemplating any expansion, let alone doubling production by 2030.

The Friends of the Sound of Jura represents a coastal community in Argyll, whose residents are concerned about the impact of salmon farming on our sustainable jobs, which depend on a clean sea.

We agree with the submission by Salmon & Trout Conservation Scotland on the impacts of salmon farming on wild salmon and sea trout, as detailed in the independent review commissioned from NINA (2018)¹. Both these species are Priority Marine Features, suffering significant harm at population levels from sea lice and escaped farmed fish, as detailed in the SAMS report. Mitigation of this harm can no longer be relegated to the Local Authority planning processes, which is incapable of delivering it. Argyll and Bute Council's submission to ECCLRC¹⁷ says that the Environmental Management Plans required by local authorities, *'are not an appropriate means to provide an area wide response to the overall impact of sea lice'* and that *'many pre-existing sites (are) operating without EMP's, and without any prospect of such unless an application should be made to alter a farm in the future'. 'EMP's are resorted to by Planning Authorities given the lack of an overall area based approach to wild fish interests founded around cumulative impacts' '...providing a somewhat random and ad hoc response to an issue which is ongoing...' 'They are in effect a sticking plaster, not a systematic means of assuring well-being in the wider environment.' '...Planning Authorities, who given their reactive role, are not ... the best placed regulator to address this issue on a comprehensive basis, taking into account cumulative effects.'*

It is clear from this that the planning system is not working and that permanent permission should not be granted for fish farms. If fish farm consenting is transferred away from local authorities we feel strongly that it must depend on community agreement & on local knowledge of a site's suitability.

The SAMS report favours Adaptive Management as a way to solve the industry's problems. At the report's authors' ECCLRC session, Prof. Tett said: *'Adaptive Management is learning by doing. It allows development to go ahead without there being absolute clarity on what the environmental effects will be'*, but going ahead and seeing what happens, then cleaning up afterwards, is the regulators' and industry's approach at present. It is not working. Instead each crisis compounds the next. The SAMS report's authors were unable to explain to the ECCLRC how this method incorporates the precautionary principle. AM is meaningless when the consenting process is not accurate and transparent, when environmental monitoring is not consistent, impartial and sensitive enough to detect every significant effect, when site-specific data is kept secret or released in arrears (making reactive management and independent long-term analysis of environmental impacts impossible), and when the agencies do not use their own analysis to spot emerging problems, then set appropriate new thresholds. SEPA, and FHI should properly police their rules and always penalise the companies that breach their licence conditions.

Official figures published on Scotland's Aquaculture website show that salmon farms exceeded their permitted biomass 863 times between January 2002 and Nov 2017¹⁹, 240 times by more than 100 tonnes. SEPA's published records show 135 breaches of EQS for fish farm chemicals in seabed sediment between June 2006 and July 2016¹⁸. SEPA seems never to have revoked any aquaculture licences due to breaches of their conditions and SEPA FOI EIR Response 0188509 shows that there has not been a successful prosecution for a breach of licence terms since 2008.

Long-term data analyses are done occasionally, but the regulators do not seem to act on the results. For instance the ECCLRC convener said to SEPA's Anne Anderson: *'The (SAMS) report indicates that in 2003, 16 salmon farms were sited above maerl beds. We have learned that, currently, 25 farms are located within MPAs that are designated for maerl beds, and we have been told that two years of fallowing does not enable beds to recover. Why on earth are we allowing salmon farms anywhere near these features?'*

Anne Anderson replied: *'The information that I have is that there are 29 sites that are currently positioned in and around areas where maerl beds are present. Maerl has not been recorded as present recently at 13 of the 29 facilities...'* She was unable to say whether the farms were having a detrimental effect on maerl beds.

Consenting, oversight and enforcement do not seem sufficiently impartial, thorough or effective at preventing impacts, and the regulating agencies seem to be failing in their function. The system should be overhauled to properly separate this industry from its regulators. This is especially important regarding Priority Marine Features (which are not always inside protected areas) and in the MPA/SAC protected areas themselves. Public data, analysed by NTS in February 2018 (quoted in their written submission), show that around a third of active salmon farms are inside protected areas.

The SAMS report highlights how little information there is for making safe decisions, for instance on the impact of aquaculture's waste and pesticides on Scottish species and protected habitats, especially on how these affect the environment in combination, cumulatively and at low levels over wide scales. Where data is lacking, Adaptive Management notwithstanding, Scotland is legally obliged to apply the precautionary principle but the report and the ECCLR hearings show how rarely this is applied.

Prof. Callum Roberts, Environment Department, University of York, has said: *'The multiple environmental problems associated with open-cage salmon farming have been thoroughly established by scientific research. Individually, many impacts represent a serious risk to the conservation objectives of marine protected areas. Collectively, they guarantee an unacceptable level of impact. Open cage salmon farms are incompatible with the conservation objectives of protected areas and should not be sited within them.'*

Many Priority Marine Feature species are mobile, which does not mean they can escape these impacts by swimming away – they may live in the only places suitable for them, or have to migrate past salmon farms. Two such PMFs are wild salmon and sea trout. Currently no agency accepts responsibility for aquaculture's impacts on them. SEPA should limit farm biomass to protect wild fish from sea lice, disease and escapes, as it is empowered to do.

Additionally, the industry harms its own interests by shooting seal and disturbing cetaceans. Both should stop & ADD use must be discontinued until they are proven not to harm or displace cetaceans.

At the ECCLR session, Rob Raynard of FHI stated that: *'there are particular challenges around harmful algae and microscopic phytoplankton that damage and irritate the gills.'* In 2016, Harmful Algal Blooms caused an ecological and economic catastrophe in Chile's aquaculture region², while smaller HABs have also closed valuable Scottish shell-fisheries temporarily. Climate change makes HABs more likely. The SAMS report suggests that HABs are purely natural events but the report also states that 5-10% of the dissolved nitrogen in the Minch is already derived from salmon farming and refers to *Heath et al (2002)*, stating that nutrient inputs from aquaculture in parts of the west coast can contribute more than 80% of the land-derived inputs. According to the SAMS report these solid inputs alone will reach 500,000 tonnes by 2030 (more than the untreated sewage of half of Scotland's people), while dissolved nutrients already total twice that much³ - and will have doubled by 2030. There seems to us to be a significant risk that this, coupled to warming seas, will increase the occurrence of HABs.

The SAMS report omits the visual impact of salmon farms on the environment, for which SNH is the statutory consultee. Tourism is worth about £11bn to Scotland, rising to c. £23bn by 2025⁴. It provides at least 100 times more jobs than those directly employed on fish farms, many in small coastal communities. In Visit Scotland's latest (2015-16) survey¹⁵, tourists cite the landscape as their main reason for visiting. You will never see fish farm cages in tourism photo adverts, and this is why: In one SARF-funded study⁵ 48% of respondents said expansion of fish farming would negatively impact the scenery and 46% said it would negatively impact the natural environment. 25% did not want to see an increase in the number of fish farms. Over a third didn't want to see them get any bigger and 10% said they would be less likely to visit these locations. SARF's members include SEPA, MSS, Crown Estates, SNH & SSPO.

The SAMS report barely mentions the SEPA-commissioned 'PAMP 2' study^{6,7} into the environmental impact of emamectin benzoate (EMB), a pesticide fed to fish to combat sea lice. EMB residue can remain active in the seabed for more than four years. The PAMP2 study found a correlation between its use & c. 60% decline in crustaceans, at sea loch scales, at levels too low to be detected by standard monitoring.

SEPA made no public comment when PAMP2 was published quietly online, but their aquaculture specialist produced an internal 'response options' report (FOI⁸. NB - SEPA has removed this document temporarily but is restoring it to its disclosure log), stating, *'...the waters in which salmon farming is practiced are usually the same waters in which Scotland's valuable crustacean fisheries are located...it is not tenable for SEPA to adopt a position where commercial shellfish species are impacted by the day-to-day activities of fish farms, activities which SEPA will have knowingly authorised under CAR... SARF098 reveals that there is a significant risk of failure to provide such protection.'*

SEPA's specialist recommended a ban, which became the agency's policy but the ban was shelved just before its public announcement, after industry lobbying, according to the *Herald*. This is how public confidence in the independence of the industry's regulators has been eroded.

SEPA has since issued a lower interim EQS for EMB use in some protected areas, but will only apply it to CAR licences for new fish farm proposals, not to the expansion of existing farms inside qualifying MPAs. We do not believe it safe to assume that the EMB used by existing farms inside MPAs is doing no harm.

SEPA maintains that all industries' CAR licences are assessed in the same way, but their own 'response options' paper states that aquaculture is unique status regarding toxic chemical discharges: *'Fish farming is unique in that it is a sector which is allowed to discharge substantial quantities of biocides...'*

Aquaculture is also unique in being allowed to release so much organic particulate and dissolved waste into the sea, concentrated at its c.250 active marine salmon farm sites, without having to treat it first, even though 'polluter pays' is a legal obligation, as is the use of best environmental practice. In Norway the industry is moving to closed containment, 'best practice' encouraged by setting higher licence fees for the companies who do not invest in this innovation. The newly devolved Crown Estate gives Scotland an opportunity to do the same thing.

SEPA's CAR biomass consenting decisions aim to protect the environment from pollution by predicting how much waste will fall on the seabed and how much EMB it will contain, then calculating the maximum allowable fish biomass, up to 2500 tonnes. Crucially, the protection provided by CAR depends on computer modeling. Regarding the recent CAR application for a 2500t fish farm at Dounie, SEPA confirmed to FoSoJ that this would be assessed using their present computer model, AutoDepomod.

On the map that FoSoJ submitted as evidence¹¹ you can see the AutoDepomod prediction, that deposited waste+EMB would only fall close to the cages at Dounie, entirely inside the Allowable Zone of Effect, where SEPA allow most living things to be killed. The tides there are strong, so AutoDepomod also predicted that 99% of the waste+EMB would be swept out of the model's 1x1 km grid. Once outside that square it is ignored, so SEPA cannot tell whether it would have a cumulative impact by adding to adjacent farms' waste. AutoDepomod has another critical flaw: it assumes the seabed is flat, but Dounie is at the top of an underwater trench. When SEPA applied its NewDepomod to Dounie, as an experiment, the predicted waste distribution was very different, with much of it landing up to 500m away, downhill & down current. Even then >80% was lost to the model's larger 4km² grid. This lost material would still be ignored.

SEPA should review all previous CAR licences assessed by AutoDepomod in situations like this, and alter or revoke these licences if necessary, starting with those inside MPAs and where PMFs are present.

AutoDepomod was at least peer-reviewed. The many assumptions implicit in how NewDepomod predicts the transport, deposition & resuspension of waste are still opaque. Astonishingly SEPA admit (FOI¹²) that its developers at SAMS have not told them of any limitations. NewDepomod's assumptions and limitations must be published for independent scrutiny before it is used by SEPA to issue pollution licences.

SEPA have confirmed to FoSoJ (letter received after the hearing & submitted separately to ECCLR) that Autodepomod was just intended to flag the worst risks, rather than making accurate spatial predictions, and that its thresholds are deliberately conservative. In essence then; Autodepomod helps SEPA to set discharge levels such that all organic pollution will fall within the AZE or leave the model's quite small grid. SEPA does not then consider the impact of the waste that leaves, and allows what remains to harm the AZE. Separately SEPA acknowledged that AutoDepomod cannot assess large scale dispersion, waste transport, the effect it has, the cumulative impacts of several farms, or storms that often redistribute waste.

From SEPA's letter it does seem, after all, that they have now committed to using the new model for all new applications – which is important and welcome news. They should also commit to doing site-specific validation in **every** case, to always publishing the results, and to setting a low and biomass-limiting threshold on how much organic waste is allowed to leave the model to 'fate unknown'.

SEPA should also explain why Marine Harvest have applied for planning permission for a 3500 tonne farm¹³ (1000 tonnes above SEPA's max) near [REDACTED], with its impacts modeled by NewDepomod, despite either the new model, or DZR, having been scrutinised or approved by Parliament.

Scotland has adopted in law the principle that the polluter pays. Allowing most living things to be killed inside each farm's Allowable Zone of Effect is gross pollution, however you look at it, and allowing 80%+ of the waste and pesticide you are modeling to leave a predictive model, unaccounted for, does nothing to regulate or control that pollution.

The SAMS report demonstrates our ignorance of the wide-scale, low-level impacts of aquaculture's pesticides. Dilution to oblivion - the industry's current approach to the disposal of aquaculture's harmful chemicals, as sanctioned by SEPA - was debunked for other industries in the 1970s.

Aquaculture is unique in that it releases so much harmful waste but pays nothing for its disposal, relying instead on a vital common resource - the sea - on which so much biodiversity and so many sustainable jobs depend.

The industry's argument that closed containment would be too expensive is in part because then it would have to match the standards applied to industries on land. This is no reason to set aside a legal principle.

Marine Scotland should look harder for evidence of harm to wild fish from gene introgression and disease transfer from escaped farmed fish, and it must address the enormous numbers of escapes, which total more than half of Scotland's entire wild salmon population every year, according to the SAMS report. FHI told the ECCLR hearing that severe storms cause many of these failures. The level of containment is clearly inadequate, not least because climate change is making powerful storms more frequent. Marine Scotland told the Friends of the Sound of Jura by telephone that all salmon cages must be able to withstand a once in 50 year event, adding that MS rely solely on the applicants to assure them that this will be so. MS confirmed in the same call that they do not check cage designs or assess the exposure of each site. Now the industry is actively expanding into more exposed locations and pressing to be allowed much larger farms, increasing the risk of escapes.

It is unacceptable for the industry to expand while HABs, disease, sea lice and their chemical and physical treatments are killing 25% of its stock. At the ECCLRC session, Rob Raynard of FHI said, '*...that the industry will need to address the mortality issues in order to be able to expand.*'

Separating farmed fish from the open sea would solve most of the industry's problems. Instead of investing £40m in a wrasse breeding plant that can fulfill only 10% of the predicted demand for sea lice cleaners, why does industry not invest that money in developing closed containment?

The Scottish Government could raise a levy to encourage the same thing, by varying the cost of seabed leases to encourage firms to move towards closed containment, as Norway is doing - making polluters pay. Rather than cutting the budgets of all the relevant agencies, the Scottish Government should also impose a levy on salmon farm profits in order to fund a publicly-trusted programme of enhanced and fully independent monitoring, and the subsequent analysis of environmental impacts, including long-term trends.

Ministers must resist industry pressure to 'streamline' the consenting process¹⁴. Salmon farming here should not aim to be as cheap as Chile. Scotland's farmed salmon should be the best in the world, and so should Scotland's safeguards to protect our precious marine environment.

References:

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SEPA Aquaculture Strategic Management Group. 'Doc 131.pdf' in 'Final Response' to FOI FO187415 at <http://apps.sepa.org.uk/disclosurelog>
- 11 Image 3: http://www.parliament.scot/S5_Environment/Inquiries/005_Friends_of_Jura.pdf
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- 19 http://aquaculture.scotland.gov.uk/data/fish_farms_monthly_biomass_and_treatment_reports.aspx?sepa_site_id=AIR1
(NB to see these 'Biomass Exceedence Tonnes' figures, first export the data as CSV, then sort column H by value.)