

Environment, Climate Change and Land Reform Committee

Environmental impacts of salmon farming

Written submission from Salmon and Trout Conservation Scotland

Salmon and Trout Conservation Scotland (S&TCS) lodged a formal Petition with the Scottish Parliament in 2016, to urge the Scottish Government to strengthen Scottish legislative and regulatory control of marine fish farms to protect wild salmonids of domestic and international conservation importance. In 2017, the Rural Economy and Connectivity Committee decided to hold an Inquiry into the issues raised by S&TCS. This short submission necessarily focuses upon the sea lice and escapes, but that is not to downplay benthic pollution, sea-lice chemical treatment residues and the threat to wild salmonids posed by other diseases on fish farms.

The international context is that, in 2016, a special session of North Atlantic Salmon Conservation Organisation (NASCO) (Scotland is a member by virtue of the EU membership), concluded that *“wild stocks of Atlantic salmon are currently vulnerable because of reduced marine survival all around the North Atlantic...that there is now sufficient evidence of significant adverse impacts from salmon farming having occurred that all Parties / jurisdictions with salmon farms must implement further, more stringent measures to protect the wild stocks from the impacts of salmon farming if they are to meet their obligations under the NASCO Convention. The Williamsburg Resolution states that where significant adverse impacts on wild salmon stocks are identified, the Parties should initiate corrective measures without delay and that these should be designed to achieve their purpose promptly”*¹

On sea-lice, in 2009, NASCO adopted 'Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon on Wild Salmon Stocks'², developed with and adopted by the International Salmon Farmers Association, which established international goals for NASCO jurisdictions relating to containment and sea lice management. For sea lice, the goal is that *“100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms”*.

A 2018 review, commissioned by S&TCS from the Norwegian Institute for Nature Research (NINA)³, examined all available research on the impact of sea lice, and concluded that *“the combined knowledge from scientific studies provides evidence of a general and pervasive negative effect of salmon lice on salmonid populations in intensively farmed areas of Ireland, Norway and Scotland. ... Levels of additional mortality by salmon lice as indicated in several scientific studies may result in salmon*

¹ NASCO (2016) Addressing impacts of salmon farming on wild Atlantic salmon: Challenges to, and developments supporting achievement of NASCO's international goals. 2016. Report of a Theme-based Special Session of the Council of NASCO. NASCO Council document CNL(16)60. 196pp

² NASCO (2009) SLG(09)5 Guidance on Best Management Practices to address impacts of sea lice and escaped farmed salmon on wild salmon stocks (Adopted in June 2009 and Revised in June 2010)

³ Thorstad, E.B. & Finstad, B. 2018. Impacts of salmon lice emanating from salmon farms on wild Atlantic salmon and sea trout. NINA Report 1449: 1-22. Trondheim, Norway, January 2018 at <https://brage.bibsys.no/xmlui/handle/11250/2475746>

stocks not achieving river specific conservation limits and, if sustained over time, could result in significant cumulative reductions in adult salmon recruitment.”

The NINA review built on earlier reviews also carried out by NINA on the sea lice impacts on sea trout that were funded by the Norwegian Seafood Research Fund, a body that includes Norwegian fish farming interests. It chimes closely with the findings of the SAMS Report for this Committee. For example, at page 15, that: “... *there is a gradually emerging body of evidence, from studies elsewhere, that sea lice not only have the potential to have a negative effect on wild salmon, but that in many situations this is likely to be the case ... With the currently high marine mortality rate for wild salmonids, and threatened status of many river stocks, any additional pressure, such as increased sea lice burdens, is undesirable, and could further erode the conservation status of vulnerable wild populations”.*

In the Scottish context, the SAMS Report worryingly concludes that “*the main treatment methods used in Scotland are experiencing reduced efficacy in dealing with sea lice on farms. New techniques are being applied, although the long-term success of these is uncertain. The legislative and voluntary frameworks that underpin the management of lice levels on farms are not transparent. They appear neither to be succeeding in controlling sea lice, nor capable of addressing the environmental effects of the lice.”⁴ S&TCS agrees with this assessment and is concerned that the science is not being translated into effective control of sea-lice on fish-farms, without which, the ambitious growth targets for the Scottish salmon farming industry cannot be met without even more damage to wild salmon and sea trout populations.*

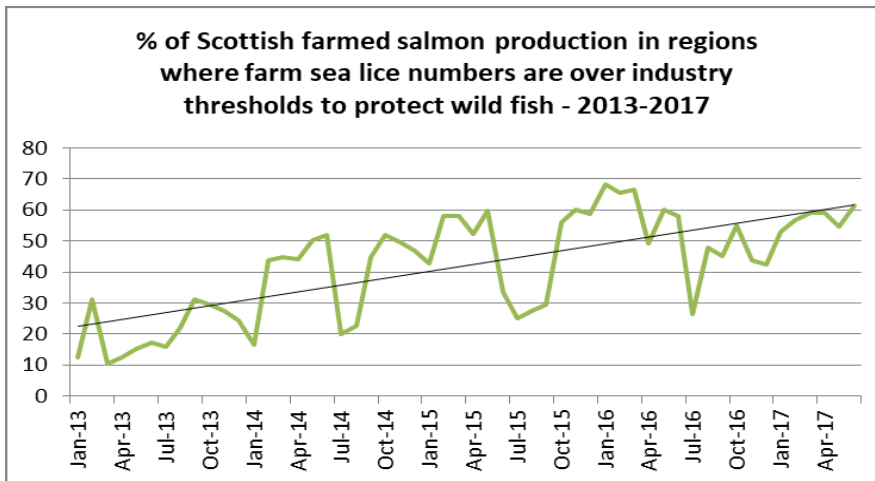
While SAMS is correct (at page vi), that “*gaps in publically available data in Scotland make it difficult to assess the efficacy of present management and regulatory regimes”*, some analysis is possible. It shows the sea lice problem getting worse. By examining 3-monthly SSPO Fish Health Management Reports⁵, S&TCS has identified, per the graph below, that an increasing proportion of the salmon produced in Scotland, is produced in regions breaching the National Sea Lice Treatment Strategy⁶ thresholds for treatment of 0.5 and 1 adult female lice per farmed fish, against which the Fish Health Inspectorate also conducts its inspections⁷.

⁴ Para 2.1.4 at page 15

⁵ <http://scottishsalmon.co.uk/publications/>

⁶ National Strategy for Sea Lice Treatment Control, annexed to the Code of Good Practice for Finfish Aquaculture. <http://thecodeofgoodpractice.co.uk/wp-content/uploads/2015/02/cogp-annexes-feb-15.pdf>

⁷ See 2008 Guidance to Fish Health Inspectors Enforcing the Provisions in Relation to the Control of Parasites



The SAMS Report, at page (vi), makes reference to public distrust in the regulator. It is regrettable that Marine Scotland's refusal to disclose individual farms breaching 3 and 8 triggers required a decision of the Scottish Information Commissioner. The SAMS Report suggests that "*no data have yet been published on the results of this new approach*". However, S&TCS has reviewed the operation of the policy to date and provided an assessment to Scottish Government. This includes a list of many fish farms breaching the 3 and 8 limits in 2017, with details of the single Enforcement Notice so far served⁸. It remains the case that sea lice limits and enforcement are considerably weaker in Scotland than other European salmon farming countries.

S&TCS understands that the SSPO is to begin publishing farm-specific sea lice data. However, the time for voluntary disclosure of sea lice and related treatment information, as once supported by Marine Scotland in the run up to the Aquaculture and Fisheries (Scotland) Act 2013, is at an end. Full publication of farm-specific sea lice and sea lice control data is required, which can be achieved easily by amending The Fish Farming Businesses (Record Keeping) (Scotland) Order 2008 to require the full publication of records which are required to be kept under this 2008 Order.

S&TCS has also previously published⁹ its analyses of data from the FHI¹⁰, SEPA biomass data¹¹ and SSPO Fish Health Management Reports to 2017. Those analyses confirm that sea lice numbers on fish farms continue to rise to unacceptable levels, particularly during the second year of production. To that end, S&TCS notes the suggestion by SAMS of growing smolts to a larger size under RAS and only transferring to net pens for a final year of growth, but believes the only long-term sustainable future for Scottish salmon farming is to grow salmon in full closed containment, with 'biological separation' of wild and farmed fish, for the whole cycle.

On escapes, closed containment would near eliminate escapes. While the 2015 Technical Standards for equipment are welcome, recent data suggests that escapes remain high. The graph below illustrates data published on the Scotland's Aquaculture database. Although S&TCS agrees with SAMS that there is work to do

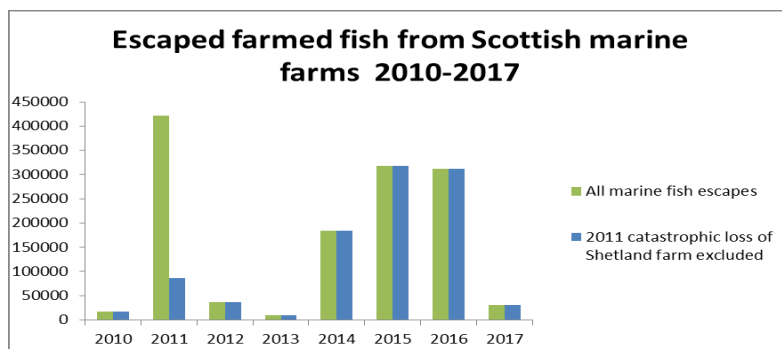
⁸ <https://www.salmon-trout.org/wp-content/uploads/2018/01/NASCO-Report-FINAL-1.pdf>

⁹ <https://www.salmon-trout.org/wp-content/uploads/2017/08/STC-Scotland-2013-2015-The-Control-of-Sea-Lice-on-Fish-Farms-in-Scotland.pdf>

¹⁰ <http://www.gov.scot/Topics/marine/Fish-Shellfish/FHI/CaseInformation>

¹¹ <http://aquaculture.scotland.gov.uk/>

on genetic introgression of wild stocks by farmed fish, a precautionary approach must be adopted, S&TCS has raised the introgression of salmon populations of rivers protected under the Habitats Directive with the European Commission¹².



Finally, on other reasons for declines in wild salmonid populations, S&TCS would draw attention to the work in Norway, not referenced by SAMS, that suggests that other anthropogenic effects on wild salmonids are not as serious as escapes or sea-lice. *Forseth et al (2017)* ranked the different anthropogenic factors and assessed the major threats to Norwegian Atlantic salmon. They concluded that “*escaped farmed salmon and salmon lice from fish farms were identified as expanding population threats, with escaped farmed salmon being the largest current threat. These two factors affect populations to the extent that they may be critically endangered or lost, with a large likelihood of causing further reductions and losses in the future*”¹³ It is a reasonable assumption that similar conclusions apply in Scotland.

Wild salmonid populations in the ‘aquaculture zone’ on the west coast of Scotland remain threatened. The Scottish Government’s latest classification of the country’s salmon populations, places almost all rivers in the west Highlands and inner Hebrides, including river systems such as the Awe, in the worst-performing categories, with wild salmon stocks not reaching their conservation limits (a measure of the overall health of the population)¹⁴. West Highlands and Islands mature sea trout are also at historically low numbers.

In that context, S&TCS sincerely hopes and expects that the SAMS Report will mark an end to what has been characterised as the ‘tit for tat’ debate with the fish farming industry over the impacts of salmon farming, as it indicates firmly and unambiguously that sea lice produced by fish farms need to be controlled expressly to protect wild salmon and sea trout populations.

Overall, the SAMS Report provides considerable support for S&TCS’ view that wild fish are not sufficiently protected in domestic law and that the Scottish Government should now seek to amend legislation with the express purpose of protecting wild fish from potential damage caused by fish-farms, including a statutory duty to control

¹² <https://www.salmon-trout.org/wp-content/uploads/2017/08/Commission-Genetics-Letter-160816.pdf>

¹³ Forseth, T., Barlaup, B. T., Finstad, B., Fiske, P., Gjøsæter, H., Falkegærød, M., Hindar, A., Mo, T. A., Rikardsen, A. H., Thorstad, E. B., Vøllestad, L. A., and Wennevik, V. (2017) The major threats to Atlantic salmon in Norway. – ICES Journal of Marine Science, doi:10.1093/icesjms/fsx020.
<https://www.duo.uio.no/bitstream/handle/10852/55750/Forseth%2BThe%2Bmajor%2Bthreats%2BICES%2BICES%2B2017.pdf?sequence=2>

¹⁴ <http://www.gov.scot/Resource/0052/00524733.pdf>

sea lice on fish farms, again expressly in order to protect wild fish populations. S&TCS remains open for discussions with all parties as to how that is best achieved and which Scottish public authorities or agencies are best placed to be take on that function.

S&TCS believes strongly that the ultimate solution to the environmental impact of salmon farming will be closed containment. To that end, S&TCS urges all parties to adopt a renewed focus on moving to full closed containment of farmed salmon production in Scotland, as soon as is practical. As the SAMS Report acknowledges, and as *Murray* recommended in 2014¹⁵, at page 128, para 8.3, we need “*a positive approach towards the adoption of RAS technology*” and not an extensive search for multiple reasons not to move to RAS, when the benefits of so doing so are clear and significant, and the potential for Scotland business as a whole very large indeed.

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¹⁵ Murray, F., Bostock, J., & Fletcher, D. (2014). Review of Recirculation Aquaculture System Technologies and their Commercial Application. Inverness, Highlands and Islands Enterprise, 75 pp.