

The Scottish Wildlife Trust welcomes the opportunity to provide written evidence on the SAMS report (hereafter ‘the report’) on the environmental impact of salmon farming in Scotland’s marine environment. The Trust considers the aquaculture industry in Scotland as an important industry and has previously provided written and oral evidence to inform the Aquaculture and Fisheries (Scotland) Act in 2012 and regularly engages with public consultations on salmon farm proposals.

The Trust supports *sustainable* finfish aquaculture and will campaign for effective regulation, monitoring, enforcement and research to achieve a Scottish fish farming industry sold on the basis of high quality and unrivalled environmental credentials.¹

The Trust considers the report to be a very comprehensive and detailed overview of the most up-to-date peer-reviewed literature. The environmental impacts identified within the report are those the Trust considers to be of most importance and need addressing. The report also provides a valuable insight into knowledge and data gaps that exist within the literature.

The Trust considers an overarching theme emerging from this report is the dearth of adequate data and evidence available to decision makers, which limits their ability to identify with certainty the impact salmon farming is having on Scotland’s environment. The lack of data is particularly concerning as many of the key risks identified within the 2018 report were highlighted as key concerns in the 2002 SAMS report.² It appears that in the interim little has been done to address these concerns. Consequently, the salmon farming industry has continued to expand, using the same practices, despite the uncertainty regarding its environmental impact. It is clear to us that the precautionary principle has been inadequately applied.

The Trust believes Scotland should be striving to be a world leader in sustainable aquaculture and best practice, yet it is clear from the report that Scotland is falling behind other countries in this regard. Norway, in particular, is leading the way on research into the environmental impacts of salmon farming, which has led to significant investment in innovative technology and progressive changes to regulation and management – all of which make the industry more sustainable. The Trust believes the Scottish Government should adopt a similar sense of urgency in addressing the environmental concerns arising from the salmon farming industry in Scotland, particularly as the proposed expansion targets will only exacerbate its environmental impact.

Areas of concern

Growth target

The Trust is concerned with the industry’s proposed growth target of 300,000 - 400,000 tonnes by 2030. This target is based on the potential for industry growth and public demand and not on the ecological limitations of the marine environment. There has been no assessment of whether the inshore waters of West Scotland, Orkney and Shetland have the capacity to support the proposed doubling of salmon production. The report highlights the value of assessing the assimilative capacity of the marine environment – which has yet to be done – to identify rates of recovery and dissemination of waste products. Such an assessment could then identify the carrying

¹ Scottish Wildlife Trust policy on Finfish Aquaculture 2012. https://scottishwildlifetrust.org.uk/wp-content/uploads/2016/09/002_057_publications_policies_Finfish_aquaculture_policy_August_2012_1345738759.pdf

² Review and synthesis of the Environmental Impacts of Aquaculture. Scottish Executive Central Research Unit 2002. <http://www.gov.scot/Resource/Doc/46951/0030621.pdf>

capacity (number of farmed salmon) of the environment. Both of these assessments could then provide an informed maximum growth target that is within environmental limits and hence sustainable.

The Trust believes an ecosystem-based sectoral strategy that incorporates the precautionary principle, and is informed by a Strategic Environmental Assessment, is required to identify areas in Scottish waters that can accommodate salmon farming expansion and ensure sustainable growth of the industry.

Publishing of farm specific data

The Trust welcomes the announcement that the Scottish Salmon Producers Organisation will be releasing farm-specific sea lice and mortality data, and believes this data should be provided as close to real time as possible. The Trust considers this should be a statutory requirement for all salmon farms in Scotland and be easily accessible to researchers and the public alike. Additionally, the Trust believes that all historical data on sea lice, mortalities, disease outbreaks, and chemical usage must also be published to allow immediate analysis and informed decisions on future management.

The release of farm specific data will identify those farms which are problematic, but equally, it will also identify those farms where sea lice, disease and mortality are well controlled. It is important to understand why these farms do not have a problem and assess whether the farming practices or the physical and hydrodynamic environment are responsible. This will inform management of fish farms and potentially assist with appropriate location and expansion of future salmon farms.

Sea lice trigger levels

The Trust believes there should be a reassessment of appropriate trigger levels of sea lice on farmed salmon, which must be informed by robust scientific research and data. The current level, set by the Scottish Government, of three lice per fish is arbitrary and has been determined by the level the industry is capable of detecting. As such, the level is not precautionary and does nothing to minimise environmental impacts.

Additionally, the Trust has concerns that the current sea lice assessments do not take into account the number of fish within a farm, but rather focus on acceptable numbers of lice per fish. This is an acceptable approach if the concern is the welfare of the farmed fish, but it does not take into account the welfare of wild salmon and sea trout. For example, a salmon farm with 1000 fish can contain up to 3000 sea lice (three lice per fish), but a farm holding 10,000 fish can contain 30,000 sea lice. Both meet the required standards regarding farmed fish health but do not address the risks posed to wild salmonids in the surrounding area, which are significantly increased where there are more farmed fish. To appropriately account for wild fish health, a trigger level of sea lice numbers at a farm level, rather than at a fish level, is required.

Genetic mixing between farmed and wild Atlantic salmon

The Trust has concerns over the risk of genetic mixing of wild salmon and escaped farmed salmon. Unlike the risks associated with sea lice and disease, which can occur in spikes or in cycles, the impact of genetic mixing is long-term and permanent. As highlighted in the report, the impact of genetic mixing can weaken the health and survival of wild salmon, which in turn can have an effect at a population level. The risks associated with genetic mixing led to Forseth et al. (2017) identifying salmon escapes as the number one threat to wild salmon populations in Norway.³

The genetic make-up of Scottish salmon populations is under researched and hence we do not know the extent to which genetic mixing has taken place, both in terms of genetic dilution and the geographic range at which mixing is taking place. The Trust believes that to improve accountability, regulators should take or require samples from fish farms so that escaped fish can be traced back to the farm or company of origin. Such a step would ensure farm operators are held to account and remedial action can be initiated.

³ Forseth, T. et al. (2017) The major threats to Atlantic salmon in Norway. ICES J. Mar Sci doi:10.1093/icesjms/fsx020

Cleaner fish

The Trust is concerned over the number of ‘cleaner’ fish (wrasse and lumpsuckers) required by the Scottish salmon industry to control sea lice, a number that will increase as the volume of farmed salmon increases. For wrasse, the industry is currently dependent on wild caught fish, which has led to unregulated harvesting of wild populations. The extent to which wild wrasse have been fished is unknown and thus the subsequent ecosystem impacts of their removal are unknown. Therefore, it is imperative that a wrasse fisheries management plan is implemented, which considers stock size, landing size limits, species behaviour and life history, and the potential for closed areas.

The Scottish salmon industry is beginning to invest into wrasse hatcheries to relieve pressure on wild wrasse stocks and create a more reliable supply. The production of cleaner fish in hatcheries should be viewed as another type of aquaculture, rather than a sea lice treatment – their production requires energy, food and medicines; they are kept in unnaturally high densities in cages; and their genetic make-up will, over time, become distinct from those found in the wild. The latter point raises similar concerns to the genetic mixing of wild and farmed salmon mentioned previously.

It is important to acknowledge that cleaner fish production is a form of aquaculture that has no end product – once the farmed salmon have been harvested, the cleaner fish are then killed to avoid spreading disease. This single-use approach to cleaner fish is highly unsustainable, both in terms of economics and resource use.

Mortalities

The Trust considers the high levels of farmed salmon mortalities reported in Scotland is wholly unacceptable and raises important questions over animal welfare, sustainable use of resources (i.e. food, energy and medical treatments), the suitability of practices currently in use, and the suitability of the physical environment within which these farms are located (e.g. current flow and water temperature).

To meet the proposed industry targets, the number and size of fish farms will need to increase, which, unless farming practices change, will lead to a rise in the number of fish mortalities. It is imperative that industry data on fish mortalities is made publicly available for analysis. Environmental data and information on farm conditions leading up to disease outbreaks could be valuable in identifying the causes of large mortality events and preventing future disease outbreaks.

Seal shooting and the use of ADDs

The Trust believes that salmon farm operators should be discouraged from shooting seals and encourage to invest in benign deterrent methods, such as tension nets. The recent announcement that in 2022 the U.S. will ban the importation of fish from farms where seals have been intentionally shot⁴, may be an important driver for moving away from the practice of seal shooting, as the U.S. is Scotland’s second largest export market. Scottish salmon producers wishing to export will soon have to clearly demonstrate their product is not associated with seal killing. If meeting these requirements can be achieved, then the Trust believes that this standard should be applied across Scotland.

The Trust considers that, until the licensed shooting of seals is stopped, there should be much tighter controls on seal shooting that require shot seals to be recovered and tagged by the licensed marksman and for necropsies to be carried out on seal carcasses to ensure the practice of seal shooting meets the standards set in the Scottish Seal Management Code of Practice.⁵

The Trust recognises that seal shooting is a “last resort” practice and other methods such as acoustic deterrent devices (ADDs) are regularly used. The Trust, however, has concerns over the effectiveness of ADDs with regard to deterring seals (as highlighted in the report) and is aware of a growing body of evidence that suggests ADDs are

⁴ Fish and Fish Product Import Provisions of the Marine Mammal Protection Act. United States Federal Register 81(157)

⁵ Scottish Seal Management Code of Practice - <http://www.gov.scot/resource/Doc/295194/0121503.pdf>

detrimental to cetaceans in Scotland, in particular harbour porpoise.^{6,7,8} The Trust considers the use of ADDs should be discouraged and require much stricter regulation. The Inner Hebrides and Minches candidate SAC has been designated to protect harbour porpoise (an Annex II species of the EU Habitats Directive) and, therefore, the Trust considers it inappropriate for any salmon farm application within this area to include the use of ADDs.

Missing or inadequately addressed items that require further investigation

- The report highlights UKBAP species and Special Areas of Conservation, but does not address the impact salmon farming is having on Scotland's nature conservation MPAs, nor the potential risks associated with continued growth. Many salmon farms were granted planning permission prior to the designation of nature conservation MPAs and, therefore, their impact on protected features has not been adequately assessed. The Trust considers a review of the environmental impact of all salmon farms located within MPAs is required to ensure they are not risking the health of protected features.
- Recent advancements in SEPA's DEPOMOD model have improved its ability to predict benthic impacts from salmon farms – the associated Depositional Zone Regulation consultation is now closed and in review. The Trust considers that all salmon farms, in particular those located within MPAs, should be reassessed using the new model to ensure all salmon farms meet current environmental standards.
- The report highlights the potential role Recirculating Aquaculture Systems (RAS) can play in mitigating the environmental risks identified, but provides few details or examples of this technology. Additionally, the report does not discuss at all the various other technological advancements currently being used in other countries that can mitigate many of the same risks. While the Trust recognises that RAS are still in the early stages of development and are not currently an economically viable option, there are many alternative, semi-closed systems that are available (e.g. the 'snorkel' design⁹).
- The report does not discuss the potential benefits and risks associated with large offshore salmon farms. Deployed in deep and exposed waters these farms can relieve pressure on inshore waters and may present a less-environmentally-damaging option. The Trust considers a cost/benefit analysis of the various options for salmon farming should be carried out.
- The report inadequately addresses the risk salmon farming poses to sea trout. The report focuses on the risks for Atlantic salmon, the most concerning being breeding with escaped salmon, but does not clarify that, due to differences in their behaviour, the biggest risk to sea trout is sea lice.
- The report does not mention at all the role of salmon farms in facilitating the spread of non-native species or diseases along Scotland's west coast. An increase in the number of salmon farms will increase the number of potential 'stepping stones' for non-native marine species.
- The report highlights the pressure the aquaculture industry is placing on fish and plant resources, but does not mention the growing interest in the use of insects as a potential alternative feed source.

The Trust is keen to continue engaging with this inquiry and would like to be kept informed of its progression.

For further information, please contact:

Dr Sam Collin
Marine Planning Officer
Scottish Wildlife Trust
scollin@scottishwildlifetrust.org.uk

February 2018

⁶ Booth, C.G., 2010. Variation in habitat preference and distribution of harbour porpoises in the west of Scotland. PhD thesis, University of St Andrews

⁷ Northridge, S.P. et al. 2010. Assessment of the impacts and utility of acoustic deterrent devices. Final report to the Scottish Aquaculture Research Forum, project code SARF044

⁸ Lepper, P.A. et al. 2014. Establishing the sensitivity of cetaceans and seals to acoustic deterrent devices in Scotland. SNH Commissioned Report No. 517

⁹ Stien, L.H. et al. 2016. 'Snorkel' sea lice barrier technology reduces sea lice loads on harvest-size Atlantic salmon with minimal welfare impacts. *Aquaculture* 458, pg. 29-37