

Briefing for the Public Petitions Committee

Petition Number: [PE1782](#)

Main Petitioner: Robert White on behalf of The Scottish Gamekeepers Fishing Group

Subject: Full consultation on stocking of salmon rivers

Calls on the Parliament to urge the Scottish Government to ensure that a full stakeholder consultation is carried out before Marine Scotland formalises policy on the stocking of Scotland's salmon rivers.

Background

The petition calls on the Scottish Parliament to urge the Scottish Government to ensure that a full stakeholder consultation is carried out before Marine Scotland formalises policy on the stocking of Scotland's salmon rivers.

The [background information](#) to the petition states that

“The Scottish Gamekeepers Association (SGA) Fishing Group believes Marine Scotland, a government agency, should carry out a full and formal stakeholder consultation before announcing a definitive policy on the stocking of Scotland's salmon rivers.

“The pros and cons of stocking salmon rivers are debated. The SGA Fishing Group believes the interests of conservation are critical but that these interests also ought to be balanced against the need to preserve viable wild fisheries in Scotland, with the jobs and economic benefits for local communities which are attached to them.

*“Scotland boasts salmon rivers and angler experiences which are known the world over, generating £135m per year in angler spend. **

“The SGA Fishing Group believes that, done properly with agreed protocols, and with local stakeholder knowledge having a role to play alongside the best science, Marine Scotland can arrive at a policy beneficial to both conservation and angling communities.”

The petitioner has published a [blog](#) on the issue, stating his, and the Scottish Gamekeepers Fishing Group's concern regarding increasing restrictions on salmon hatcheries intended to stock Scotland's salmon rivers. While they acknowledge that stocking is controversial, they believe that a full consultation

should be held to allow all sides to have a say before policy is developed. In the background information they go on to say

“To date, Marine Scotland has formed an outline policy position and has then taken the idea out to river board representatives in the expectation of building approval before announcing a decision.

“The position remains contentious and the SGA Fishing Group believes - as is the case with all good policy - that all stakeholders should be consulted properly and formally before decisions are taken.”

Marine Scotland’s current policy position from May 2019 is for a presumption against stocking. More information on the policy and scientific background is set out below.

SPICe produced a briefing on wild salmon in August 2019, which can be found [here](#). The briefing provides in-depth analysis on the pressures facing wild salmon and the role that this species plays in the economy and society.

Stocking of salmon rivers:

Wild Atlantic salmon (*Salmo salar*) are a migratory fish species which spawn in freshwater rivers. Young salmon live in freshwater and then migrate to the seas of the high Arctic, where they mature before returning to spawn in freshwater, completing their lifecycle.

Marine Scotland defines stocking as “the practice of releasing fish, usually raised in hatcheries, into the wild”.¹ Salmon reared in captivity, which are released when the salmon are ready to migrate to the sea, is called “ranching”².

The aim of stocking is to increase fish populations, either for commercial or conservation reasons. Scottish salmon populations have declined, with rod catches of salmon in rivers in 2018 being the lowest on record.³ This has led to the conservation status of Scottish rivers declining in recent years.⁴ Rivers are given a grade from 1-3, and restrictions on activities depend on the grade:

- Grade 1: Exploitation is sustainable. No additional management action is currently required.
- Grade 2: Catch and release should be promoted strongly to reduce exploitation.

¹<https://www2.gov.scot/Topics/marine/Licensing/fishintros/introduction/SalmonStockingPolicy>

² <https://www.speyfisheryboard.com/wp-content/uploads/2018/07/MSS-Report-on-Smolt-Stocking-2015.pdf>

³<https://digitalpublications.parliament.scot/ResearchBriefings/Report/2019/8/19/Wild-Salmon>

⁴ <https://www2.gov.scot/Resource/0054/00542422.pdf>

- Grade 3: Catch and release is mandatory as exploitation is unsustainable.⁵

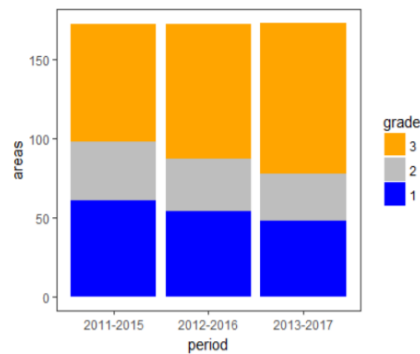


Figure 3. Number of assessment areas for the different grades when the conservation regulations assessment is run for three different time periods.

Source: Scottish Government (2019). Conservation Regulations 2019. Available from: <https://www2.gov.scot/Resource/0054/00542422.pdf>

The graph above shows that the number of rivers given a Grade 3 has increased in recent years.

A number of pressures on Scottish salmon populations have been identified, including exploitation, predation/competition, disease and parasites, genetic introgression from stocking, and habitat issues, among other things.⁶

Genetic introgression refers to the introduction of genes from one gene pool into that of another. One of the concerns with stocking is the genetic impacts on the wild (un-reared) population from the introduction of fish reared in captivity. In their 2014 report, the Rivers and Fisheries Trusts of Scotland (RAFTS) explained that:

“A salmon stock in a river is made up of a single or multiple separate breeding populations, with heritable life-history and behavioural traits that are adapted to their local environment. It has been clearly demonstrated that the operation of hatcheries can cause loss of fitness through artificial breeding of close relatives (inbreeding depression) and breeding between different populations (outbreeding depression). Salmon and trout raised in hatcheries display different physical, behavioural and genetic properties which result in a lower life-time performance than that of wild counterparts. There is also evidence of damage to wild stocks resulting from increased competition from hatchery fish stocked at larger than natural size for the time of year or at numbers that crowd out the wild fish. Subsequent loss of fitness and performance of wild stocks have been identified as a consequence of mating between wild and hatchery-reared fish.”

⁵<https://digitalpublications.parliament.scot/ResearchBriefings/Report/2019/8/19/Wild-Salmon>

⁶ <https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence/status/Pressures>

As a result, RAFTS felt that there should be a general presumption against stocking but acknowledged that *“there are specific situations where the use of hatcheries can be appropriate in breeding support programmes aimed at restoration and for mitigation for permanent loss of juvenile production.”*

A Marine Scotland Science report compared returns to Scottish rivers from hatchery and wild-reared smolts (young salmon) “originating from the same stocks released concurrently at the same river sites”.⁷ The experiment found that recapture of wild-reared smolts was on average 10x higher than that of stocked fish, with recapture rates of stocked fish ranging from 0-0.23%.⁸ The authors concluded that stocking is “unlikely to be sustainable in the Scottish context” given the low success rate and associated genetic risks to wild stocks.⁹ On the genetic considerations, they explain:

“It is well established (Einum and Fleming, 2001; Weber and Fausch, 2003; Jonsson and Jonsson, 2006) that artificial rearing of salmonid fishes affects their subsequent biology. In captivity they are held at high densities relative to wild-reared fish, feed primarily on artificial food and may lack the abilities to recognise and catch wild prey effectively. Compared with wild-reared fish, hatchery-reared salmon are a different shape, have lower swimming capabilities, reduced social awareness, and poorer predator recognition and escape behaviours. Indeed, the overall brain mass is smaller in hatchery than in wild-reared salmonids, probably reflecting the simpler environment in which they grow (Lema et al., 2005; Kihlslinger et al., 2006). It appears that the longer fish are kept in artificial rearing facilities before they are released, the less well adapted they are to survival in the wild (Milot et al. 2013; Young, 2013). Therefore, poor survival of hatchery-reared smolts is to be expected. Despite extensive periods of stocking on the Rivers Tyne and Thames (England) with both hatchery-reared parr and smolts as part of a rehabilitation programme, both Milner et al. (2004) and Griffiths et al. (2011) 9 concluded that natural processes (recolonisation, improved water quality, better access) were more important to recovery than initial pump-priming with hatchery-reared fish.”

Likewise, following a conference in Glasgow in 2014 sponsored by IBIS, a European-funded collaboration between Loughs Agency, the University of Glasgow and Queen's University Belfast, scientists published what they called [“A scientific consensus on salmon stocking”](#). They summarise “what the authors believe accurately reflects the current scientific consensus on salmon stocking” as:

- *“Removing adult salmon from the natural environment, breeding them in captivity, and stocking their hatchery-reared offspring into the natural environment can, but does not always, increase the number of adults*

⁷ <https://www.speyfisheryboard.com/wp-content/uploads/2018/07/MSS-Report-on-Smolt-Stocking-2015.pdf>

⁸ <https://www.speyfisheryboard.com/wp-content/uploads/2018/07/MSS-Report-on-Smolt-Stocking-2015.pdf>

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they contribute to the next generation. The net demographic outcome of stocking depends on the balance between the higher survival rates experienced by fish in captivity, and the subsequently lower survival rates of stocked fish relative to wild fish of the same age.

- *“Hatchery fish that survive to reproduce as adults in the natural environment, whether through mating with other hatchery fish or wild fish, typically produce fewer adults in subsequent generations than do wild fish, and this difference is more pronounced where permanent hatchery lines or non-native fish are used for stocking.*
- *“Stocking may thus increase the number of adults in a population temporarily, but is likely to reduce the longer-term productivity of the population.*
- *“Stocking poses a risk to wild salmon populations through a variety of ecological and evolutionary mechanisms, such as increased competition for food and interbreeding between hatchery and wild fish.*
- *“The risk to wild populations is scale-dependent. The more hatchery fish that are stocked and the higher the ratio of hatchery to wild fish in the natural environment, the greater the risk to the wild population.*
- *“The impact of stocking on the genetic make-up of a salmon population depends in part on the type of broodstock used. Some impacts can be minimised by using wild native broodstock (i.e. same population) bred and reared using best practice. However, even in this case genetic changes can occur due to the absence of sexual selection (i.e. crosses are artificially produced that would not happen in the wild), and relaxed and domestication selection in the hatchery environment. 2*
- *“Following the cessation of stocking, the integrity of a wild population is likely to recover over time. However, in some cases stocking may lead to permanent changes in the genetic composition of a population, which may affect population productivity.*
- *“Where the integrity of wild salmon is a management priority, stocking hatchery fish into wild populations is unlikely to contribute to management objectives.*
- *“Where a population is at imminent risk of extinction, and all appropriate and possible fishery management and habitat restoration interventions have been realised, time-limited stocking may be appropriate to rescue the population. That is, when local extinction is imminent, the benefit of a short-term increase in adult abundance may outweigh the risk of long-term damage.*
- *“Where the integrity of wild salmon is not a management priority, stocking may support fisheries by producing adults for capture or harvest. In such instances, however, some stocked fish will inevitably stray to neighbouring populations, which may have different*

management objectives. It is important to appreciate and assess this risk.

- *“The costs, benefits and impacts of a stocking programme on wild populations can only be assessed with well-planned monitoring programmes. Such monitoring is an important part of all stocking activities.*
- *“Science alone does not determine the role of stocking in salmon management. Social, political and economic factors all influence fisheries management decisions.”*

More recently, in their 2017 report, “[Understanding the risks and benefits of hatchery and stocking activities to wild Atlantic salmon populations](#)”, the North Atlantic Salmon Conservancy Organisation (NASCO) outlined:

“Analyses conducted by the ICES Working Group on the Effectiveness of Recovery Actions for Atlantic Salmon indicated that improvements in connectivity and freshwater quality and freshwater habitat restoration were most often reported as having a high or very high benefit to the recovery of salmon populations, so much can be achieved to rebuild stocks without the need for stocking. While hatchery programmes and stocking may have a role to play in kickstarting the restoration of stocks in rivers where they have been lost, or where the stocks are at critically low levels, stocking continues in some areas irrespective of the risks to the wild stocks associated with such activities and without evidence of benefits... There should be a strong presumption against stocking for sociopolitical reasons and the use of tools such as Population Viability Analysis should be used to inform decisions to stock where wild populations are considered to be at risk of extirpation, and then only as an interim measure while other rebuilding efforts are being implemented.”¹⁰

NASCO also conclude that while there are new methods being developed that may mitigate the risks of stocking, these require further evaluation.

Scottish Government Action

Since 1 August 2008, legislation has been in place to regulate stocking/introduction of freshwater fish in Scotland. It is illegal to stock live salmon or trout (or spawn) into Scottish inland waters without the written consent of a District Salmon Fisheries Board, or from Marine Scotland (where there is no DSFB operating or the introduction concerns species other than salmon or trout)¹¹ More information on licensing for introductions can be found [here](#).

Fisheries Management Scotland state:

¹⁰ http://www.nasco.int/pdf/reports_other/2017ThemeBasedSession.pdf

¹¹ <https://www2.gov.scot/Topics/marine/Licensing/fishintros/introduction>

“DSFBs are statutory regulators and written consent must be obtained from the relevant Board prior to the artificial stocking of salmon and sea trout in the Board’s district. Fisheries Management Scotland have produced guidelines to assist Boards in this regulatory function^[12]; hatcheries and restocking projects can be effective management actions if carried out in the appropriate circumstances. Inappropriate stocking practice can be ineffective and costly at best, and at worst positively damaging to native stocks and sub-stocks of salmon. This is becoming more evident as our understanding deepens in relation to the genetic structures of salmon.”¹³

As the body responsible for developing and implementing policy on this issue, Marine Scotland have stated that “Increasingly, scientific studies are concluding that there are risks of negative effects of stocking wild Atlantic salmon.”¹⁴ As a result, as of May 2019, Marine Scotland’s policy on stocking of wild Atlantic salmon is for a presumption against stocking, *unless*

- “salmon populations would be significantly impacted¹⁵ without such intervention, because other options to mitigate sufficiently the impact of human activity are undeliverable”, or
- The stocking activities are for scientific purposes or for restoration, defined as “stocking to encourage and accelerate the return of a local Atlantic salmon population towards a previous state in water bodies assessed as significantly impacted¹⁶ due to human activity which has now been successfully mitigated or completely resolve.”¹⁷

However, Marine Scotland have stated that they will assess each case on individual merit and will do so in accordance with NASCO’s guidance on incorporating socio-economic factors into decisions regarding the Precautionary Principle.¹⁸

Scottish Parliament Action

Salmon stocks are a topic of interest within the Scottish Parliament. The Scottish Parliament are not currently considering stocking as a management practice, but are considering other related topics.

¹² At time of writing, these were not accessible online.

¹³ <http://fms.scot/policy-areas/>

¹⁴ <https://www2.gov.scot/Topics/marine/Licensing/fishintros/introduction/SalmonStockingPolicy>

¹⁵ ‘Significantly impacted’ means where there is a risk of an environmental standard being breached. The standards are set out in <https://www.gov.scot/publications/scotland-river-basin-district-standards-directions-2014/>

¹⁶ ‘Significantly impacted’ means where there is a risk of an environmental standard being breached.

¹⁷ <https://www2.gov.scot/Topics/marine/Licensing/fishintros/introduction/SalmonStockingPolicy>

¹⁸ <http://www.nasco.int/pdf/agreements/socioeconomics.pdf>

On 4 April 2019 the Scottish Parliament [debated the issue](#) of declining salmon stocks, in response to Motion S5M-15657, in the name of Rachael Hamilton,

“That the Parliament notes the reported long-term decline in salmon stocks across Scotland’s major rivers, including the Tweed, the Spey, the Dee and the Tay; understands that catches have decreased over the last decade; notes that, on the Tweed, rod catches have fallen from 23,219 in 2012 to 6,577 in 2017; believes that this is marginally above the previous worst years, 1977 and 1980; understands that angling in Scotland supports around 2,800 jobs and contributes £100 million to the economy; acknowledges that fishing generates significant employment opportunities in rural areas; recognises that there are significant challenges ahead if salmon stocks are to return to previous levels, and notes the calls for the Scottish Government to take urgent action to devise effective conservation and management plans in conjunction with relevant bodies to help address what it sees as the persistent decline in salmon stocks.”

Mairi Gougeon MSP, Minister for Rural Affairs and the Natural Environment concluded the debate:

Mairi Gougeon:

“We have to consider all the pressures. As I understand the discussion that took place at the Environment, Climate Change and Land Reform Committee on 12 March, when the Conservation of Salmon (Scotland) Amendment Regulations were considered and passed, Claudia Beamish noted the significant improvement in this year’s assessment approach. We have to consider everything in the round and make sure that we do the research into each of the individual pressures.

“We are continuing to develop and improve our annual assessment of adult stocks. Last year, we introduced a Scotland-wide assessment of juvenile stocks, which we hope will complement and improve the existing science. However, angling is just one part of the picture; as I have just stated, research in the area is vital.

“In March 2018, we announced a package of £500,000 to be invested across a range of research and practical projects that are helping us to examine and address the wider pressures on salmon. For example, on predation we are working with the sea mammal research unit to analyse the behaviour and movement of seals in the River Dee. Later this year, Marine Scotland will publish the results of research that was carried out with the Ness district salmon fishery board and the University of Aberdeen to identify the impact of dolphin predation on returning adult salmon in the Moray Firth. I am also happy to confirm to Joan McAlpine that we have recently commissioned new research to analyse the feeding habits of fish-predating birds, to identify where and when they are feeding and what they are eating—a point of concern that was raised by members during the debate. I know that, in the past, the impact of such birds has been of concern to Rachael Hamilton and to many anglers and fisheries managers.

“SEPA is working with local authorities, landowners, fishery trusts and conservation bodies to deliver an annual programme of projects to remove and ease barriers to migrating fish. There is a recent example of that in West Lothian, where, since January, water is now flowing down a new bypass channel around the redundant rugby club weir, which is the third of seven weirs that will be tackled by 2021 to restore fish access to the River Almond catchment. The project is opening up around 200km of the river network to native fish, including salmon, for the first time in generations. It will also create new opportunities for angling, tourism and recreation.

“I recently visited the Esk district salmon fishery board in Brechin to hear about the work that it does. I was taken to the site of the Pow Burn project, in which the board is working with SEPA to change the morphology of the burn and look at the impact that that has made. The board is starting to see trout return to that part of the river, where there had been none for a number of years. Board members also described to me their work on the catchment-wide approaches that Mark Ruskell mentioned. That vital work includes the tree planting that is happening further up the glens and other work around the Esk in relation to invasive non-native species.

“On habitat improvement, fisheries boards are working with SEPA to address acidification and reduce diffuse pollution. Scottish Water is working to improve abstraction regimes in nine zones, to ensure that sufficient water remains in our rivers and lochs during periods of low rainfall.

“As a number of members have mentioned, other pressures are associated with our salmon farming industry, giving rise to concerns. We have responded to the recent report of the Rural Economy and Connectivity Committee on salmon, and identified links to many of our current initiatives, including the farmed fish health framework, the interactions working group, and SEPA’s sector plan.

“During the debate on the report on 6 February, there was broad cross-chamber support for the sector, but with an emphasis on making progress on the known issues. We agree with that and have acknowledged that salmon farming must be developed sustainably, with appropriate improvements that help to minimise and address environmental impact.

“However, such pressures do not affect only the salmon in our rivers. As the ICES figures show, the issues exist much more widely, and the loss of so many fish in the marine environment is also of great concern. That is why it is so important that we work with our partners across the world. Marine Scotland is taking part in sea sailor, which is a research programme that is being conducted by an expert international consortium to examine the factors that impact on the variation in marine survival of Atlantic salmon over time and in different geographical areas.

“More widely, this is the international year of the salmon, which is an initiative that is being led by the North Atlantic Salmon Conservation Organization and the North Pacific Anadromous Fish Commission. I recall that Michelle Ballantyne also lodged a motion on the issue, much of which the Scottish

Government agreed with. At the time, I did not realise that she was also the species champion for the salmon.

“The international year of the salmon aims to raise awareness and understanding of the social and economic benefits that salmon provide, and to highlight the many issues that they face around the world. Last October, Roseanna Cunningham launched the Scottish component of the international year, when she met the presidents of NASCO and the North Pacific Anadromous Fish Commission in Perth. Officials from Marine Scotland were among a range of international speakers who contributed to last Friday’s annual meeting of Fisheries Management Scotland.

[...].”

In addition, salmon regulations are continually updated to reflect salmon stocks. The Environment Climate Change and Land Reform Committee passed the Conservation of Salmon (Scotland) Amendment Regulations 2019 in March 2019, and considered the Conservation of Salmon (Scotland) Amendment (No. 2) Regulations 2019 [on 28 January 2020](#). The regulations relate to the grading of Scottish rivers (as mentioned above). Changes to the model for assessing two of the variables used to assess conservation status of rivers (egg requirements and number of returning adults) were changed between 2018 and 2019 in response to comments on a public consultation and feedback from DSFBs.¹⁹

Finally, both the Rural Economy and Connectivity Committee, and the Environment, Climate Change and Land Reform Committee have recently taken evidence on the salmon farming in Scotland, which includes the impact on wild salmon stocks. The Rural Economy and Connectivity Committee’s report on the enquiry can be found here:

<https://digitalpublications.parliament.scot/Committees/Report/REC/2018/11/27/Salmon-farming-in-Scotland>

Anna Brand
Senior Researcher
28/01/2020

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¹⁹ <https://www2.gov.scot/Resource/0054/00542422.pdf>