

Removing the Barriers

Salmon as a climate change indicator species

Salmon are a keystone species and clear indicator of the health of our freshwater and marine environments. They are impacted by climate change across both their freshwater and marine life stages. The population is in crisis and this is telling us that there are serious issues relating to their survival as the climate change emergency accelerates. It also makes them a perfect “indicator species” to measure how effective local and national adaptive management techniques that can be in reversing climate change impacts.

Wild salmon, in their migrations across the oceans, are one of the natural world’s most sensitive indicators of the biological and chemical effects of climate change. Recent research has shown quite clearly that aquatic systems are changing and changing fast. Water is getting warmer, storms are getting stronger and the availability of food resources in and from the ocean is under threat. Oceans and atmosphere are intimately and inextricably linked. Changes in the oceans are “forcing” unprecedented shifts in climate patterns.

Similar patterns are apparent in freshwater. We have recently witnessed a series of unprecedented rainfall deluges across the UK which has caused massive movements of mud and silt. Such climate perturbations are also causing major biological modifications, including the appearance of new marine species off the coast and the spread of non-native species around the coast and in freshwater.

A significant part of Scotland’s and the wider UK’s natural capital, salmon are now disappearing fast from our rivers and seas. The population has crashed by 75% in the last 20 years. Salmon are a species whose presence and role within an ecosystem has a disproportionate effect on other organisms within that system. As a keystone species if they disappear, they will take with them entire eco-systems and a significant part of Scotland’s heritage.

A structural change from the current overly prescriptive method to a more adaptive management and “fleet of foot” process is required if we are going to make any significant in-roads to ensure the survival of salmon and other species impacted by climate change. If the current trend continues, wild salmon could be extinct across Scotland within the next 20 years.

The purpose of this document is to demonstrate the MSA’s commitment to work collectively with Marine Scotland and others to help deliver the substantial work that is required to reverse wild salmon’s decline and, by so doing, demonstrate that we can successfully mitigate the wider threats to biodiversity and species survival which climate change represents. Using salmon as an indicator species we can trial a range of solutions and understand how to influence our long-term management strategy for species survival.

Using Marine Scotland’s identified 12 pressure groups, which identifies the mortality pressures associated with salmon, the aim is to speed up the solutions required to reverse salmon population declines. Lessons learnt from this exercise can be then applied to other species impacted by climate change.

Using a combination of the best available evidence and new projects focussed on mortality impacts emanating from the Likely Suspects Framework, the aim is to remove the barriers to implementing the solutions now.

We recognise that there are other elements within each of the 12 pressure groups where there are opportunities to make significant gains – such as the fundamental importance of protecting wetlands, peat bogs and other natural storage areas for freshwater; minimising fish and seal predation on salmon; reducing in river poaching; and mitigating the impact of culverts – but the outcomes described below represent our immediate priorities.

It is understood that our suggested outcomes will sometimes require substantial funding and a change to current thinking. Predation, exploitation and the two primarily aquaculture related pressures – fish health and genetic introgression – are clearly very sensitive areas, which we acknowledge makes progress particularly challenging.

Whilst we have offered outcomes against each of the 12 pressure groups, we stand ready to focus funding and accelerated actions on the other 8 pressure groups, which we believe have a much greater reach across to wider environmental concerns and where there may therefore be broader appeal.

So, what do we need to do?

1. **Habitat - Thermal - Tree planting.**

Rising freshwater temperatures are a major threat to juvenile salmon survival. In order to help reduce freshwater temperatures we should be planting the right sort of trees along our riverbanks. Although this process has started it is far too slow, it has little co-ordination, is poorly funded and is often focussed in the wrong areas. In addition, there is little or no follow up and plantations are often poorly maintained.

Outcome - Clear guidelines, utilising the Scotland River Temperature Monitoring Network model of where best to plant and an appropriate budget should be created to enable this riparian planting to happen promptly with a clear strategic focus and sufficient scale.

2. **Predation / Competition – Predator control.**

In-river predation of juvenile salmon by a wide range of species in the freshwater part of their life cycle has always happened. Salmon are both predator and prey in different parts of their life-cycle. So, what has changed? As predator numbers have remained stable or increased over the years, salmon numbers have declined. The impact on salmon has therefore become greater. When there were 8 million salmon returning to rivers in the North Atlantic, losing 500,000 had little impact. Now that we have only 2 million salmon returning to our waters, losing 500,000 has a disproportionate and unsustainable impact.

In order to reduce this impact a more adaptive and flexible approach to the current licencing system should be considered. If we wait until we have all the science to prove every single point, there will be no salmon left. We respect and support the need for sustainable bird populations, for example, but they should be balanced against the wider environmental and economic benefits of having healthy salmon populations.

We also recognise the significant sensitivities if/where appropriate management activity is required. However, we are convinced that significant improvements to the current SNH 'shoot to scare' licensing regime can be made which would benefit juvenile salmon without jeopardising protected birds or causing stakeholder alarm.

Considerable resource is currently required to count birds to support annual licence applications to SNH. The majority of rivers do not have this resource, cannot therefore apply to shoot to scare and so deliver no protection from bird predation during the smolt run. Those that do, such as the rivers Nith, Tweed, Dee and Spey, are investing vital resources which, particularly at this period of crisis for wild Atlantic salmon, could be far more usefully spent tackling other local pressures, including but not limited to planting riparian trees, for example.

Outcome - We ask that SNH, SASA and Marine Scotland urgently pilot a new regime which gives all Scottish rivers a de minimis annual shoot to scare allowance, using the historic counts which have been provided to date as reference data. Such a scheme would provide a significant opportunity to deliver better protection during the critical smolt runs, whilst also freeing up local resources to better mitigate other pressures.

3. **Exploitation.**

Traditional methods of killing salmon broadly fall into two categories. Firstly netting. A variety of netting methods are used to kill salmon as a source of food. Over the past 10 years there has been widespread recognition that this indiscriminate form of harvesting salmon as a resource is unsustainable. Significant steps have been taken already to reduce / eliminate this form of exploitation.

Outcome - Illegal gill netting, very close to the shore, remains a recurrent issue, because the existing regulation allows illegal operators to claim that they are targeting species other than Atlantic salmon and sea trout. We seek the prohibition of the deployment of gill nets within 0.5 miles of the shore, where the method of deployment and/or depth

of water where deployed would result in a high risk of a salmon and/or sea trout bycatch.

Secondly exploitation by sport anglers. Over the past 20 years sport anglers have been the driver behind salmon conservation. Without salmon as a resource, individuals have no angling opportunity to offer clients and therefore no income. Additionally, capital values relating to salmon fishing decline as the number of fish caught decline. Happily, for anglers there is no need to kill a salmon once it has been caught on a rod and line. Catch and release is now commonplace across Scotland with most rivers well into the 90% + of all fish caught being returned. Angling exploitation is also governed through the Conservation levels established for each river by the Scottish Government.

Outcome - Consideration should be given to compulsory catch and release if salmon stocks are not seen to be increasing as part of a wider set of measures going forward.

4. Fish health – reduce the impact of Aquaculture.

The pressures that the aquaculture industry exert over wild salmon are well documented and the current IWG reviewing aquaculture impacts and the Technical Working Group is due to report shortly.

Outcome - Actions from the IWG and the Technical Working Group should be implemented quickly and monitored appropriately. The aquaculture industry has a duty of care not to destroy the marine environment that it occupies or to continue to negatively impact wild salmon and other marine species. The Scottish Government has a duty of care to put in place adequate protection through appropriate legislation to ensure this. In particular, focus should be given to creating a physical barrier between farmed and wild salmon (closed containment) to help prevent the spread of disease from farmed to wild salmon and to reduce the lethal impact of sea lice on wild salmon and sea trout.

5. Genetic introgression - reduce the impact of Aquaculture and better regulate stocking.

Genetic introgression from farmed salmon escapes is identified, in Norway, as the number one threat to wild salmon. We welcome Marine Scotland's national introgression project, which commenced in July 2018, which seeks to quantify levels of introgression of genetic material from farm escapees into wild Scottish Atlantic salmon populations.

Outcome – the introduction of an introgression threshold which, if exceeded, triggers the implementation of immediate additional mitigation measures / removal of the local salmon farms.

Hatcheries - Increasingly, scientific studies are concluding that there are risks associated with stocking juvenile wild Atlantic salmon. These risks may be short term, such as attracting higher numbers of predators or increasing competition among the fish such that the population is reduced to where it would have been without stocking. Risks may also be longer term through reduction of the strength and resilience of natural populations by interfering with the genetic structure of wild salmon populations. This process of introducing mal-adapted genes, termed introgression, can be particularly insidious if the stocked fish are not local to the area where they will be introduced. The risk also increases with the time that the stock is held in a hatchery. Selection for characteristics that are suitable for a rearing environment create maladapted fish for the natural environment. A further consequence of using locally adapted stock is that the process of removing brood stock can itself also weaken the wild population, particularly where there is a plentiful supply or indeed a surplus of spawning and nursery areas. .

In situations where stocking is judged to offer a viable option for delivering benefits for an Atlantic salmon population, these are best delivered through the adoption of an appropriate stocking practice which guards against the risks of genetic damage to the local wild Atlantic salmon stock and follows the NASCO guidelines.

Outcome- We welcome and support Marine Scotland's new wild salmon stocking policy, but seek its consistent implementation through Marine Scotland's formal review of all stocking activity across Scotland.

6. Barriers to migration – faster mitigation of the upstream and downstream barriers to migration.

Scotland's River Basin Management Plans (RBMPs) set objectives for the protection and improvement of our water environment, with the aim of 87% of water bodies achieving a classification of 'good ecological status' by 2027. Fish passage is recognised as one of the three main priorities of RBMP2, including the challenges faced by smolts in their downstream migration, particularly in relation to hydro schemes.

Outcome – We seek a significant acceleration of this work with clear guidelines set to prioritise smolt migration across impacted rivers. For example, SEPA and Marine Scotland have identified that downstream smolt passage can be improved across circa 26 of Scotland's hydro dams. Whilst we acknowledge that this is a complex subject area in terms of designing and engineering case by case solutions, the positive outcome for salmon when delivered has unequivocal agreement across all experts. With new focus, energy and commitment, we are convinced that significantly enhanced smolt migration through each of these 26 barriers can be delivered, resulting in a measurable increase in the number of adult returners. SEPA have identified the opportunity, but progress to date has been painfully slow and we perceive it currently implausible that the necessary work will be concluded within the next **five** years – a timescale which we believe is necessary and achievable if we are to halt salmon declines in time.

7. Habitat - Water quantity – improve water levels

Historical water levels set at the time of creating hydro schemes did not reflect the needs of salmon in those rivers. Put another way, we would not set them at these levels now because we understand the negative impacts they would have. This historical misunderstanding needs to be rectified. The RBMP process and SEPA's CAR licensing govern water abstraction and impoundment. We welcome the introduction of a new licence condition which will link to water scarcity levels and will better reflect the current pressure on individual catchments and ecology.

Outcome - SEPA must have sufficient resources to assess compliance with licenses; license reviews should be completed in a quicker timescale and we seek urgent clarification of whether and, if so, how the current status of salmon stocks (e.g. conservation status arising from the Conservation of Salmon(Scotland) regulations) form part of SEPA's licensing process. In short, more water needs to be made available to migratory salmon rivers that have historical water levels set at an inappropriate and damaging level.

8. Habitat - Water quality – reducing Pollution.

It is vitally important that in the future the UK should maintain the highest international water quality targets and standards. It is often said that our rivers are in better conditions now than any time since the industrial revolution. Indeed, reductions in diffuse pollution have been achieved through the controlled activity regulations (CAR) and associated "General Binding Rules" (GBRs) and adherence to other guidelines such as the forest and water guidelines. However, we believe more still needs to be done.

Outcome - In line with FMS, we too seek assurance that simply meeting GBRs will result in ecological improvements which benefit fish and fisheries. If they do not, they desire changes to the GBRs to ensure that these ecological benefits occur.

We are also keen to help further explore the potential for nutrient enrichment to improve the size and therefore marine survival of smolts, building on Marine Scotland's early positive research results.

9. Habitat – Riparian – Scotland wide delivery of protected buffer strips.

GBRs include requirements for buffer strips to reduce fine sediment and nutrient delivery and encourage the growth of riparian vegetation.

Outcome – We seek an audit of what river length, across Scotland, does not have a buffer strip which complies with GBR requirements and an associated plan to remedy the shortfall within an ambitious timescale.

10. Habitat - Instream – optimising spawning areas.

We recognise that hydro schemes and/or extreme weather can negatively impact riverbed gravel, creating sedimentation issues.

Outcome – We would like to explore a joint project which delivered some controlled gravel introductions, initially where hydro schemes have impacted natural renewal, to monitor the impact on wild salmon, following reported success of similar initiatives in Wales.

11. Invasive non-native species.

The SNH-led Scottish Invasive Species Initiative (SISI) is a priority project in the Scottish Biodiversity Strategy's route map to 2020. The route map sets out the major steps needed to improve the state of nature in Scotland and halt the loss of biodiversity by 2020. It highlights the spread of invasive species as one of the key pressures on biodiversity. The SISI project is not only involved in highlighting the spread of invasive species but is also engaged in practical management action to control such species, such as mink.

Outcome – We would welcome a review of SISI's future plans to explore the scope for them to be prioritised on actions which support the recovery of wild salmon.

12. Coastal and Marine – in-built monitoring of Offshore renewables in the Marine environment.

As part of our efforts to combat climate change, Scotland has proposals to erect a huge quantity of offshore wind turbines around the entire coast of Scotland. Little is known about the long-term impact that this will have on fish such as salmon that have to migrate through or past them.

Outcome - In order to ensure that we do not end up with the same level of conflict that we currently have with aquaculture, adequate long-term funding should be put in place to monitor salmon migration past these developments. Where such impacts are shown to exist on migration route and / or survival, consent for development should be withheld.

Our initial priority is for research which investigates the influence of large arrays of wind turbines and wind turbine bases and possibly construction activities on the level of predation by all types of predator – marine mammal, bird and fish - on fish, including migrating salmon smolts and adults and sea trout.

13. Prescription - saving what we have – create Strongholds.

Some of Scotland's most iconic salmon rivers have all but lost their salmon runs. The social and economic impact on these areas has been significant. Rivers such as the Tweed, Tay, Spey and Dee were major tourist attractions generating substantial employment and economic value from salmon fishing. Much of their regional history is tied up in salmon folklore and it is an integral part of the culture in these areas. This is fast disappearing.

Outcome - Where we still have viable salmon populations consideration should be given to giving these areas wider powers to protect these "Strongholds". By creating Salmon Strongholds where the precautionary principle applies when considering future developments, we can go a long way to preserving this keystone species in areas that it still lives and thrives.

14. Salmon as an indicator of Climate Change.

What we hope that we can achieve by getting other parties involved in “removing the barriers” is a co-ordinated approach to saving salmon and monitoring our ability to mitigate against climate change. By doing so we will establish a blueprint for how other species can be protected from the worst effects of climate change. Led by the Scottish Government and announced by the Minister when the wild salmon strategy is presented to Parliament in September would be a list of outcomes such as those above. We could identify a list of organisations that are prepared to sign up to the wild salmon strategy and help implement the solutions needed. By building in a monitoring process, such as the national electrofishing programme for Scotland (NEPS), we can measure the improvements made and adapt to new ones that can make the difference.

List of organisations

Scottish Government

Marine Scotland

Scottish Natural Heritage

Scottish Environment Agency

Missing Salmon Alliance partners

Fisheries Management Scotland

Crown Estates Scotland

Scottish Wildlife Trust

Royal Society for the Protection of Birds

Royal Society for the Protection of Animals

Scottish Salmon Producers Organisations

Industry bodies from Whisky / Power / Oil / Renewables etc.