LINK Consultation Response
Significant Water Management Issues for Scotland consultation
30th June 2020

Scottish Environment LINK

Significant Water Management Issues for Scotland consultation

Scottish Environment LINK welcomes the opportunity to comment on the Significant Water Management Issues for Scotland (SWMIS).

Freshwater biodiversity is in decline not just in the Scotland, but globally. International research[1] confirms that tackling freshwater biodiversity loss (in line with national and international frameworks), requires prioritisation at a local level. For some parts of our water environment, current targets and frameworks (or their implementation) do not go far enough to protect the unique biodiversity that these habitats support; for example small waters such as ponds, headwaters, ditch systems, small lakes, and ground water dependent terrestrial ecosystems such as springs, fens and other wetlands, that fall outside of the size thresholds for designation as WFD waterbodies all require action to improve their status that is not well promoted through the existing River Basin Management Planning framework.

River Basin Management Plans (RBMPs) must be alive to the opportunities to deliver the additional actions needed to secure the future of these sites (regardless of whether they are articulated through revised waterbody targets, as actions embedded in the plans themselves, or contained in complementary frameworks such as the National Planning Framework and the Land Use Strategy for Scotland). Similarly, they should be alive to opportunities to deliver against wider objectives and targets; for example, improving soil health, expanding the use of natural flood management solutions, and improving biosecurity to protect and conserve nature.

We must work collaboratively, considering how to realise the synergies between public sector targets, and the ambitions of sectors outside of Government. Of particular importance will be the environmental ambitions of Scottish Water, and the transformation of the agricultural sector as it moves towards a more climate and nature-smart future.

Water can only be managed sustainably if all water-users in the river basin work together: all public bodies, local communities, businesses, and land and water managers. For the private sector, water is both a risk and an opportunity, whether for corporate headquarters, manufacturing facilities, supply chains, or in the fields where raw materials are grown. But businesses are also uniquely positioned to champion innovative solutions to freshwater challenges, demonstrating visionary leadership that secures water for the good of the business, people and nature. More businesses need to go beyond adopting water efficiency practices to becoming better water stewards.

To achieve the holistic collaboration of stakeholders described above requires multi-stakeholder engagement combined with spatial planning. Significant benefits could be realised by integrating / aligning river basin management planning with similar processes for planning and prioritising environmental land management and delivery of Nature Networks[2].

Climate impacts

Climate change is recognised as a major driver of change in nature, globally[3]. In Scotland, it is causing widespread changes in the abundance, distribution and ecology of a range of wildlife[4]. Freshwater habitats and species are particularly at risk, because of profound effects of the prevailing conditions of the water

[1] https://academic.oup.com/bioscience/article/70/4/330/5732594
[2] https://www.scotlink.org/wp-content/uploads/2020/03/Nature-Networks-Briefing-FINAL-2.pdf
[3] https://zenodo.org/record/3553579/files/ipbes_global_assessment_report_summary_for_policymakers.pdf?download=1
[4] https://www.scotlink.org/files/documents/Scotlands_Nature_Red_Alert.pdf

environment on interrelationships between ecosystem functioning and prevailing conditions[5]. The impacts of climate change on freshwaters are likely to include increased air and water temperatures and an increased extent and frequency of flooding and droughts[6].

Giving more space for rivers and coasts to move and adjust naturally will regenerate habitat, improve wildlife and help us adapt to climate change. Spatial planning must prevent development on floodplains, and measures to ensure sustainable land use (e.g. arable reversion) and management (e.g. crop rotations) will be necessary to support our adaptation to the effects of climate change, helping to restore the functionality of some floodplains. High proportions of rivers are disconnected from their floodplain by embankments and flow control structures, limiting the scope of those floodplains to hold water during high flows and contributing to downstream flooding issues. This loss of connectivity must be reversed. Mapping of priority wetland habitats which identifies existing areas of good-quality habitat as well as opportunities for restoration, should be drawn upon to identify areas where habitat restoration or recreation will be valuable to support biodiversity delivery as well as creating functional floodplains / coastal habitats that can play a role in flood and coastal erosion risk management. Targeting tree planting to riparian areas will help to shade watercourses and prevent water temperatures rising. The development of Nature Networks has a key role to play here.

The conservation of peatland is key to delivering many benefits for the water environment. Peatlands are important stores of carbon and healthy, functioning bogs retain water and help to attenuate downstream flows. However, if they are damaged they can no longer store as much carbon, or water for us. Over time, there is the potential for positive feedback within the carbon cycle to lead to an increase in carbon dioxide in the atmosphere and a worsening of the effects of climate change. The loss of organic carbon and iron to the water environment, results in colouring of the water and subsequent increased costs for drinking water treatment, and the exacerbation of temperature rises in downstream watercourses.

Despite the international importance of Scotland's peatlands, peat extraction continues to happen across central Scotland. Many peat extraction sites have permission to extract minerals which allows continued peat extraction for 30 to 40 years into the future. Whilst permissions for peat extraction are reviewed every 15 years, this process only allows for the planning conditions to be updated, with no allowance for the original permission to be withdrawn. It is essential that SEPA opposes the continuation or extension of peat extraction rights at every opportunity.

Many bogs have had their peat extracted for sale as compost for horticulture; however historically agricultural intensification and afforestation have also contributed to the loss of these habitats. Recent voluntary approaches to move the horticultural industry away to peat alternatives have failed to make the step change that is required to protect this fragile habitat. A change in buying habits of gardeners, horticulturists and local authorities is required. A tax on the production of peat products could lead to producers sourcing their peat from outwith Scotland, and therefore damaging this fragile habitat in other countries. The long-term aim should be a ban on the sale of peat in Scotland, however in the meantime, a levy on the sale of peat products would lead users to source alternatives to peat and raise funds to ensure continued investment in research on alternatives and the restoration of degraded bogs[7].

Without intervention and restoration, further habitat loss, and subsequent loss of biodiversity is likely due to the gradual desiccation of bogs which have been fragmented from each other and damaged by previous attempts at drainage. Continued investment is therefore required in peatland restoration to provide carbon storage, retain water and attenuate flows, and to prevent the loss of carbon into the downstream environment.

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[5] https://onlinelibrary.wiley.com/doi/10.1002/aqc.2958

[6] https://journals.sagepub.com/doi/10.1177/0309133314542957

[7] https://www.rspb.org.uk/Images/Greening%20UK%20Gardens_tcm9-271944.pdf

Restoring resilience in physically modified rivers

Relative to their size and extent, freshwater habitats are of exceptional importance for biodiversity. Mechanisms must be put in place to ensure that water-dependent habitats (including running & standing waters from source to sea; and freshwater and estuarine / coastal wetland habitats) are recognised, and their protection and restoration prioritised

Habitat restoration and creation, planned and prioritised through a spatially mapped Nature Network informed by local knowledge, should then be funded by a combination of sources including WFD-focussed funding, Scottish Rural Development Programme payments from Government, Flood Risk Management Funding, Scottish Water investment programme and other sources, and through developer-funded delivery of Biodiversity Net Gain. Together, this spatial planning and framework integration can deliver the "urgent step change in effort" that the biodiversity crisis demands[8].

We need to accelerate the implementation of both strategic and specific actions to manage catchments in ways that reduce freshwater pollution, improve water quality and regulate the quantity and timing of flow. These interventions will both support nature's recovery, and help the freshwater environment become more resilient to the impacts of climate change. Nature-based solutions to climate change[9] are increasingly recognised as an essential approach to water management and we must restore wetlands and rivers, including managing water flow patterns, in ways that promote ecosystem processes. Restoring and rewetting drained peatlands is a key nature-based solution to climate change, with the scope to lock up carbon, benefit biodiversity and enhance human well-being. Restoring wetlands and tidal marshes can protect coastal cities from storm surges and erosion. However, nature based solutions are not yet sufficiently incorporated into strategic and project plans.

The restoration and recreation of wetlands, such as reedbeds, wet meadows and wet woodlands**,** will make a significant contribution to securing biodiversity, healthy functional ecosystems and the provision of ecosystem services, as well as being crucial to the protection and enhancement of rivers, lakes and other freshwater habitats. In particular, the ecological and ecosystem services value of floodplains need to be better recognised, and the potential risk to rivers and lakes of failing to undertake improvements to wetlands should be considered as part of the cost-benefit assessment for land-based enhancements.

As the in-channel opportunities to improve freshwater biodiversity are progressively realised, focus must shift to other freshwater habitats including lakes, estuaries and coastal waters, underpinned by a shift in focus that favours the restoration of natural processes as the most sustainable footing for biodiversity recovery. Both cost and technical feasibility have limited action in these waters to date; to counter this, natural ecosystem function should underpin a 'no-regrets' approach to restoration.

The mapping of opportunities must also take account of benefits to the estuarine and in-shore coastal environment given the remit of River Basin Management Plans for transitional waters and extending out to three nautical miles offshore. Opportunities should feed into the spatial prioritisation via a Nature Network as this may alter the priority of land-based projects which also benefit the marine environment. Nature Networks need to extend out to sea though Marine Protected Area measures wherever possible.

Measures to improve joint working should be supported, including via the sharing of information so that stakeholders are clearer on the contributions that they could make to improving the state of estuarine and coastal waters by undertaking work further up the catchment. Funding criteria for catchment-based projects should include an assessment of whether they have incorporated actions which will contribute to improvements

[8] https://ipbes.net/sites/default/files/2018_ldr_full_report_book_v4_pages.pdf

[9] https://www.naturebasedsolutionsinitiative.org/what-are-nature-based-solutions/

in the status of estuarine and coastal waterbodies or designated sites. Similarly, actions in estuarine and coastal waterbodies should consider upstream benefits including the removal of barriers to the passage of migratory fish species, and the cessation of netting activity that currently impacts migration and breeding success.

We also need to increase public and private investment in nature-based solutions for climate-related water risks, such as extreme floods and droughts. Scottish Water in particular has a role to play in terms of climate change mitigation: nature-based solutions to water treatment potentially offer significant advantages in terms of biodiversity, construction cost and energy use, and more effective measures to drive water efficiency will reduce greenhouse gas emissions associated with pumping and treating water.

Rural Land Use

Shifts in wider land management practices will also make a major contribution, given the impacts of agricultural land management on the freshwater environment. Achieving a shift to more sustainable land use and management will require more action to deal with issues relating to water quantity, such as increasing soil organic matter to reduce vulnerability to drought, and air quality through better manure and fertiliser management, benefiting wildlife and public health. Nature Networks should also have a key role in identifying the most critical places where land use change can play a key part in biodiversity recovery, as well as in the provision of ecosystem services including flood mitigation.

Connectivity is a key attribute required for healthy, functioning ecosystems. The prioritisation of projects or proposals mapped through Nature Networks could be used to enhance connectivity, both directly (e.g. fish passage projects which improve physical connectivity, and enhancements to lateral connectivity by reconnecting rivers with their floodplains) as well as by considering the quality of connected habitats. For example, a river restoration project may be more valuable if it links upstream and downstream areas which have already been restored, as it increases the area of connected *high-quality* habitat. In coastal waters activities such as construction and dredging can cause changes in the water column and hydrology resulting in changes in sedimentation and this can have adverse ecological impacts on habitats, especially seagrass meadows.

Invasive Non-Native Species (INNS)

INNS are one of the five principal drivers of biodiversity loss globally, as defined by the UN IPBES Global Assessment, and freshwater habitats are among the most vulnerable to INNS impacts. This global context would help to frame the SWMIS document – but beyond this we believe it broadly frames the issue correctly, i.e. that INNS are a driver of biodiversity decline in Scotland; that the situation is deteriorating and this will intensify in future, particularly under the influence of climate change; that action should focus on prevention, early detection and rapid response; that control of established species must be undertaken at the catchment scale.

However, the sense of urgency is too low. Note that impacts of INNS are not restricted to out-competing native species, as is suggested in the document: this section needs expanding for accuracy. INNS can be novel predators; can introduce new diseases and pathogens; can alter habitats and water quality; and can hybridise or otherwise disrupt reproductive patterns of native species. Stronger emphasis should also be placed on scanning the near horizon: the Ponto-Caspian invasives, for example, a suite of dozens of freshwater species from numerous taxa that have spread across mainland Europe, devastating freshwater ecosystems. We now have at least 4 species established on the island of Britain – the relevant biogeographical unit for INNS – that are spreading, and the impacts are likely to be severe. Scotland must urgently improve freshwater biosecurity to protect native ecosystems. This should involve the establishment of a professional INNS inspectorate to maximise the effectiveness of legislation and public policy, and significant investment in public awareness and

vigilance campaigns. For example, 'Check, Clean, Dry' information[10] should be placed at popular recreational waterbodies, viewpoints and walking spots. This could include entry and exit points of national parks, and at popular view/scenic points, bird hides and wildlife reserves, making use of existing information boards or using other techniques such as QR codes where more intrusive signage may not be appropriate. Fishery and river trusts can help to identify key locations and resources should be provided to assist in the installation of signs, posters or other resources.

Manmade barriers to fish migration

Existing work to identify and remove unnecessary/defunct structures, and enforcement to deal with unconsented works, must continue. Preference must be given to schemes which utilise nature-based solutions/natural flood management wherever possible; it will not always be possible to adapt to climate change and the pressure to implement hard engineering solutions in order to attempt to do so must be resisted; we must instead think in terms of mitigating the impacts of a changing climate, and select solutions which work *with* nature. Working with natural processes is now more readily considered but there remain questions that concern some stakeholders, such as around long-term maintenance, liabilities and so on, which would benefit from resolution. As our understanding of such techniques grows, findings must be widely communicated amongst stakeholders, particularly to Local Authorities, to ensure that all involved in Flood Risk Management are able to draw upon techniques that work with natural processes in the widest sense, considering for example not just leaky dams, but measures such as soil health. Similarly, there are opportunities to align nature-based solutions to flood management with the Scottish Planning Policy and the Land Use Strategy. The 'mainstreaming' of nature-based solutions across government policies is a key step in tackling the climate and nature emergencies.

Where new structures are required, assessments of their impact upon freshwater ecology should extend further than only considering migratory fish. Invertebrate species can travel far shorter distances than fish and weirs and other barriers could have an exaggerated impact on their dispersal. Weirs, dams and other structures also alter sediment flows in watercourses which has implications for invertebrate and plant species both in the channel and in riparian features such as gravel beaches and bars.

Hydropower

Scotland has a long history of harnessing our water environment to generate electricity, and whilst many hydropower schemes are large-scale and date from the mid-20th century, small-scale 'micro-hydro' schemes are increasingly being seen as sustainable solutions to energy supply. Rather than damming a river valley with a large concrete structure, these small-scale schemes divert a proportion of the flow from the main channel, through a turbine house, before returning to the main channel further downstream.

Flow diversion for hydro-power schemes results in the river flow downstream of the intake being depleted. Typical flow diversion leaves a residual flow to limit the impact on the downstream river but this still results in an unnatural flow regime which disrupts the natural changes in flow of the river, and results in changes to the sediment transport and ecological conditions downstream in the river. Aquatic habitats in this depleted reach are typically diminished which limits the space available for aquatic invertebrate, bryophyte and lichen species, which can lead to competition for food and space, may lead to migration of species to more suitable habitat downstream, or their loss from the local ecosystem. Obstructions such as weirs also disrupt hydrogeomorphological processes such as erosion, deposition, and the transport of sediments in the watercourse, which can have impacts on riparian habitats and species. It is therefore important that the cumulative impact of hydropower schemes in a river catchment is considered. Furthermore, assessment of hydropower schemes is generally restricted to the ecological impact upon migratory fish, bryophytes, and

[10] https://secure.fera.defra.gov.uk/nonnativespecies/checkcleandry/documents/check-clean-dry-scotland.pdf

freshwater pearl mussels. As explained above these schemes can have far wider consequences and it is important that an assessment of their impact is undertaken for other aquatic invertebrates, other aquatic plants, and the fauna and flora of riparian habitats such as gravel bars and beaches.

A further concern is the potential impact of climate change on upland watercourses where many of these schemes are located. Summer water temperatures are predicted to rise by almost 4 degrees Celsius by 2050, and summer flows may reduce by more than 25%[11]. Reduced flows, increased flashiness, and increased water temperatures are likely to have a significant detrimental effect on aquatic wildlife, particularly invertebrates and salmonids. These effects may be exacerbated by the development of hydro-power schemes in these watercourses. It is essential that the impact of climate change on water flows and temperatures is taken into account when assessing schemes to ensure that there are no detrimental impacts on the ecology of the watercourse during the lifetime of the proposed hydro-power scheme. It is also important that the feasibility of the scheme in terms of power output is assessed both on the basis of current flow conditions, but also on those that might occur in 20-30 years' time.

Novel Pollutants

Despite great strides in tackling diffuse and point source pollution from traditional sources such as agriculture, mine drainage, and the sewerage network, there is still much to do to tackle the growing number of novel pollutants. The WFD Watch List provides a useful starting point for identifying pollutants of potential concern, however the surveillance required is limited. In this regard SEPA should go 'beyond compliance' and investigate further the prevalence of substances on the Watch List across Scotland, not just in a limited number of samples to fulfil the Watch List monitoring requirements.

Similarly SEPA should develop monitoring programmes for other novel pollutants including:

- **Pharmaceuticals** such as analgesics (eg paracetamol, ibuprofen, etc.), antidepressants (eg fluoxetine), antibacterial compounds (eg triclosan), and anticonvulsants (eg carbamazepine).
- **Veterinary medicines** such as wormers (eg avermectins), and domestic flea treatments (eg fipronil and imidacloprid).
- **Agricultural chemicals** such as fungicides (eg tebuconazole, prothioconazole, etc.) and molluscides (eg metaldehyde and ferric phosphate).
- **Emerging persistent pollutants** such as all PFAS compounds (not limited just to PFOA & PFOS).

Furthermore, ecological/biological monitoring should be carried out in line with environmental contaminant monitoring to determine if there are associated effects on populations as a result of chemical contaminants. The Environment Agency is developing an Early Warning System as an approach to combat emerging contaminants, in order to take a proactive, rather than reactive approach, and we would like to see SEPA develop something similar.

A robust and strategic approach to tackling chemicals in the freshwater and nearshore environment is urgently required. Scotland, and the UK as whole, should stay in REACH, which will prove to be much more cost-effective and prevent any unnecessary work, time and money being spent on system duplication. Only by linking elements of the Water Framework Directive with a regulatory control of substances of very high concern can the intended protection of water bodies/aquatic ecosystems be achieved.

[11] https://www.sepa.org.uk/media/159070/climate_change_water_scarcity.pdf

Plastic Pollution

With production of plastic packaging forecast to quadruple by 2050, the need to tackle plastic pollution is more urgent than ever. SEPA should therefore continue to lend its weight to support actions and targets that focus on reducing the pollution at source, raising public awareness and cleaning up existing pollution where possible. These could include:

- Supporting the implementation of the Deposit Return Scheme when it comes in to force in 2022.
- Developing Extended Producer Responsibility schemes that are built to reduce waste and increase resource efficiency.
- Supporting further action on single-use items of all materials, including plastic, which pollute our waterways.
- Adding microplastics to the list of pollutants regularly monitored in inland waters, following agreement of an accurate, repeatable, reportable method for microplastic quantification.

The Marine Litter Strategy includes a plan to address a range of plastic pollutants leaking into the marine environment and this should be further integrated into the National Litter Strategy, all River Basin Management Planning and subsequent Regional Marine Planning (such as the developing Shetland and Clyde Regional Marine Plans), with suitable resources to support delivery toward a circular economy approach to reduction, use, re-use and, where necessary, recycling of plastics.

Reducing plastic waste in our waters will also require more education of the public and human behaviour change, and an increase waste collection systems such as more bins, and regular emptying of bins, at carparks, etc. Research is required regarding what triggers or techniques can be used to stop people discarding any waste into the environment, and to move away from our over reliance on disposable plastic items. There is already extensive evidence on Sewage Related Debris, which can be used to target problem items/groups of items through public education and awareness campaigns, for example sanitary items not being flushed, and alternative materials to single use plastics, including reusables. A series of public awareness campaigns to link terrestrial activity to the impacts of plastic pollution in freshwater and marine habitats should also be explored. This could include greater support to the 'Yellow Fish' scheme to highlight the connectivity of different habitats, supporting beach cleans and urban clean ups for more built up areas, as well as building on the stark images seen in Blue Planet to highlight some of the harmful impacts plastic has had on wildlife in Scotland.

There also needs to be increased support for monitoring of plastic pollutants in the freshwater and nearshore marine environments, including for existing proven initiatives such as the Marine Conservation Society Beachwatch project[12] that contributes to the Scottish Government's formal litter monitoring commitments for beaches and coast (as well as to formal UK and OSPAR monitoring). Such citizen science initiatives should not be taken for granted and require ongoing support, as well as building capacity for plastic monitoring upstream and inland.

River Basin Management Plans should detail the sources of plastic pollution in their area and identify actions to reduce the release of plastics into the water environment. They should also consider the impact upon receptor sites such as coastal habitats including seagrass beds. They should consider the full range of impacts including the impact upon species using these habitats for key parts of their life cycles (e.g. fish nurseries) and the impact upon the carbon uptake potential of what is increasingly being recognised as a key part of our 'blue carbon' sequestration infrastructure.

[12] https://www.researchgate.net/publication/332781302_Pilot_Scottish_Beach_Litter_Performance_Indicators_SBLPI

SEPA should consider convening 'producer responsibility groups' to encourage collaboration and best practice adoption amongst the business sectors that are a key source of plastic pollution, and should ensure that they consider the benefits of collaborations with other sectors where a multi-sectoral approach would be beneficial to pollution prevention, monitoring, and clean-up. It is essential to ensure industry optimises plastic reduction on both a manufacturing and consumer level. For example, the reduction of plastic entering rivers via washing machines needs innovation and particular attention. In addition, Scottish Water should review how waste water treatment plants could be improved to prevent plastics entering waterways, for example by installing additional filters on outlets. A review of Combined Sewer Overflows is also urgently required, including monitoring of the frequency at which overflows occur.

Fish farming and wild fish interactions

The fish farming industry has grown significantly over the last two decades and has become a crucial part of Scotland's rural economy. Fish farmers are dependent on coastal waters being of good quality but, at the same time, aquaculture practices significantly threaten both water quality and the health of marine ecosystems. The types of damage currently caused to both fresh and marine waterbodies are numerous, and include:

1. Nutrient addition to the water column (salmon farms in fresh and marine waters, trout farms in freshwater);
2. Plastic pollution, both macroplastics from damaged or discarded equipment, or microplastics from wear on feed pipes, etc.
3. The release of pesticides and pharmaceuticals in uneaten food and fish faeces;
4. The deposition of organic solids (fresh and marine waters);
5. The transfer of disease from farmed to wild salmonids;
6. An increase in sea-lice populations to the detriment of natural salmonid populations
7. Escapees interbreeding to the detriment of the genetics of wild populations

Salmon farming has been identified within the Scottish Government's 12 high level pressures groups[13] for wild Atlantic salmon in Scotland, with sea lice and interbreeding recognised as the two key concerns. Scottish Environment LINK notes and supports the recommendations of the recent Report of the Salmon Interactions Working Group[14], which proposes changes to salmon farming regulation to better protect wild salmonid populations.

Wild Atlantic salmon are most at risk from sea lice as smolts, when they begin their journey from freshwater to the marine environment. During this transition, smolts must pass by salmon farms (often many), and in doing so are at risk of being infected with sea lice, particularly when passing farms that have high sea lice levels. Unlike adult salmon returning to freshwater, where any sea lice picked up will be shed as soon as the fish enters freshwater, the smolts will remain infected with sea lice until either the host or the parasite dies.

To improve smolt survival rates, it is essential that new salmon farms are located away from key salmon migratory routes and the locales of existing farms are reviewed. The proposed spatial planning approach being developed by Scottish Ministers must be complemented by increased data collection on salmon migratory routes, as data in this field are poor but essential for ensuring the impact of future development on Atlantic salmon populations is minimised.

[13] https://www2.gov.scot/Topics/marine/Salmon-Trout-Coarse/fishreform/licence/status/Pressures
[14] https://www.gov.scot/publications/report-salmon-interactions-working-group

Sea trout also face a significant risk from sea lice, but unlike Atlantic salmon that migrate from freshwater out to sea, sea trout remain in coastal areas and within the vicinity of salmon farms. This behaviour increases their exposure to salmon farms and, therefore, sea lice. The longer exposure time can result in heavier sea lice burdens on sea trout, compared to salmon, and an increased risk of mortality. To address the impact of sea lice on sea trout, it is essential to reduce the amount of sea lice on a farm, potentially by supporting and incentivising the use of technological advancements, such as sea lice skirts and semi-closed systems, and moving salmon farms further away from the coastal waters sea trout inhabit.

Escaped farmed salmon pose a significant threat to wild populations, and in Norway escapes have been identified as the greatest threat to wild salmon.[15] When farmed salmon escape, both as adults and smolts, they pose a direct threat to wild populations through competition for space and resources, spreading disease[16], and interbreeding.[17] The escape of salmon can be caused by a number of factors, such as human error, nets being torn by predators (i.e. seals), and adverse weather. Reducing the opportunities for human error and investing in tougher netting and semi-closed systems can significantly reduce the potential for salmon escapes.

It is important that all chemicals found to present an unacceptable environmental risk are phased out and where the risks are particularly high, for the chemical to be promptly taken out of use. To reduce the environmental impact of salmon farming, farms must be located in (or relocated to) well-flushed water bodies, where deposition under the cages will be minimised, and both nutrients and chemicals found to have an acceptably low risk to the marine environment, will be more rapidly dispersed. New farms should not be situated in areas where existing farms show consistently poor performance through benthic surveys, and such existing farms should be relocated as a matter of urgency. Moving to more exposed, offshore sites, however, will require more robust and, potentially, larger cages to cope with more energetic sites, and prevent salmon escapes and predation by seals.

It is imperative that the proposed new framework, and future changes to the regulation of salmon farms, ensure that the environmental impacts of the salmon farming industry are minimised, and that any future development is environmentally sustainable.

Marine benthic populations

The Marine Atlas[18] highlights under the section on the Water Framework Directive:

> "*There are 30 coastal water bodies at moderate status. These are mainly downgraded because of the condition of the benthic invertebrate populations. This may be due to organic pollution or trawling pressures*"
>
> "*SEPA is working with partner organisations, including Marine Scotland, to improve the condition of downgraded water bodies through changes to current practice, where appropriate. Examples of this approach are reducing fishing pressures to improve the status of benthic populations*"

Reducing trawling (and indeed dredging) pressure is therefore crucial to achieving both Good Ecological Status under the Water Environment and Water Services (Scotland) Act 2003 and Good Ecological Status under the Marine Strategy Regulations since the Act applies to 3 nautical miles in Scotland. SEPA should therefore be

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

[16] Johnsen, B.O. et al. 1994. The spread of furunculosis in salmonids in Norwegian rivers. J Fish Bio 45, 47-55

[17] Naylor, R. et al. 2005. Fugitive salmon: Assessing the risks of escaped fish from net-pen aquaculture. Bioscience 55, 427-437

[18] https://www.gov.scot/publications/scotlands-marine-atlas-information-national-marine-plan/pages/12/

proactive in articulating the case for minimising pressure from benthic fishing gear in order to help achieve Good Ecological Status for our inshore waters.

This response is supported by the following LINK member organisations:

- Association for the Protection of Rural Scotland
- Buglife – The Invertebrate Conservation Trust
- Fidra
- Marine Conservation Society
- Plantlife
- RSPB Scotland
- Scottish Wild Land Group
- Scottish Wildlife Trust

Scottish Environment LINK is the forum for Scotland's voluntary environment community, with over 35 member bodies representing a broad spectrum of environmental interests with the common goal of contributing to a more environmentally sustainable society.

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