	<p>Council</p> <p><i>Salmon Stressor Analysis - UK - Scotland</i></p>	<p>CNL(25)32</p> <p>Agenda item: 6.g)(i)</p>
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Salmon Stressor Analysis - UK - Scotland

Marine Directorate and Fisheries Management Scotland

Background

Wild Atlantic salmon populations are in decline throughout most of their native range, including Scotland. In the face of declining salmon numbers and poor marine survival, it is increasingly important to protect and where possible improve freshwater salmon habitats to maintain and improve juvenile production and smolt output. Targeted management action requires both an understanding of the status of salmon populations at sub-catchment scales and information on the spatial extent and severity of pressures impacting those populations. A semi-quantitative assessment of the pressures impacting on wild Atlantic salmon production in Scotland was conducted through expert opinion solicitation, completed in 2021. This collaboration between Scottish Government and local fisheries managers (facilitated by Fisheries Management Scotland) aimed, for the first time, to assess and map the impact of different pressures acting on salmon in Scotland with a view to informing management and policy at local and national scales.

Methods

A list of 28 natural and anthropogenic stressors, or pressures, potentially impacting salmon populations in terrestrial and coastal areas of Scotland was defined, grouped across broad themes such as exploitation, predation, habitat, obstacles to fish passage, invasive species, disease, farmed escapes, sea lice and marine coastal developments (Table 1). Local fishery managers were invited to submit data via an online Geographical Information System (GIS) at spatial scales relevant to the specific pressure (Table 1). They were provided with background information on the current status of adult salmon stocks, juvenile salmon stocks, and water status classification to inform their assessments of the severity and status of each pressure at the catchment or sub-catchment scale. Severity classifications represented a semi-quantitative assessment of the proportion of salmon production lost as a result of the pressure; status classifications represented categorisation of the temporal development of the pressure (i.e. historic, chronic, episodic, or emerging). In addition, fisheries managers provided a confidence rating of 'high' or 'low'. The information was summarised to national and regional scales by aggregating scores and weighting relative to total wetted area. Please see [Marine Scotland and Fisheries Management Scotland \(2023\)](#) for details. The results reported here are for the national-level aggregation.

Results

A total of 66 local salmon fishery management organisations provided data for this assessment. The national summary of pressures mapping data is presented in Figure 1 (reproduced from Marine Scotland and Fisheries Management Scotland (2023)). Predation by birds and seals, and upstream barriers were considered to be the most severe chronic or episodic pressures acting on wild salmon. Of the emerging pressures, high river temperatures and flows were considered the most severe. This national summary is dominated by data originating from the East of Scotland where

the largest salmon river catchments are located. Notable regional variation included a relative increase in the importance of sea lice from aquaculture and fish farm escapes in the West and South West, respectively. It was not possible to include pressures marked as having an 'unknown' severity in the quantitative national summary. The most important of these (in terms of spatial extent) was marine developments (including harbour developments and marine renewables), followed by farm escapees and seal predation.

It is important to acknowledge that there are gaps in understanding individual pressures, and the present analysis relies on expert judgement and assumptions based on available evidence. Initial assessments date back to 2019, with updates in 2021, but newer evidence, including insights into genetic introgression and climate-related threats, has since emerged.

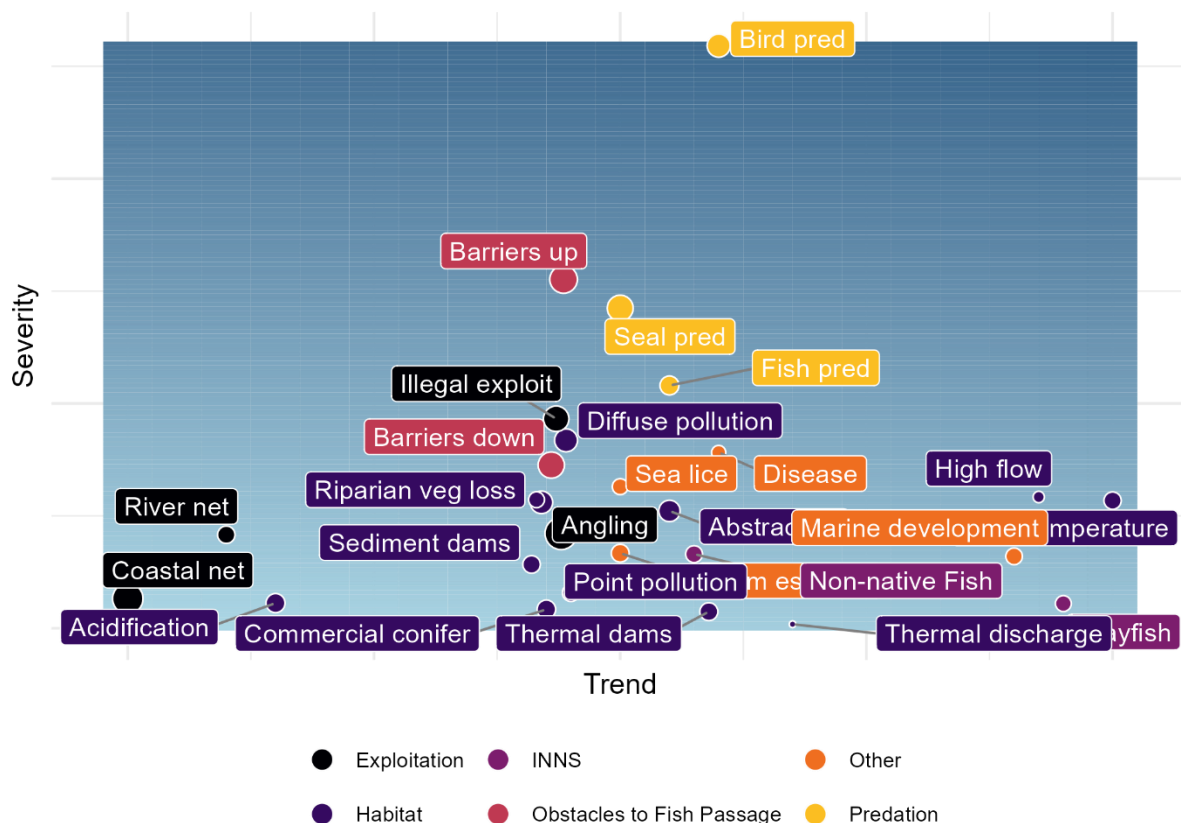


Figure 1 Summary of pressures data across Scotland. The horizontal axis indicates whether a pressure was considered to be historical (left), chronic or episodic (middle), or emerging (right). The vertical axis indicates the severity of pressures as recorded by local fisheries managers at the time of assessment, with the size of the points indicating their confidence in the assessment of the pressure.

Future development

The pressures mapping project is the first national summary assessment of the pressures acting on wild Atlantic salmon and has contributed to the development of local [Fishery Management Plans](#). At a national level, the work supported the development of Scotland's [Wild Salmon Strategy Implementation Plan](#).

The results will be used to inform the development of Scotland's reporting to NASCO under the 4th reporting cycle, including informing the prioritisation of stressors underpinning the UK (Scotland)'s Conservation Commitments and ensuring alignment with the existing Scottish Wild Salmon Strategy Implementation Plan.

Table 1 List of pressure themes, pressures and spatial scale of pressures assessed

Theme	Pressure	Scale
Disease	Disease	Catchment
Exploitation	Illegal exploitation	Catchment
Exploitation	Coastal netting	Catchment
Exploitation	In river & estuarine netting	Catchment
Exploitation	Rod & line	Catchment
Farmed escapees	Farmed escapees	Catchment
Habitat - Instream & Riparian	Loss of sediment transfer	Reach
Habitat - Instream & Riparian	Instream Works Including Canalisation / Dredging / Boulder removal	Reach
Habitat - Instream & Riparian	Loss of natural riparian vegetation	Reach
Habitat - Instream & Riparian	Conifer afforestation	Reach
Habitat - Thermal	Changing Temperature Patterns & Loss of Shading	Reach
Habitat - Thermal	Thermal discharge	Reach
Habitat - Thermal	Thermal Modification due to Impoundment	Reach
Habitat - Water Quality	Acidification	Reach
Habitat - Water Quality	Point-source pollution	Reach
Habitat - Water Quality	Diffuse pollution & Eutrophication	Reach
Habitat - Water Quantity	Abstraction & Flow Regulation	Reach
Habitat - Water Quantity	Extreme high flow events	Reach
Invasive Non-Native Species (INNS)	Crayfish	Reach
Invasive Non-Native Species (INNS)	Non-Native or Translocated Fish	Reach
Marine development	Marine development	Catchment
Obstacles to Fish Passage	Downstream passage	Reach
Obstacles to Fish Passage	Upstream passage	Reach
Predation	Piscivorous birds	Catchment
Predation	Piscivorous fish	Catchment
Predation	Seal predation	Catchment
Sea lice	Sea lice	Catchment