	<p>International Atlantic Salmon Research Board</p> <p><i>Projects of Interest to the Board and its Work</i></p>	<p>ICR(26)05rev¹</p> <p>Agenda item: 6</p>
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Projects of Interest to the Board and its Work

Purpose

The purpose of this paper is to provide an update on projects of interest to the Board and its work.

Decisions

- no decisions are required.

Background

At the 2020 Annual Meeting of the International Atlantic Salmon Research Board (the Board), [ICR\(20\)16](#), it was agreed that an Agenda item would be retained in future years that focused on projects of interest to the Board and its work. This would include information on projects where NASCO has some ownership (such as EU-funded projects and the Likely Suspects Framework) and other relevant projects; those researchers could be invited to contribute information. The Board asked the Secretary to provide updates on projects where NASCO has some ownership and, through the Board and SAG members, to seek information on projects that would be of interest to the Board and its work.

This paper contains the information provided in response to the Secretariat's request for information in relation to projects of interest to the Board.

1. Information provided by the Board Member for the UK (Jonathan Gillson)

The UK has provided information on a number of projects that may be of interest to the Board, listed under each of the Board's top research priorities as follows:

Basin-wide patterns of marine growth and survival of Atlantic salmon

None

Migration of salmon at sea

Several relevant research projects are being undertaken, including:

- Smolt tagging studies in the River Severn estuary and inshore coastal waters between South Wales and North Devon in England by Swansea University in conjunction with the Environment Agency and Natural Resources Wales to evaluate the migratory behaviour of salmon.
- The West Coast Tracking Project – A partnership between the Atlantic Salmon Trust, Fisheries Management Scotland, and the Scottish Government Marine Directorate have collected three years of tracking data for salmon post-smolts from multiple rivers across the West coast of Scotland. Data has been collated and analysis of this is continuing by the Marine Directorate. By combining data from different jurisdictions, broad-scale movements of fish have been published. While the tracking / data collection aspect of this work has finished, the subsequent analysis is ongoing and focuses on understanding within loch movement and behaviours. The outcome of this work is to inform the implementation of the sea lice risk assessment framework by the Scottish Environment Protection Agency

¹ Revised 30/05/2026 to include information on the ROAM Project.

(SEPA) for regulating the interaction of sea lice arising from aquaculture to wild salmon.

- The North Coast Telemetry Project is funded by the Scottish Government's Scottish Marine Energy Research (SG-ScotMER) programme and delivered in collaboration with the Atlantic Salmon Trust and other partners. It is investigating the spatial and temporal movement of salmon post-smolts from multiple rivers in the Irish Sea off the northwest coast of Scotland from 2023 to 2025. A number of wind farm developments are proposed in this area. This work is currently being written up for submission to a peer-reviewed scientific journal. More information on this project is provided in the YouTube recording of the ScotMER 7th symposium (2025): [ScotMER 7th Symposium 2025: Diadromous Fish](#).
- Fieldwork associated with the SG-ScotMER funded project, Moray Firth / Wick Telemetry Project, was completed in July 2025. This project aims to improve our understanding of the movement of salmon post-smolts through marine waters with operational and proposed wind farms. This work is currently being written up for submission to a peer-reviewed scientific journal. More information on this project is provided in the YouTube recording of the ScotMER 7th symposium (2025): [ScotMER 7th Symposium 2025: Diadromous Fish](#).
- In spring 2025, a telemetry project was carried out in the Inner Moray Firth to detect salmon smolts tagged in the River Ness catchment as part of a study examining their movement through the firth, an area of marine renewable development. This work is being written up to complement other telemetry studies carried out in the Moray Firth.
- The Southeast Coast Telemetry Salmon Project is funded by the SG-ScotMER programme and commenced in spring 2026. This large-scale acoustic telemetry project aims to track the movement of salmon post-smolts as they migrate from the rivers Tweed, Tay, South Esk, and Teith into the marine environment where wind farm developments are operational, consented, and/or proposed. This study will also include the tracking of returning adult salmon to the rivers Tay and Tweed.
- A PhD project (University of Essex) is developing a biochemical tool using archival tissue from otoliths and eye lenses to determine the river of origin of salmon captured in the east coast of Scotland. The findings of this project should contribute to more effective management and protection of salmon populations from rivers designated, under the EU Habitats Directive, as Special Areas of Conservation.

A relevant peer-reviewed publication is:

- Newton, M., Main, R., Gardiner, R., Kynoch, R., Gilbey, J., Cauwelier, E., Watret, R., Stainer, P., Bridcut, E., Archer, J.A. and Gauld, N.R. 2026. Distribution of Atlantic salmon (*Salmo salar*) from epipelagic trawling surveys and genetic analysis in Scotland. *ICES Journal of Marine Science* 83(2): p.fsag007. <https://doi.org/10.1093/icesjms/fsag007>

The impact of freshwater environment on mortality occurring at sea

Two relevant publications include:

- Elliott, S.A., Aebischer, N.J., Gillson, J.P., Utne, K.R., Beaumont, W.A., Boraiah, K. and Roberts, D.E. 2026. Atlantic salmon survival during different life-stages: time to focus on improving marine survival to slow population declines. *Frontiers in Ecology and Evolution* 14: p.1727431. <https://doi.org/10.3389/fevo.2026.1727431>
- Marsh, J.E., Gillson, J.P., Riley, W.D., Elliott, S.A. and Gregory, S.D., 2026. Understanding immediate and carry-over effects to prioritise habitat protection and restoration: a case study of threatened Atlantic salmon. *Biological Conservation* 317: p.111822. <https://doi.org/10.1016/j.biocon.2026.111822>

Potential interactions between pink salmon and Atlantic salmon

Two relevant research projects include:

- A PhD Project (University of St Andrews) is examining public and angler attitudes to pink salmon – as an invasive species, or an alternative to Atlantic salmon. This research, supported by a NETGAIN Doctoral Focal Award (a NERC: Natural Environment Research Council funded DFA supporting interdisciplinary research on nature recovery and nature markets), develops Bayesian statistical models that formally integrate philosophical frameworks and reasoning to support data-driven and ethically grounded conservation decisions. It will focus primarily on developing Bayesian methods to inform data-driven conservation decisions, specifically for salmonid populations in Scotland.
- Surveillance of pink salmon in Scotland using molecular approaches in Atlantic salmon rivers within Scotland. Molecular surveillance using eDNA was used to monitor the presence of pink salmon in 10 catchments in 2023. Pink salmon catch/sighting records continue to be collected by agencies in Scotland, England, Wales, and Northern Ireland.

Quantification of the mortality of Atlantic salmon caught as bycatch in pelagic and coastal fisheries

- A study titled "Revealing potential Atlantic salmon bycatch hotspots from pelagic fisheries landings across the northeast Atlantic" is being finalised and a manuscript is being written up for submission to the *Journal of Fish Biology*. This study narrows the space-time domains within the northeast Atlantic where there is a high risk of post-smolt bycatch, directing future research efforts on quantifying and mitigating bycatch risk. Pelagic fisheries landings data from an ICES-led data call were used to provide spatially and temporally resolved assessments of post-smolt bycatch exposure. Temporal patterns of monthly landings of six commercially important pelagic finfish species (mackerel, herring, horse mackerel, sardine, capelin, and chub mackerel) within the northeast Atlantic region from 2000 to 2022 were considered alongside reconstructed salmon migration regions.
- Two relevant research proposals have been developed for submission to the Horizon Europe call HORIZON-CL6-2026-02-FARM2FORK-08: Advancing basic knowledge and developing tools for sustainable management of key migratory fish species. These include:
 - i) diadPATH: DIADromous Pathways – Tools for holistic assessment and management. The overall objective of this project is to overcome the current failure of management systems to address the full set of pressures acting on diadromous species across their life cycle, by integrating spatially explicit, multi-pressure knowledge into harmonised data frameworks, analytical tools and advisory workflows that will support adaptive management, evaluation of measures and long-term conservation and sustainable use. This project will pursue three specific objectives: 1) improve knowledge on life history parameters, connectivity and anthropogenic pressures of diadromous species through integrated, life-cycle wide data collection and monitoring systems across freshwater, transitional and marine habitats; 2) advance understanding of cumulative anthropogenic and climate-driven impacts on diadromous species through holistic, multi-stressor assessment frameworks integrating ecosystem services and societal benefits at regional and pan-European scales; and 3) enhance the capacity of authorities and stakeholders to implement effective, coordinated and adaptive management of diadromous species through co-designed operational tools and participatory processes across sectors and countries.
 - ii) FishScape – Fisheries innovative science for holistic sustainable co-designed management of migratory commercial and endangered species. This project will bring

together cutting-edge science, indigenous and local knowledge, and multi-species socio-ecological research across an international network of pilot sites. The aim is to close evidence gaps and co-develop effective, scalable management solutions that benefit both commercial and endangered migratory species in the context of climate and ecosystem change. The project aligns closely with the Horizon call objectives, including improving life-history knowledge, strengthening monitoring systems, assessing anthropogenic pressures, and developing coordinated management tools for key migratory fish species across their full life cycle.

2. The Likely Suspects Framework Programme

Background

At its 16th Annual Meeting in 2017, the Board agreed to part-fund a workshop on the Likely Suspects Framework (LSF) concept. An Atlantic Salmon Trust (AST) workshop in 2017 developed the concept, and the proceedings were published in the AST Blue Book series.

The 35th Annual Meeting of NASCO in 2018 endorsed the LSF concept and agreed to request the Secretary to explore with ICES how best to integrate Atlantic salmon marine survival and population data with relevant ICES marine databases. This led to joint workshops, including WKSalmson in 2019 and WKSalmson2 in 2022.

Since 2019, the LSF has been developed by the UK's Missing Salmon Alliance as a programme to mobilise evidence on the drivers of salmon mortality across the full life cycle, and to translate that evidence into modelling and decision-support tools for salmon managers.

Over recent years, reports to the Board have outlined progress in developing the LSF concept, data infrastructure, scientific evidence base, modelling framework and decision support tool. This report provides an update on progress over the past 12 months.

The programme aligns closely with the Board's 2024 research priorities for understanding the future prospects of Atlantic salmon populations towards 2050. It contributes directly to priorities on basin-wide and regional patterns of marine growth and survival, migration of salmon at sea, the influence of freshwater conditions on mortality occurring at sea, and quantification of bycatch risk in pelagic and coastal fisheries. Potential interactions between pink salmon and Atlantic salmon have not been a specific focus of the LSF programme to date.

Progress in 2025 / 26

Project status and transition to deployment

The development phase of the Likely Suspects Framework was completed at the end of March 2026, marking the transition from research and development to consolidation and early applied use. The project now enters a consolidation phase from April to September 2026, followed by a deployment phase from October 2026 onwards, subject to future resourcing and governance arrangements.

The final Technical Steering Group meeting in May 2026 will review the outputs of the development phase and provide strategic steer on the consolidation and deployment phases. This will include future governance, applied use and potential pathways for scaling or integration of outputs within wider salmon recovery and management initiatives.

Modelling framework and evidence base

Substantive development of the LSF modelling framework has now been completed. This includes the development of a stage- and state-responsive salmon population model, with improved representation of multiple life-history strategies. The modelling framework has been developed to remain deliberately lightweight and extensible, allowing new marine and

freshwater evidence to be incorporated without requiring fundamental redesign. A paper setting out the foundations of the model, based on the River Bush (NI) salmon population is now in preparation.

Research to populate the framework with evidence on drivers of marine mortality has advanced considerably, supporting the Board's priorities on basin-wide and regional patterns of marine growth and survival, and migration of salmon at sea. The LSF project team has combined modelling of post-smolt migration trajectories from rivers across the UK and Ireland with research on changing zooplankton energy in the Northeast Atlantic. This provides support for regionally appropriate estimates of marine survival under different climate scenarios, linked to underlying ecological mechanisms. Recent peer-reviewed LSF team outputs include work on modelled marine migration pathways, changing zooplankton energy and the role of river-sea thermal conditions in marine survival.

A further strand of LSF marine work has examined potential exposure of migrating post-smolts to pelagic fisheries in the northeast Atlantic, contributing to the Board's priority on quantifying mortality of Atlantic salmon caught as bycatch in pelagic and coastal fisheries. Building on data mobilisation associated with the ICES/ NASCO workshop on salmon mortality at sea (WKSalm2), the analysis combines reconstructed post-smolt migration corridors with spatially and temporally resolved pelagic landings data from 2000–2022, identifying areas and periods of greatest potential exposure and highlighting priorities for future monitoring, bycatch quantification and mitigation.

Development of the freshwater component of the LSF modelling framework has also progressed, supporting the Board's priority on understanding how freshwater conditions may affect mortality occurring at sea. The framework has been applied across a set of data-rich rivers in the UK and Ireland, supporting wider model fitting to salmon populations beyond the River Bush and informing the development of illustrative case studies for use in guidance and communications.

Decision support tool, reporting and uptake

The key LSF output, the Salmon Management Decision Support Tool, has been substantially developed and is now being finalised for consolidation and early collaborative use. It brings together data mobilisation through SalHub, evidence synthesis and life-cycle modelling to support scenario testing, evaluation of trade-offs and prioritisation of interventions by salmon managers. During the reporting period, technical work from the marine, freshwater and life-cycle modelling components has been packaged for integration within the tool. User-facing documentation and illustrative case studies are being prepared to support practical use. Remaining work during the consolidation phase will focus on technical testing, refinement, governance arrangements, user guidance, illustrative case studies and early collaborative use in real-world contexts.

Data mobilisation and engagement

SalHub, the LSF data mobilisation platform, has continued to support the wider ambition of improving how salmon data are standardised, shared and integrated into management. International engagement has included continued collaboration with the Research Network for Arctic Observations in Alaska, engagement with the Atlantic Salmon Joint Research Venture, and discussions with the Basin Scale Events and Coastal Impacts project to share lessons learned from the development of SalHub.

LSF-related science has continued to be presented to scientific, practitioner and stakeholder audiences. Members of the project team presented marine science arising from the programme at the Ocean Sciences Meeting in Glasgow in February 2026, including work on projected declines in zooplankton energy supporting Northeast Atlantic ecosystems and wider links

between marine prey, ocean conditions and salmon ecology. LSF outputs were also presented at the ICES Annual Science Conference in 2025, through work on distilling multi-scale ocean change into a wild salmon management tool. The developing decision support tool has been shared with UK fisheries and restoration audiences, including through presentations at Wild Salmon Connections, the Fisheries Society of the British Isles annual meeting, and the River Restoration Conference.

Written Outputs To Date

The LSF programme has contributed to the evidence base through the following written outputs to date:

Peer-reviewed papers

- Bull, C. D. et al. (2022) *The likely suspects framework: the need for a life cycle approach for managing Atlantic salmon (Salmo salar) stocks across multiple scales*. ICES Journal of Marine Science, 79(5), 1445–1456.
- Diack, G. et al. (2022) *Enhancing data mobilisation through a centralised data repository for Atlantic salmon (Salmo salar L.): providing the resources to promote an ecosystem-based management framework*. Ecological Informatics, 70, 101746.
- Diack, G. et al. (2024) *Salmon data mobilization*. North Pacific Anadromous Fish Commission Bulletin, 7, 61–76.
- Bull, C. D. et al. (2024) *Building salmon life cycle assessment frameworks to inform future management challenges*. ICES Journal of Marine Science.
- Tyldesley, E. et al. (2024) *Patterns of declining zooplankton energy in the Northeast Atlantic as an indicator for marine survival of Atlantic salmon*. ICES Journal of Marine Science, 81(6), 1164–1184.
- Tyldesley, E. et al. (2025) *River–sea thermal differential experienced by salmon post-smolts is not a proximal driver of marine survival*. Journal of Fish Biology, 107(4), 1411–1419.
- Borland, A. et al. (2025) *Modelled marine migrations of Atlantic salmon post-smolts from Irish and Scottish rivers vary interannually with local currents and salinity*. ICES Journal of Marine Science, 82(5), fsae185.

Technical and scientific reports

- ICES (2020) *NASCO workshop for North Atlantic salmon at-sea mortality (WKSalmor; outputs from 2019 meeting)*. ICES Scientific Reports, 2:69, 175 pp.
- ICES (2023) *The second ICES/NASCO workshop on salmon mortality at sea (WKSalmor2; outputs from 2022 meeting)*. ICES Scientific Reports, 5:36, 69 pp.

Submitted, in preparation and upcoming papers

- Banas, N. et al. *Investigating management intervention scenarios on the wild Atlantic salmon (Salmo salar) population of the River Bush, Northern Ireland, using a new life cycle model*. In preparation.
- Bull, C. et al. *Design and implementation of a life-cycle decision support tool for Atlantic salmon management*. In preparation.
- Tyldesley, E. et al. *Projected declines in zooplankton energy supporting Northeast Atlantic ecosystems*. Under review at Nature Communications Earth & Environment.

- *Borland, A. et al. Quantifying exposure of migrating Atlantic salmon to pelagic fisheries in the northeast Atlantic to reveal potential bycatch hotspots. In preparation.*
- Multiple authors. *One or more case study papers applying the modelling framework underpinning the decision support tool to real-world management and infrastructure scenarios. Upcoming.*

3. SMOLTrack Projects

The EU has provided funding to the Board to support the following SMOLTrack projects:

- Understanding and comparing early mortality of European salmon populations at sea (SMOLTrack I – completed);
- Comparing mortality of European salmon populations at sea using multiple-method telemetry studies (SMOLTrack II – completed);
- Quantifying smolt survival from source to sea: informing management to optimise returns (SMOLTrack III – completed);
- Quantifying salmon survival from river exit to return as adult: Collecting thermal and behavioural data to refine smolt to adult survival indices (SMOLTrack IV – completed); and
- Studies of behaviour and survival of salmon during their migration – development of tagging programmes to follow the marine migration of salmon to oceanic feeding areas and back (SMOLTrack V – completed).

The website for the projects is: [SMOLTRACK](#). There is also information on the [Board website](#).

SMOLTrack V: Studies of behaviour and survival of salmon during their migration – development of tagging programmes to follow the marine migration of salmon to oceanic feeding areas and back

Recent marine survival estimates for Atlantic salmon are amongst the lowest recorded in decades and indicate that as little as 3% of wild smolts now survive to return as adults. In recent decades, survival at sea has widely been accepted as the key determinant of river stock abundance. However, recent research conducted in Denmark, England, Ireland, Portugal, Spain, Sweden and Northern Ireland through the EU-funded SMOLTrack and related initiatives, have indicated that smolt mortality during the early outward migratory phase from ‘source to sea’ is much higher than previously assumed. Thus, early smolt mortality may be more important than marine mortality. To support this hypothesis, various studies have demonstrated that a reduction in negative pressures (e.g. predation, aquaculture) on smolts in the relevant zone of influence can ultimately boost associated numbers of adult returns.

Therefore, it has become apparent that significant knowledge gaps remain to understand, quantify and partition the principal cumulative factors responsible for Atlantic salmon smolt survival during this critical life stage. In addition to the high mortality for smolts and post-smolts, there is also a significant mortality in the oceanic phase of Atlantic salmon.

It is important to investigate if any part of this mortality may be managed. The SMOLTrack V project built on the work of the previous SMOLTrack projects, enabling studies of behaviour and survival rates of salmon during their migration through the lower parts of rivers, estuaries and coastal areas. Thus, the project aimed to provide data on smolt run timing and migration behaviour, as well as generate ocean migration data through tagging of smolt with nano-DSTs (Data Storage Tags). SMOLTrack V further expanded on the development of a ‘fit for purpose tagging programme’ to be able to follow the return migration of salmon from feeding areas in the Arctic Sea (East Greenland).

NASCO staff were involved in the administration and co-ordination of each work package (WP) in SMOLTrack V. A 12-month extension to the timeline of the project was secured by NASCO, moving the end date to April 2026, to enable a further expedition to East Greenland to take place in 2025.

Work Package 1(WP1): Tagging in East Greenland

Objective:

To test and expand a ‘fit for purpose tagging programme’ developed in SMOLTrack IV, to be able to follow the return migration of salmon from the feeding areas in the North Atlantic and Arctic Sea.

Scientists from the National Institute of Aquatic Resources at the Technical University of Denmark (DTU Aqua) and Inland Fisheries Ireland (IFI) visited East Greenland in September 2024 and September 2025. The purpose was to continue documenting the presence of Atlantic salmon in inshore marine waters and determine their relative abundance and catchability. It is hypothesised that these fish emanate from a broad number of European salmon rivers. This programme in this area has continued previous work to sample tissue samples for genetic assignment, age and growth analysis, and to establish procedures for future electronic tagging programmes. A total of 75 individual immature adult salmon were sampled for genetic analysis. In both years, a subsample was sacrificed and examined further for a general health assessment, and for stomach content analysis, and otoliths were extracted. Most salmon were caught in floating monofilament gillnets, but trolling was also successfully used to catch and tag a number of salmon with electronic tags. Fork length ranged from 64 to 91.5 cm. The sex ratio was highly in favour of females. All examined salmon were sexually immature, indicating that they will all be 2SW or older when returning to spawn. The water temperature during autumn of 2024 was relatively cold compared with 2025, which was reflected in relatively low catches and lower condition of salmon in 2024. Two acoustic telemetry receivers were setup in 2024 with the aim to test feasibility of this technology in the area. Both were easily located and brought to the surface in 2025 demonstrating the potential for deploying acoustic arrays in the area, although no fish were detected.

Introduction

Adult Atlantic salmon have been shown to migrate to East Greenland for foraging, especially from European rivers (Rikardsen *et al.* 2021). Older expeditions to East Greenland have also shown the salmon migrate to the fjords in the area and catches are also documented by local fishers today. There is very limited information on Atlantic salmon behaviour and survival in their ocean phase and scant knowledge on the Atlantic salmon frequenting the area, including origin, size and feeding. The typical marine surveys involving expeditions at sea in research ships are very costly and generally will not be able to provide detailed knowledge on behaviour.

Individual survival and behaviour requires tagging with electronic tags, which again necessitates catching live salmon in good condition. One way to generate key knowledge in a cost-efficient way is to target Atlantic salmon in East Greenland fjords. Here, the salmon can be caught, sampled and tagged from smaller boats by trolling. The fjords are more sheltered from weather and trolling can provide salmon in good condition for tagging with electronic or traditional tags. Additionally, by sampling via netting provided by local fishers, it is possible to increase the samples taken for population assignment and feeding habits. This approach has proven successful in Western Greenland (Sheehan *et al.* 2019, 2021a, 2021b).

East Greenland is a vast area and very sparsely populated. Approximately 3000 people live on the entire East coast of Greenland, with two thirds living in the city of Tasiilaq and the remainder dispersed in few small communities across the fjords in the area. This constrains the choice of locations where such an expedition can take place, because local support and

knowledge is often essential for such projects. The current expeditions were centred around the village of Kuummiut ($65^{\circ}51'55''\text{N}$ $37^{\circ}00'30''\text{W}$), where the necessary infrastructure, local knowledge and support was available (Figure 1). The expeditions took place over two weeks in September 2024 and September 2025. The results add to the previous expeditions in 2021 and 2023. The purpose of the expeditions was to:

- test whether a sampling and tagging approach was possible and what would be the most successful sampling methods;
- sample and tag Atlantic salmon captured in the area with the aim to determine population origin, localised feeding habits and behaviour; and
- investigate the feasibility of live fish holding in the area, with the future goal of being able to tag individual salmon after rapid genetic assignment (fish fit for tagging purpose).



Figure 1. Map over the study area. Fishing took place from Kuummiut to Kulusuk.

Methods

The pilot studies took place in September 2021 and September 2023. The present studies built on them and focused on adding Atlantic salmon tagging and samples, as well as improving the holding facilities for potential future use. The studies were performed during 7 – 18 September 2024 and during 10 – 24 September 2025. Salmon was caught by monofilament nets and by rod and line trolling from boat. Net captured salmon were sampled for length, weight and fin clips, otoliths and food items were retained. Salmon caught by trolling were measured, weighed and tagged (Acoustic tag Thelma Biotel LP13), before being released shortly after tagging. Based on length and weight data, Fulton's condition factor was calculated. The goal each year

was to catch and sample 50 salmon and tag as many salmon as possible from trolling. Additionally, work was performed on a new, bigger and better type of livewell.

Results

Net capture of salmon was done by setting short gillnets (30-90 m) perpendicular from the coast and trolling was performed from two smaller local boats. In 2024 there were very few captures (22) in nets and none by trolling. In 2025 there was a much better net capture, and 50 salmon were caught and sampled. Trolling proved to be a bit more challenging as the main trolling area from the previous years were less accessible due to weather. Three salmon were caught by trolling, of which two were sampled, tagged with acoustic tags and subsequently released and the last sampled together with the net caught salmon.

In total, samples (tissue, stomach content and scales) were taken from 22 salmon in 2024 and 51 in 2025. Two additional salmon was tagged with acoustic tags in 2025. Length distribution is shown in Figures 2 and 3. Mean weight and condition factor can be seen in Table 1.

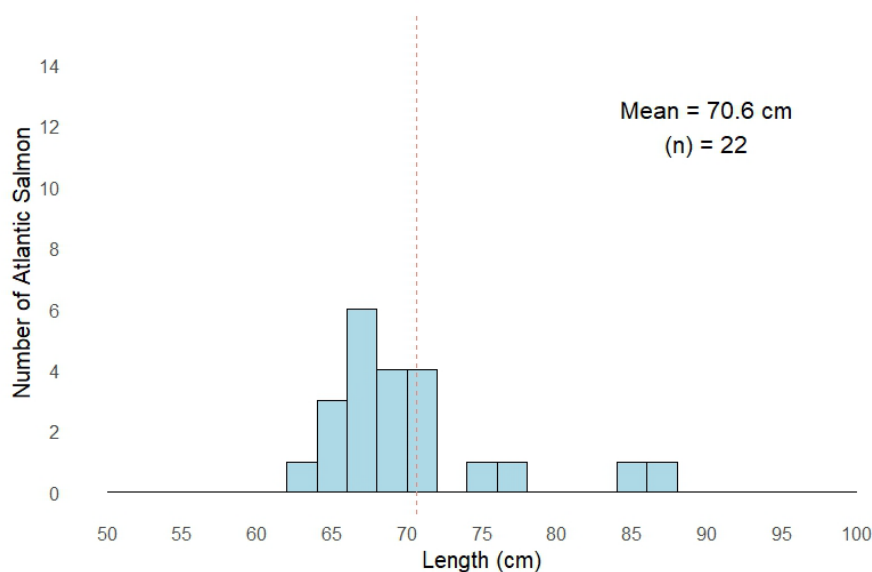


Figure 2. Number and length of Atlantic salmon caught during the expedition in September 2024. Mean length is the vertical dotted line.

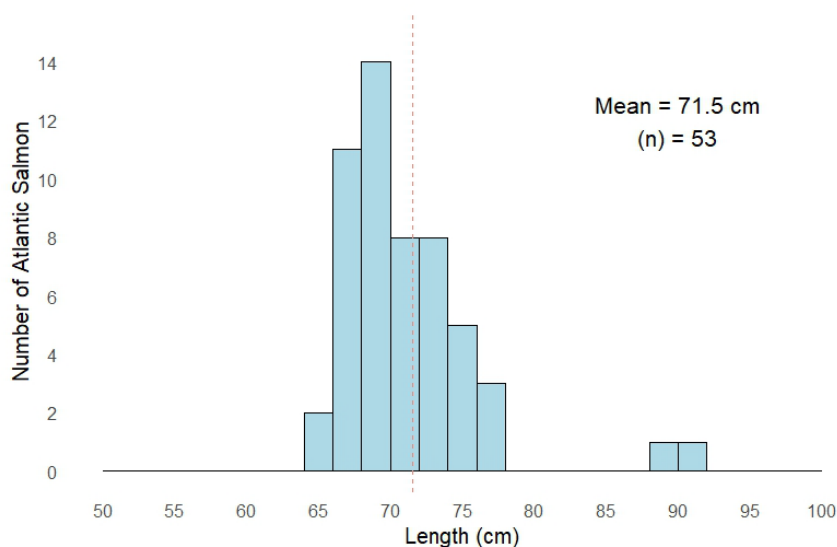


Figure 3. Number and length of Atlantic salmon caught during the expedition in September 2025. Mean length is the vertical dotted line.

Length, weight and condition factor of weighed salmon can be seen in Table 1. There was significant difference between condition factor in 2024 and 2025.

Table 1. Mean Length (+/- SD), weight (+/- SD) and condition factor (+/- SD) of sampled salmon in 2024 and 2025. N = numbers measured.

Year	N	Females/males	Length (cm)	Weight (g)	Condition Factor (F)
2024	22	18/4	70.6 (+/- 6.2)	3567 (+/- 1033)	0.99 (+/- 0.09)
2025	53	43/8	71.5 (+/- 4.9)	4152 (+/- 1129)	1.13 (+/- 0.11)

In both years, salmon checked for maturity status were immature. All females had very small egg sacs and males had slim, hardly visible semen strings. The proportion of females was 0.82 (22 checked) and 0.84 (51 checked) in 2024 and 2025, respectively.

Stomach content was analysed for sacrificed salmon. The stomach was opened and all material dissected. Content was divided into functional groups (fish, crustaceans and squid) and furthermore divided to species, where possible. After this division, the number of prey items were counted and noted for each stomach. The results were very similar to the 2021 and 2023 results, with one notable difference, no sand eels were detected in either 2024 or 2025.

Discussion

The catches demonstrated that Atlantic salmon are present, but clearly in fewer numbers in 2024 compared with 2025. Local knowledge suggested late arrival of the salmon in 2024 due to lower fjord temperatures. The studies confirmed results from previous years that salmon can be caught, tagged and released successfully, showing the potential for additional electronic tagging and sampling in the area in the future.

The length of the observed salmon was in the same general range in both years, probably reflecting the majority of salmon present. However, there was a clear difference in weight and hence condition factor of the salmon. In 2025 the salmon was significantly heavier and condition factor higher. As in previous years all salmon were immature and combined with length, strongly suggest that all salmon caught were 1+ SW or older, meaning they will have a minimum of 2SW upon return to rivers of origin.

The new updated livewell performed well and was left on site for potential future use.

Stomach content analysis, although not exhaustive, showed a relatively narrow range of food items, with the noticeable difference between previous year and 2024-2025, that no sand eel was found in any salmon, whereas it was the dominant food fish in previous years. Instead, capelin ('ammassat' in Greenlandic) was the dominant food source in many salmon. It indicates that prey fish population may vary among years and it is unclear to what extent. It will be beneficial to visit other areas in East Greenland, more southern and northern like the Scoresbysund / Ittoqqortoormiit area and also in other months (local fishers indicate they start catching salmon from August through October).

Salmon origins are currently being determined by genetic assignment in Canada, but initial tests on salmon from 2021, has shown the salmon had primarily originated from NW Europe, including countries like Denmark, Norway, Ireland, Scotland and England.

Two acoustic receivers (with an acoustic release) were deployed in the area in September 2024 and retrieved in 2025. The loggers were deployed on the bottom between 200 and 300 meters depth on either side of a narrowing of the fjord between Kuummiut and Kulusuk to test both the feasibility of the method and potentially detecting acoustically tagged salmon visiting the area. Loggers were easily found and released in 2025 and results confirmed that detection was sufficient to cover the area, although no acoustic tagged salmon were detected.

In previous years (2021 and 2023) pink salmon were recorded spawning in local rivers, with six (mean length 50.2 cm) and seven (mean length 47.5 cm) individuals caught in nets in 2021 and 2023, respectively. Only one additional pink salmon (54.0 cm, caught in net) was recorded during the 2024–2025 survey.

Conclusion

Taken together, the experiences from the sampling expeditions have been shown that it is possible to study, sample, tag and generally work on Atlantic salmon on their feeding grounds in East Greenland. The deployment of receivers gave proof of concept, meaning future projects may be able to setup acoustic receivers in the area and successfully retrieve them. This may significantly aid in our understanding of marine behaviour of salmon. In all years except 2024, the density and reliability of salmon being available at Kuummiut, is a very persuasive justification for a number of very relevant research avenues which could be based there.

The site provides access to a mixed pool of pre-adult salmon from most geographical areas of its distribution range in the middle of their feeding period, a part of the life-cycle least studied. Specifically, an acoustic telemetry project could widen the understanding of survival, timing and behaviour within the fjords. Stable isotope studies would also inform previous feeding patterns of these fish and further study is merited.

With the development of a rapid genetic assignment test with high accuracy, various types of tagging could lead to genuine breakthroughs in understanding of a key element of Atlantic salmon ecology and population development.

Literature

- Rikardsen, A.H., Righton, D., Strøm, J.F., Thorstad, E.B., Gargan, P., Sheehan, T. and Aarestrup, K. 2021. Redefining the oceanic distribution of Atlantic salmon. *Scientific Reports*, 11, 12266.
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- Sheehan, T.F., Bašić, T., Deschamps, D., Dugan, S., Lipsky, C., Millane, M., Tray, E. *et al.* 2021b. The International Sampling Program: Continent of Origin and Biological Characteristics of Atlantic Salmon Collected at West Greenland in 2018. US Department of Commerce, Northeast Fisheries Science Centre Reference Document 21-05; 60 p.

Work Package 2 (WP2): Full marine migration temperature of salmon smolts, gender dependent behaviour, smolt-runs in River Minho and tests of impacts of handling, tagging.

Objective 1 (WP2):

To continue the effort to obtain several full marine migration temperature data-sets from salmon. This will be accomplished by tagging outgoing smolts with miniature Data Storage Tags (DST). The aim is to tag 200 smolts with DST tags in Erriff and Bush Rivers with the goal of getting as many adult returns as possible (rendering full-datasets upon retrieval).

Background

The goal of this WP was to record the range of temperatures that migrating salmon from smolt stage to adult river return experience over their full oceanic migration. Few data are available due to the small size of salmon smolt which, to date, could not accommodate internal implantation of temperature logger tags which typically exceed the tag burden smolts can tolerate. Recent advances in logger technology have resulted in increased miniaturisation and this presented a unique opportunity for the previous SMOLTrack IV to collect a key dataset (thermal data for migrating salmon smolt and returning adults). The efforts were continued in SMOLTrack V.

Methods

Outgoing smolts (minimum > 13 cm FL) were implanted with miniature Data Storage Tags (DST; Star-Oddi nano-T tags) at two river sites which have full trapping facilities for adult returnees (River Bush in Northern Ireland, and River Erriff in Ireland). This allowed for removal and processing of returned tagged fish. Smolts were also implanted with a PIT tag to trigger DST tagged fish removal at each trap site. Smolts were captured with a Wolf trap in the River Bush and with a screw trap in the River Erriff.

Key findings

A total of 200 smolts were tagged with DSTs in 2024 with 130 in River Bush (Northern Ireland) and 70 in River Erriff (Ireland), respectively. The largest smolts were selected in both sites, but several tags were later in season transferred to from the River Erriff to the River Bush because minimum size could not be attained for the goal of 100 tagged smolts in the River Erriff. Number and mean length is listed in Table 2.

Table 2. Number and mean length of smolts tagged with DSTs in 2024 in River Bush (Northern Ireland) and River Erriff (Ireland).

River	N	Mean fork length	Min size(cm)	Tagging dates
Bush	130	16.2 (± 0.7)	15.4	22 Apr - 13 May
Erriff	70	13.7 (± 0.7)	12.9	19 Apr - 8 May

As in previous projects, the upstream adult traps in both rivers were monitored daily from the start of the season to the end of the season 2025 for returning 1 SW salmon. One returning adult was detected in 2025 from the 2024 smolt cohort in the River Bush, this fish was a 52.0cm L_F female, which was 1365g and had a condition factor of 0.97 (Fultons Index). The recovered DST tag yielded a valid long term marine temperature dataset. This adds an additional dataset to data obtained during the previous SMOLTrack projects.

Conclusion

The recovery of another tagged adult fish was a key achievement for this WP, reinforcing the proof of concept and demonstrating the feasibility of tracking the thermal experience from smolt to adult stage. Greater returns were anticipated, based on historical smolt to adult returns averaging 5%, but return rates across much of the range of 1 SW salmon have been very low between 2021-2025, indicating poor smolt to adult survival. Nonetheless, the recaptured salmon has provided a wealth of data which is currently being analysed with the hope to publish the results later this year. Monitoring of adult traps for further tag recoveries is ongoing in 2026 as it is possible that a small number of tagged 2SW fish could return from the batch of tagged smolts in 2024. This work has definitively proven the concept of recapturing salmon initially tagged as smolts and this relatively low-cost WP has provided comprehensive data on thermal preferences in the marine phase of the life-cycle.

Objective 2 (WP2):

To increase knowledge of smolt run size and behaviour data for the most Southern salmon populations. This will be accomplished with smolt-trapping and PIT (Passive Integrated Transponders) tagging.

Background

The aim of this part of WP2 was to record the range of temperatures that migrating salmon, from smolt stage to adult river return, experience over their full oceanic migration. Few data are available due to the small size of salmon smolts which, to date, could not accommodate internal implantation of temperature logger tags which typically exceed the tag burden smolts can tolerate. Recent advances in logger technology have resulted in increased miniaturisation and the opportunity to collect key thermal data for migrating salmon smolt and returning adults.

Methods

Under SMOLTrack V a Rotary Screw Trap (RST) was visited daily on the Mouro River between 23 March to 31 May 2024 and 17 March to 31 May 2025 (Figure 4). This supplemented data taken under the previous SMOLTrack projects between 1 March to 31 May 2022 and 1 March to 31 May 2023. Additional data being collected in 2026 is preliminary and when completed will give a five-year data set. Biometric measures were taken (tail length and width). Tissue samples were collected for genetic analyses, and scales. Tagging with PIT tags was conducted for potential recapture.

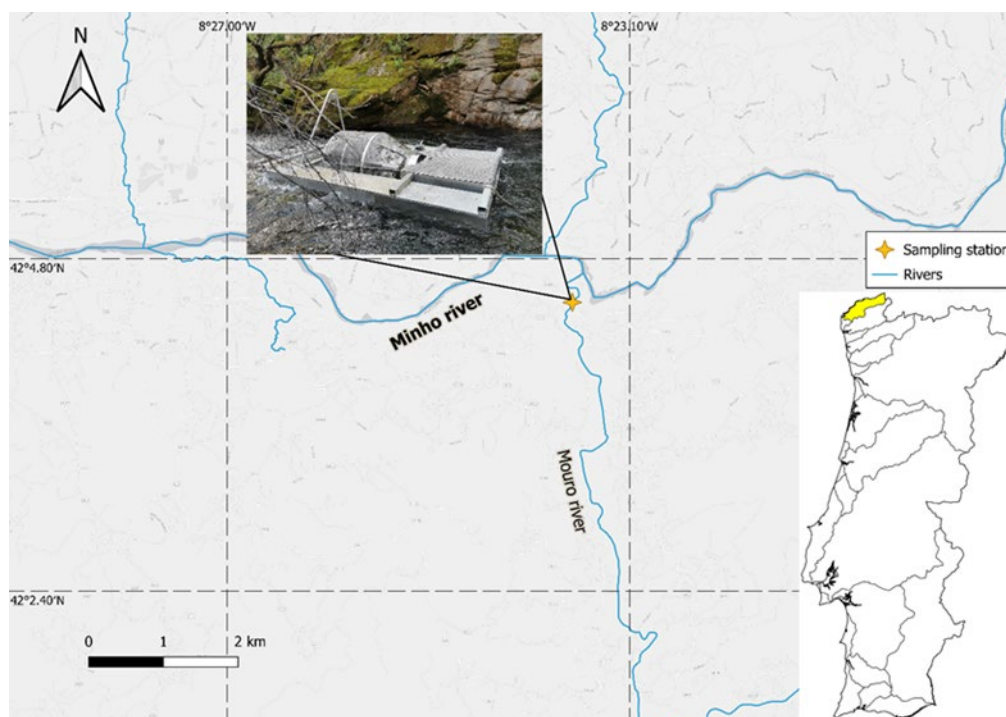


Figure 4. Placement location of the Rotary Screw Trap on the Mouro River (2022-2026).

Key findings

The number of salmon smolt captures during the study years (2022-2025) is represented in Figure 5. It is important to note that during 2025 monitoring, the RST was not inspected for smolt captures during several days due to harsh environmental conditions such as heavy rain and very high river discharge that made the trap inaccessible and/or non-operational.

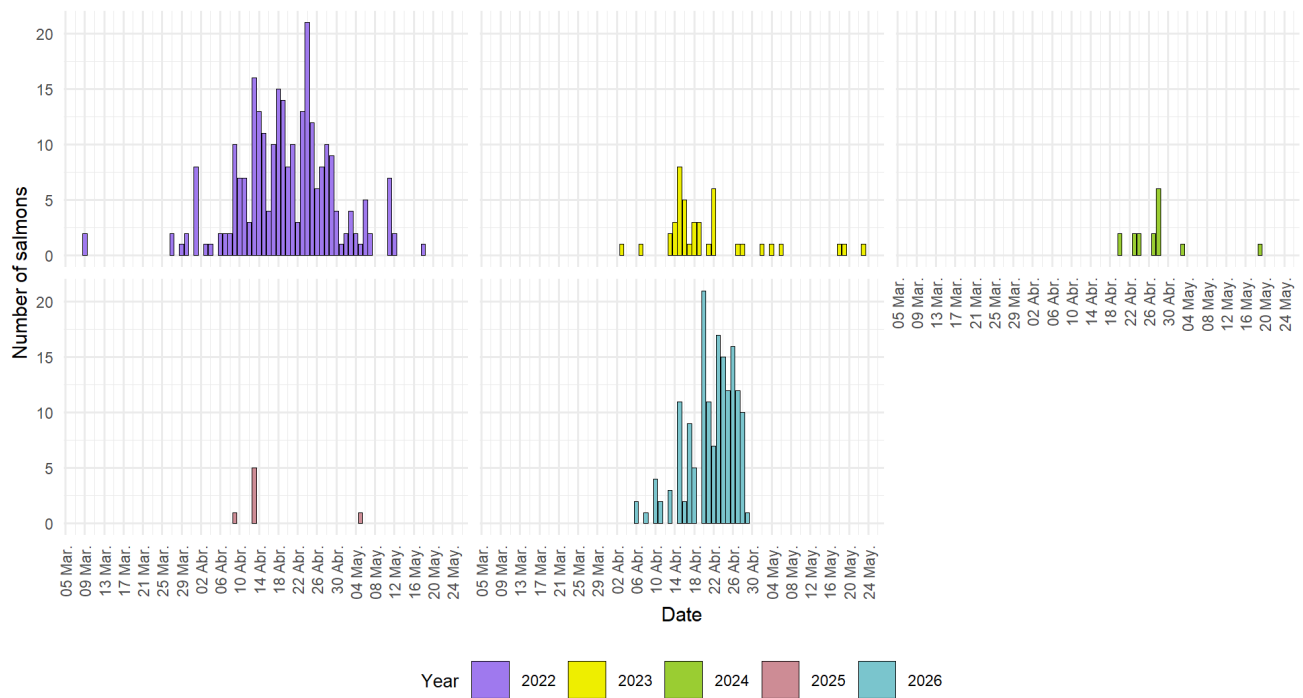


Figure 5. Daily number of salmon catches across study years. *2026 data is preliminary.

It was observed that since 2023, salmon smolts' migration has been starting on later dates. Migration in 2022 started on 9 March, the next year it started on 3 April, in 2024 it started on 19 April, in 2025 the migration started on 9 April and in 2026 it started on 6 April. According to these data, the salmon smolt migration onset appears to have started at least one month later since 2022. Regarding the total number of smolts captured over the years, a very evident decrease was recorded (Figure 5 and Table 3). 2022 was the year in which the highest number of salmon smolts were caught (N= 263 smolts). However, over the next three years, catches fell sharply: in 2023, 42 smolts were caught; in 2024, 16 smolts were caught; and in 2025 only 7 salmon smolts were caught. In 2026, catches are increasing significantly compared to previous years.

Table 3. Salmon smolt captures across study months and years. *2026 data is preliminary.

Month	Year				
	2022	2023	2024	2025	2026
March	7	0	0	0	0
April	229	36	14	6	161
May	27	6	2	1	-
Total	263	42	16	7	-

In line with the total number of smolts captured per year, the highest number of smolts captured per day also seems to have decreased through the years. In 2022 the maximum number of captures per day was 21 smolts; in 2023 it was 8; in 2024 it was 6; in 2025 the highest number of captures per day was 5 smolts; and in 2026, to date, it is 21 captures.

The peak migration during all years was observed to happen during the last two weeks of April. In 2022 the day with the highest number of captures was on 24 April; in 2023 it was on 15 April, the next year it was on 28 April and finally in 2025 it was observed on 13 April. In 2026, the peak migration possibly occurred on 20 April.

The migration end date was variable throughout the study years. In 2022 the migration ended on 18 May, in the next year it ended on 23 May. In 2024 the migration ended on 10 May, almost two weeks sooner compared to 2023. In 2025 the migration ended on 5 May.

Regarding the migration duration from 2022 to 2025, a decrease was registered. In the first year of the study, migration lasted 71 days, in 2023 it lasted 51 days, in 2024 it reduced to 29 days, and in 2025 it was recorded to be 27 days. For instance, the salmon smolts' migration duration was reduced by 44 days over the previous monitored years.

With the aim of comparing the biometric data obtained, the total length, weight and Fulton condition values were grouped in 14 weeks that represent the whole migration season for the study for all study years. The biometric data is represented in boxplots for every week during all study years, showing the variability among weeks, in Figure 6.

In terms of smolts' total length, measurements seem to have similar median values among years (Figure 6), the majority are between 150 mm and 175 mm. Measurements in 2025 seem to have the highest median of all years, followed by measurements in 2023. Furthermore, 2022 is the year with the greatest number of outliers over time, followed by 2026. 2022 is the year that has the lowest median total length value along the study years.

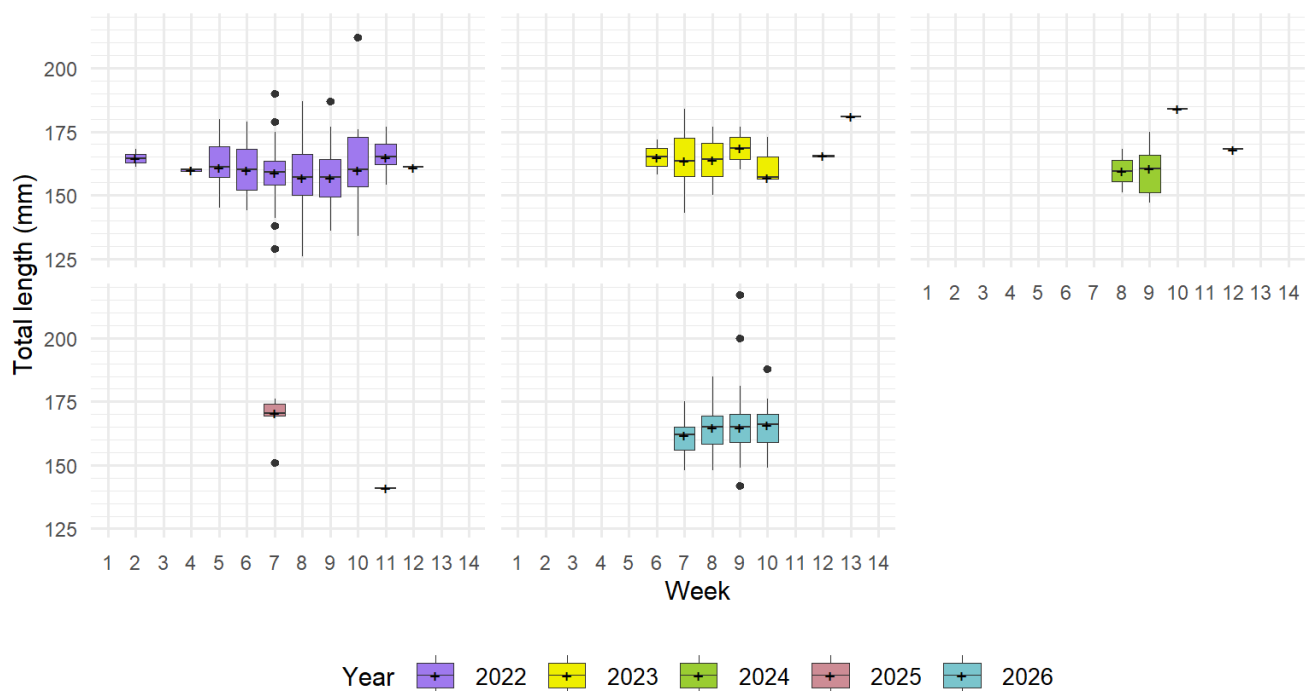


Figure 6. Boxplot of salmon smolts' total length by week and study year. *2026 data is preliminary.

Figure 7 shows that most salmon smolts caught weighed between 25 and 40 grams. The year when individuals had the highest median weight was 2023, followed by 2026, and in 2022 the median weight appears to be the lowest of all years. The first study year appears to be the most variable year in terms of weight, given that it has the largest number of outliers.

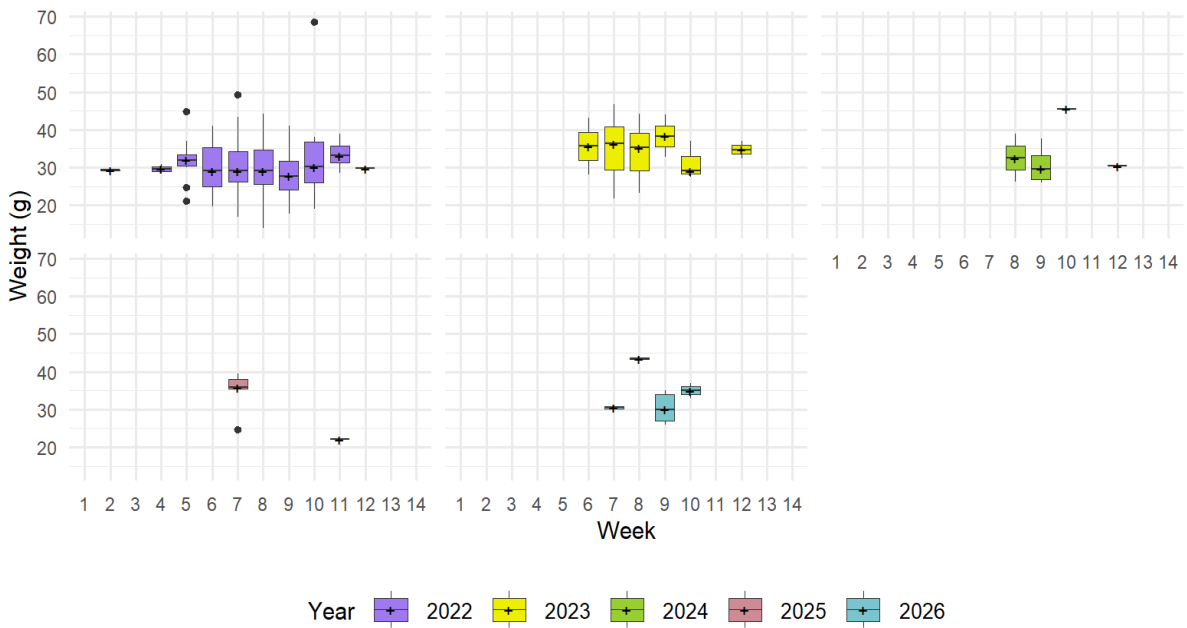


Figure 7. Boxplot of salmon smolts' weight by week and study year. *2026 data is preliminary.

The salmon smolt's Fulton condition through all years analyzed for this study (Figure 8) appears to have mostly stable median values, between 0.7 and 0.8. Fulton condition values under 1 denote that the fish has poor condition or very poor condition when the value is below 0.8 (Fulton 1902; Barnham and Baxter 1998). The lowest Fulton condition values of all years were found in 2022 and 2026.

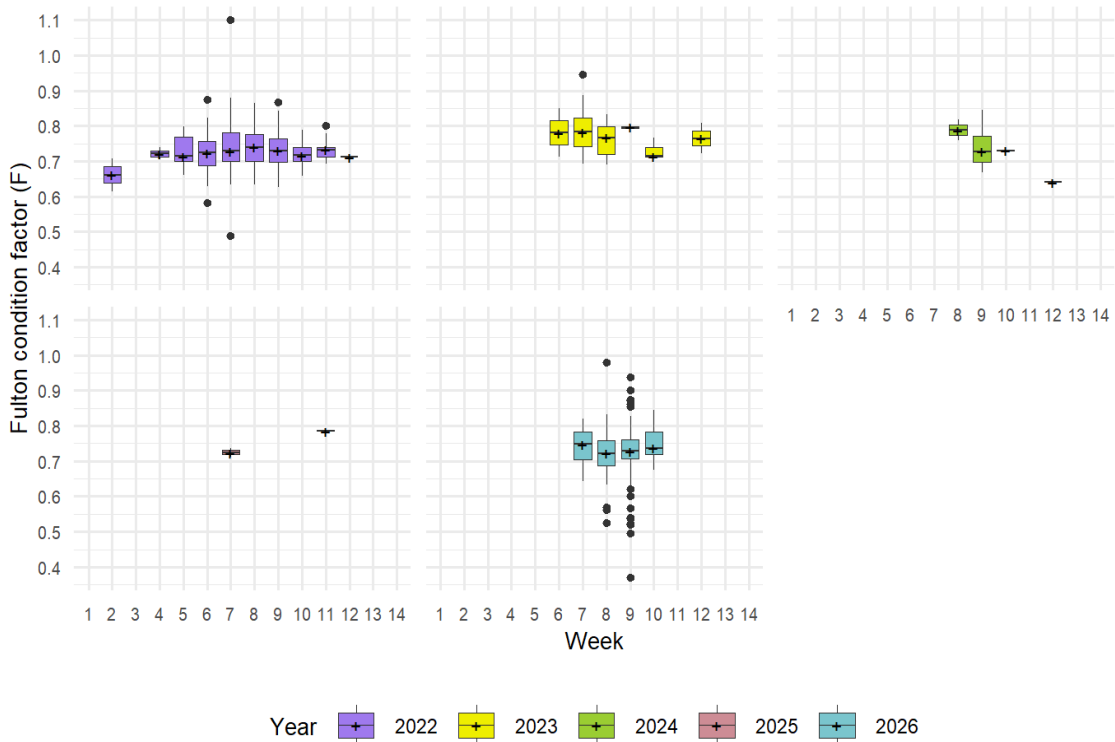


Figure 8. Boxplot of salmon smolts' Fulton Body Condition Value by week and study year. *2026 data is preliminary.

Conclusion

Atlantic salmon populations have been decreasing significantly in the Portuguese territory since 90 years ago. In the present study, in Mouro River, smolt occurrence has reduced considerably since the beginning of this monitoring in 2022, but is showing a recovery in 2026. Moreover, smolts appeared to have poor body condition, which could limit their migration success. Migration duration was observed to have had a total reduction of 44 days and a delayed onset of almost one month, during the study period.

The present study enlightens the current state and phenology of Atlantic salmon smolts in Portugal. Given that since the monitoring began in 2022, the population trend has been decreasing until 2025. However, although monitoring for 2026 is still underway, catches recorded so far reveal that the number is higher, at least for the present year. Deepening and expanding the monitoring studies of Atlantic salmon in the Minho River and tributaries could help discover survival bottlenecks. This highlights the importance of continuing the study of the salmon population in the Minho River.

Literature

Barnham, C. and Baxter, A. 1998. Condition factor, K, for salmonid fish (Fact Sheet No. FN0005). State of Victoria, Department of Primary Industries. <http://bamboorods.ca/Trout%20condition%20factor.pdf>

Fulton, T. W. 1902. The rate of growth of fishes. 20th Annual Report of the Fishery Board of Scotland 1902 (3):326-446.

Objective 3 (WP2):

To investigate if there is sex-based differences in smolt outmigration survival and / or in return rates of 1SW and MSW. This will be accomplished with outmigrating smolts being captured and tagged. Their sex will be determined by genetic analyses of a tissue sample. We aim at 100 smolts gender-determined and tagged in River Bush or River Erriff and a (much) higher number sex assigned and PIT-tagged to evaluate return rates.

During SMOLTrack V a lot of effort has been spent both working on publishing previous studies in SMOLTrack context as well as working on studies undertaken within SMOLTrack V. Two studies were performed during SMOLTrack V, one of evaluating the two most used methods for capture and handling when using telemetry on smolt and the second on exploiting the relatively new opportunity to genetically detect sex of the smolts. On top of that work has been done on papers relating to direct comparison of behaviour and survival of trout and salmon smolts, direct effect and variability over time of a physical bottleneck and survival and behaviour of salmon kelts. A full list can be seen below. In short, the studies have shown that the two different methods for capture, handling and tagging gave similar comparative and representative results, which shows both can be used, but that some variation needs to be incorporated in the study design. The study of behaviour and survival in relation to sex, showed no difference between the two sexes, they perform equally during smolt migration in terms of behaviour and survival. The comparison between salmon and trout smolt showed similar behaviour during river migration, but a significantly faster migration of salmon through the fjord. This is interpreted as a strategy difference between the two species in terms of the distance to the feeding ground, where salmon migrates significantly longer. The final paper was reporting on survival and behaviour of kelts, a much-understudied life stage in salmon. The results showed that over 50 % of the tagged salmon survived to sea and a total of five percent returned to the river. Surprisingly, all returning salmon was shown to be alternate spawners and also have a high straying rate to a neighboring smaller river. A full list of publications can be seen below.

- Sortland, L. K., Jepsen, N., Kennedy, R., Koed, A., del Villar-Guerra, D., Lennox, R. J. and Aarestrup, K. 2024. The effect of trapping on the migration and survival of Atlantic salmon smolts. *River Research and Applications*, 40, 1971-1986.
- Sortland, L. K., Aarestrup, K. and Birnie-Gauvin, K. 2025. Comparing the migration behavior and survival of Atlantic salmon (*Salmo salar*) and brown trout (*Salmo trutta*) smolts. *Journal of Fish Biology*, 106, 1360-1376.
- Sortland, L. K., Wightman, G., Flávio, H., Aarestrup, K. and Roche, W. 2025. A Physical Bottleneck Increases Predation on Atlantic Salmon Smolts During Seaward Migration in an Irish Index River. *Fisheries Management and Ecology*, 32, 26-40.
- Sortland, L. K., Aarestrup, K., Bradley, C., Prodhon, P., del Villar-Guerra, D. and Kennedy, R. Investigating sex-specific influences on migration and survival of Atlantic salmon smolts. (submitted)
- Flávio, H., Sortland, L. K., Birnie-Gauvin, K., Koed, A., Larsen, S. and Aarestrup, K. Insights on the seaward and return migration of repeat spawning Atlantic salmon from a major Danish river. (submitted)

Overall Conclusions and Impacts

The SMOLTrack V project has significantly advanced our understanding of the oceanic migrations of Atlantic salmon. The project's success in tracking the thermal range from smolt to adult returns provides a substantial contribution to the literature and is crucial to improve our understanding of the thermal preferences that influence salmon survival during their marine phase. Furthermore, the development and application of capture methods and of livewell holding in East Greenland opens the possibility for future studies on the marine migrations of salmon. These insights are essential for developing informed conservation strategies in the face of changing marine environments.

4. PINKTrack Projects

PINKTrack: Co-Ordinated eDNA Surveillance for Pink Salmon in the EU

The EU has provided funding to the Board to support the PINKTrack project.

At the 2022 and 2023 meetings of the North Atlantic Salmon Conservation Organization (NASCO) serious concerns were raised about the on-going and future threat of non-native pink salmon to native wild Atlantic salmon stocks in the Convention areas. There has been an unprecedented occurrence of pink salmon over a wide geographical scale in all Convention areas since 2017, predominately in odd-years. Of particular concern is that self-sustaining pink salmon populations have become established in northern Norwegian and Finnish rivers in recent years and in some rivers there they have been reported to out-number co-existing Atlantic salmon stocks. Since 2019, an explosive population growth in pink salmon stocks has been observed both in northern Norway and in the adjacent White Sea basin of northwestern Russia, where this non-native species was originally introduced. This has raised additional concern, that as a consequence, pink salmon may be encountered more commonly and have the potential to establish populations in adjacent regions and more southerly EU Member States.

This project intends to address these concerns under the beneficiary of NASCO, through a consortium comprised of state agencies and research institutes based in EU jurisdictions and Denmark (in respect of Greenland) which is supported by technical expertise from Norway. The project is undertaking work to better understand the extent of occurrence of pink salmon in EU waters through the use of environmental DNA (eDNA), which will enable it to elucidate

temporal and geographic patterns of spread and provide an ‘early warning system’ of their presence to inform appropriate management responses.

Work Package 1 (WP1): eDNATrack

Objective:

Development of standardized protocols for eDNA sampling and standardized approaches for the analyses of eDNA samples for the detection of pink salmon in EU Member States with the intention that such methods can continue to be utilized in routine national monitoring programmes after the project concludes.

This includes preparatory work to evaluate different approaches to sampling and analyses and their effect on the results for detection. Establishment of a repository of eDNA samples collected during the project and in subsequent years to provide valuable material for future assessments as analytical technologies develop.

Work Package 2 (WP2): SurveillTrack

Objective:

Establishment and undertaking of an eDNA sampling programme for detection of pink salmon in EU Member States, Denmark (in respect of Greenland) and Norway.

The intention of this work package is to elucidate temporal and geographic patterns of spread and provide an ‘early warning system’ of their presence to inform appropriate management responses with the intention that this programme of work can provide a basis for continued routine national programmes after the project concludes.

Methods

eDNA surveillance sampling for pink salmon was undertaken in a total of 52 catchments in seven jurisdictions (Denmark, France, Germany, Greenland, Ireland, Norway and Sweden) in 2025, see Figures 1 and 2.

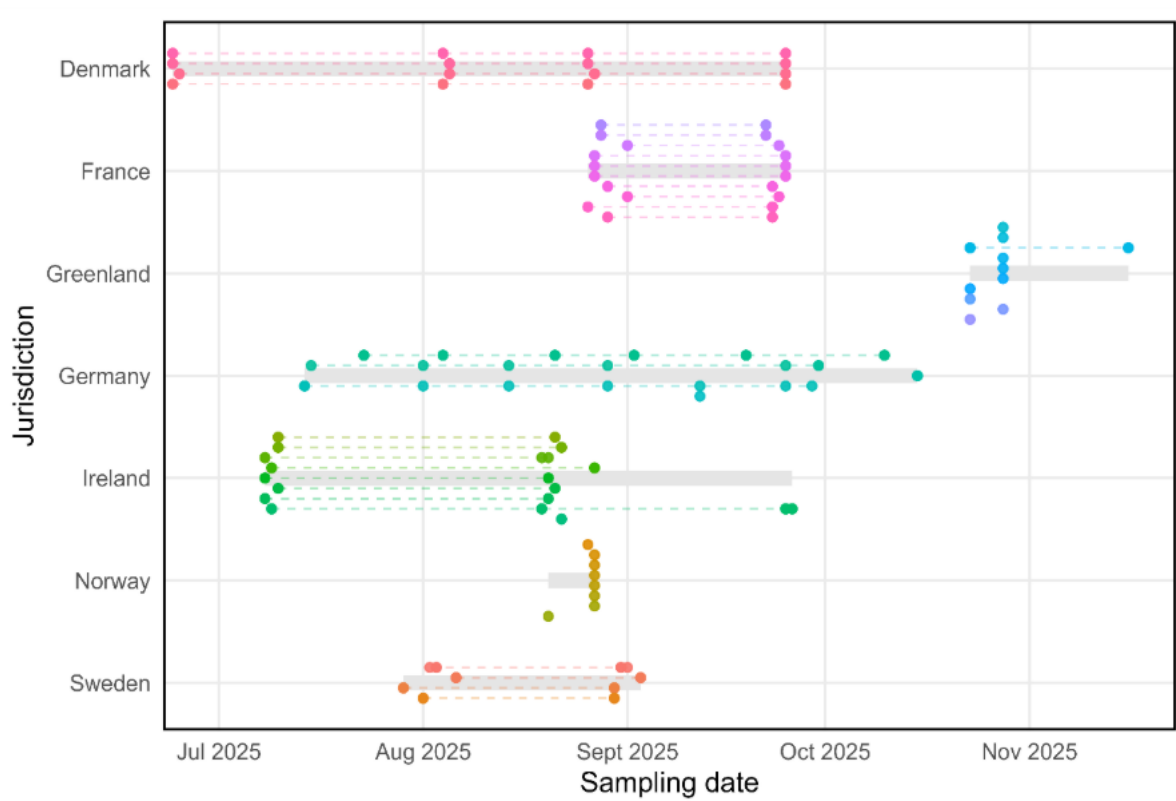


Figure 1. Timeline of pink salmon eDNA sampling undertaken by jurisdiction for SurveillTrack (WP2). Grey bar

indicates sampling time range in each jurisdiction. Specific rivers are identified as points by unique colour and plotted in alphabetical order within each jurisdiction. Rivers that were repeat sampled are linked by dashed lines. River names per jurisdiction can be found in Figure 2.

A total of 212 sites were sampled. Sampling was conducted between late June and mid-October in EU jurisdictions, in August in Norway and in October and November in Greenland.

Five laboratories participated in the eDNA sample analyses as follows:

- Germany: Thünen Institute of Fisheries Ecology, Germany;
- National Research Institute for Agriculture, Food and Environment (INRAE), France;
- Norwegian Institute for Nature Research (NINA), Norway;
- Technical University of Denmark (DTU), Denmark; and
- University College Dublin (UCD), Ireland.

All jurisdictions analysed the samples taken in their respective laboratories except for Greenlandic and Swedish samples which were analysed by DTU and NINA, respectively.

Results

Pink salmon eDNA was detected in four of the jurisdictions sampled (Denmark, Ireland, Norway and Sweden) in 2025. This comprised a total of thirteen river catchments (Figure 3). The majority of positive detections were in August, with a single detection prior to this in late June in a Danish River.

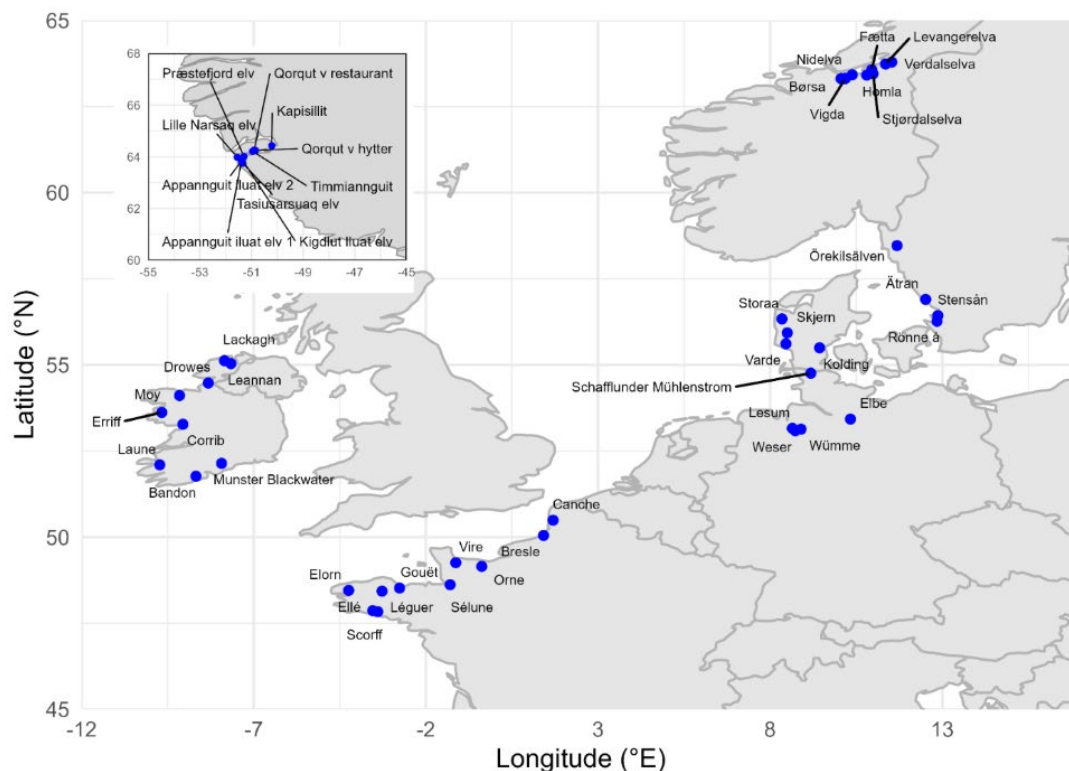


Figure 2. Catchments where eDNA surveillance for pink salmon was undertaken in 2025 for SurveillTrack (WP2). Inset is West Greenland.

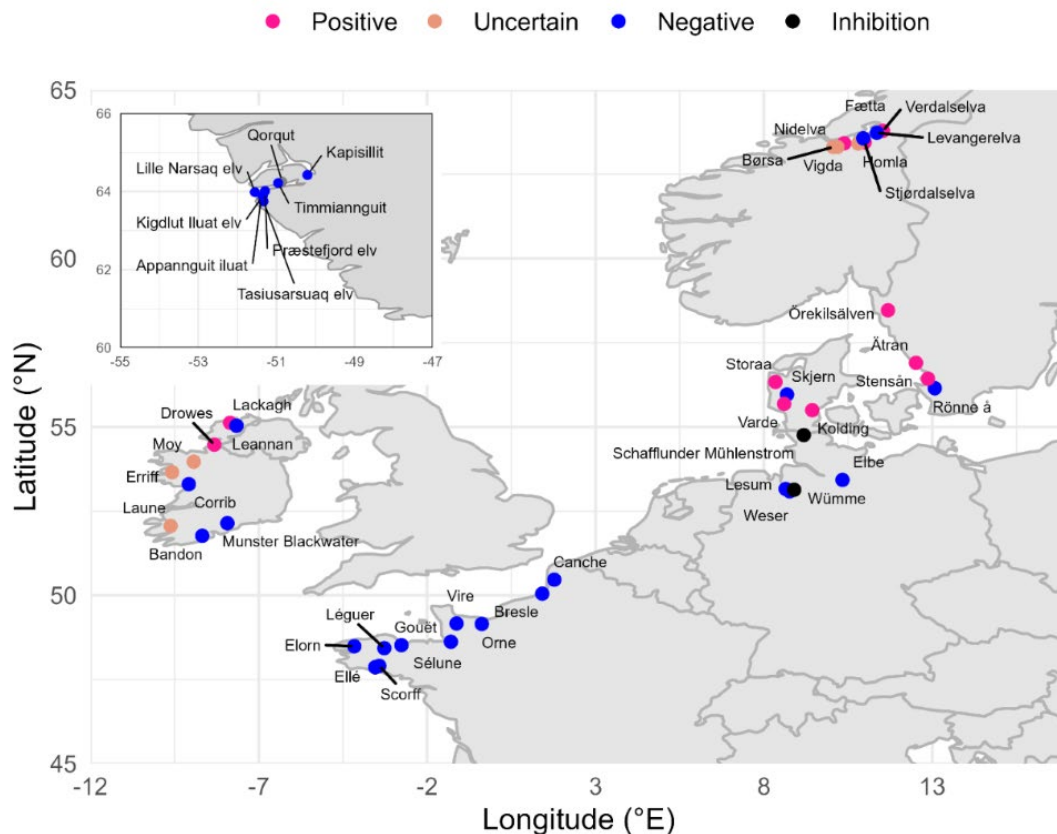


Figure 3. Preliminary results of eDNA surveillance for pink salmon was undertaken in 2025 for SurveillTrack (WP2). Inset is West Greenland. Notes: positive is any positive detection in river catchment; uncertain is when no positive detection occurred but amplification was present in 1/3 of technical replicates or there was less than 3 positive droplets in a digital PCR; there are two river catchments sampled in Appannguit iluat (elv1 and elv 2) and in Qorqut (v hytte and v restaurant); the results of some French samples are outstanding.

There were also some ‘uncertain positive’ detections of pink salmon eDNA in Denmark, Ireland, Norway and Sweden (Figure 3). Uncertain positive detections are those where qPCR amplification only occurred in one of the technical sample replicates or there is less than 3 positive droplets in a digital PCR. In these instances, positive detections were also observed in the same Danish, Norwegian and Swedish rivers in most cases. However, for Ireland and Norway, three rivers in each country with uncertain positives were different to those where there were positive detections (Figure 3).

In addition to the above, some remaining samples from France are awaiting analyses. However, it is not anticipated that these will have positive detection for pink salmon based on the lack of detections in the samples already analysed in France in 2025.

Discussion

Information on the distribution, occurrence and abundance of pink salmon in North-east Atlantic jurisdictions in 2025 has not yet been officially reported. As such, it is not yet fully possible to compare the results of SurveillTrack presented in this report with detections made by other means. In Portugal, for example, although not involved in the eDNA work, contacts have been periodically made with commercial and recreational fishermen to increase awareness about this potential threat and collect any data about current and potential future detections in national waters, with no occurrences being reported until now. However, it is expected that the Pink Salmon Working Group of NASCO will collate and report this information in advance of their annual meeting in June 2026 and enable this comparison to be made. The *4th International Seminar on Pink salmon in the Barents region and in Northern Europe 2025* held in late October 2025 does however, provide some useful preliminary reports in this regard ([Kalske](#)

[2025](#)). These indicate that overall, pink salmon continue to have a strong presence in Northern Norwegian and Finnish rivers in 2025, albeit potentially somewhat lower than in preceding odd years. Outside of this region, pink salmon abundance appears to continue to remain relatively much lower. For instance, no pink salmon have been officially reported in German waters in 2025.

In addition, in Ireland, only a single pink salmon specimen was verified in 2025 (in the River Moy). It is notable that only an *uncertain positive* was recorded for pink salmon eDNA presence in this river with confirmed eDNA detections only recorded in two other river systems despite no actual specimens being directly observed. Similarly in Sweden, there have been relatively few direct observations and reports of pink salmon, thus the use of eDNA is paramount to understand the distribution and spread of pink salmon with particular interest in the Baltic Sea region ([Staveley et al 2025](#)). In the river Ätran, on the Swedish west coast, eight individuals passed through a fish counter and there was only one report of a caught pink salmon from a recreational fisher from 2025. There were some unconfirmed reports in addition to these, however, verification is difficult particularly as reporting of recreational fishing catch information is not mandatory in Sweden. In general, this highlights the value of using an eDNA approach to detect the presence of pink salmon which otherwise may not be encountered. The relatively large number of 212 individual sites in seven jurisdictions in this project show the potential for using eDNA as a cost-effective screening method for pink salmon across Europe.

Conclusion

The successful delivery of the SurveillTrack (WP 2) work programme represents the implementation of a coordinated multi-jurisdictional approach for the surveillance of Pacific pink salmon using eDNA across EU jurisdictions, Norway and in West Greenland. The positive detections of pink salmon in Sweden, Denmark and Ireland suggest that eDNA can be used to determine pink salmon occurrence in rivers where abundance is likely low outside of Norway. However, several ‘uncertain’ results also suggest that the method still can be improved to increase its sensitivity. In addition, inhibition and filtration constraints may reduce detection sensitivity, particularly for low-abundance species, and should be considered with caution when interpreting negative results.

The results will be communicated to fisheries managers in the relevant jurisdictions. The PINKTrack consortium envisages that this programme of work will continue and be enhanced in 2027 based on the experiences of 2025 if further support can be secured. The inclusion of other North-east Atlantic jurisdictions in future iterations of this surveillance programme (including the Faroe Islands, Finland, Iceland and the UK countries) should be considered. This should facilitate a more comprehensive evaluation of the status of pink salmon in the North-east Atlantic and result in improved coordination of such monitoring activities in this important invasion frontier.

References

- Kalske, T. (Ed.) 4th International Seminar on Pink salmon in the Barents region and in Northern Europe 2025. Oct 21st and 22nd 2025, NIBIO Svanhovd, Norway. Abstract report M-3051|2025. The County Governor of Troms and Finmark, 36 p. Available at: [Abstract report 4th International Pink salmon seminar 2025](#)
- Staveley, T.A. *et al.* 2025. Detection of Non-Native Pink Salmon (*Oncorhynchus gorbusha*) in Swedish Rivers Using eDNA. *Environmental DNA*, 7(3), p.e70117. Available at: <https://doi.org/10.1002/edn3.70117>

PINKTrack II: Co-ordinated eDNA Surveillance for Pink Salmon in the EU

A funding application for a further stage of the PINKTrack project to continue the current work beyond its end date of 31 October 2026 was successful and began in January 2026 to run alongside and extend past the current work.

PINKTrack II is the follow-on iteration of PINKTrack and focuses on 1) adult pink salmon from the less common even-year cohorts, and 2) juvenile pink salmon spawned in 2025 by the odd-year adults.

An initial project workshop was held in March 2026.

Work Package 1 (WP1): SPAWNTrack

Objective:

Assessment of eDNA to detect pink salmon juveniles in index rivers where odd-year pink salmon are known to have been present in 2025 and therefore, may have spawned in these rivers. Also assess Atlantic salmon DNA quantity in sampled rivers.

At the initial project workshop it was agreed that sampling will occur in spring 2026, in Denmark, France, Germany, Ireland, Norway and Sweden. Millex 2µm eDNA filters will be used as the primary filter for sampling. Other eDNA filters may also be used to complement this if there are additional resources available for sample analyses. Control samples are also required as per the standard sampling protocol developed in PINKTrack.

The 2026 sampling is intended to test out the Millex eDNA filters in a range of river types and should inform their suitability for future potential sampling programmes in 2027.

Work Package 2 (WP2): EVENTrack

Objective:

Surveillance for even-year pink salmon in index rivers in the North-east Atlantic region (EU Member States, Norway and Denmark (in respect of Greenland)) using the methodological approaches developed and implemented in PINKTrack I. Assess the effectiveness of these approaches to detect even-year cohorts by validation in rivers with known stocks of even-year cohorts (e.g. in Finland and Norway). Also assess Atlantic salmon eDNA quantity in sampled rivers.

At the initial project workshop it was agreed that sampling will take place in summer 2026 and will be principally focused on rivers in northern Norway and Finland where even-year populations are most likely to be present. There will also be some single river sampling in other jurisdictions to complement this.

5. ROAM Approach to Marine Tracking

RAFOS Ocean Acoustic Monitoring (ROAM) is an acoustic tracking system where low frequency long ranging sound wave ‘pongs’ are emitted from ocean moored sound sources and received by a tag equipped with a hydrophone attached to the study animal. A primary advantage of the ROAM approach is the long range of the ‘pongs’, which could result in more accurate geolocation over a wider spatial and temporal range compared to traditional light-based methods. The development of the ROAM approach to marine tracking is being led by researchers at the Woods Hole Oceanographic Institute (WHOI) and the University of Rhode Island, USA.

ROAM was first brought to the attention of the Board in 2017 (CNL(17)9) and annual updates have been provided since (ICR(18)06; CNL(19)09; ICR(20)16; CNL(21)12; CNL(22)10; CNL(23)10; CNL(24)17, ICR(25)11). In addition, a workshop involving researchers from the North Atlantic and Pacific oceans was held in 2018, which provided a detailed overview of the

ROAM approach (<https://repository.library.noaa.gov/view/noaa/22044>). ROAM is a re-design and re-purposing of a common oceanographic monitoring technique. As such, efforts have been focused on evolving the monitoring approach to be suitable for tracking marine animals in the ocean and on conducting field trials to verify that the equipment performs as expected. Unfortunately, the project has experienced numerous delays associated and caused by the COVID-19 pandemic, equipment/supply shortages, equipment failure and a lack of dedicated funding.

Field trials were conducted in 2021, 2022 and 2024. The trials were largely unsuccessful due to a variety of issues unrelated to the functionality of the ROAM approach. However, the preliminary data that was obtained from those efforts were encouraging. In spite of these setbacks, all collaborators remained keen on the project and progress continues. As such, interest remained high and researchers continue to pursue the field-testing of the approach so that informed decisions can be made on the next step.

In 2023, a project proposal to Canada First Research Excellence Fund (CFREF), which included a ROAM subcomponent, was selected for funding. The project proposal contains two phases, with Phase II's funding being contingent on the successful completion of Phase I. Phase I activities are focused on further chip development and field testing. The ROAM chip is being redesigned to bring it in line with contemporary chip manufacturing protocols while also incorporating the ability for multi-frequency monitoring and detection. This will allow for the chip to be commercial produced while also being able to detect 'pongs' of different frequencies. Generally speaking, low frequency 'pongs' provide increase accuracy whereas high frequency 'pongs' helps to increase detection range.

Field trials are again scheduled to occur in 2027 in the Pacific Ocean. Field trials will be combined with a fully funded oceanographic monitor survey, which will be utilizing ROAM sound sources in support of carbon sensing and monitoring project. Although the testing will be 'piggybacked' onto this survey, the fact that the survey is fully funded and is utilizing ROAM sound sources provides a unique and cost effective opportunity for a 'dedicated' field trial for the ROAM tags. The field testing will likely focus on dedicated glider missions, although detailed plans are still being developed.

In 2025, ROAM principal investigators were contacted by a representative from a private foundation. The investigators were asked to develop a funding proposal for a multi-year two phased project. Phase one would be focused on further ROAM infrastructure development and testing. Phase 2 would be focused on implementing a large-scale Atlantic salmon migration monitoring program in the Northwest Atlantic. Discussions with the foundation are ongoing and we expect a decision by the end of June 2026. This is a welcome opportunity which demonstrates that interest still remains high in advancing the ROAM approach to aquatic animal tracking.

Secretariat
Edinburgh
31 May 2026