Report of the Twenty-Third Annual Meeting of the International Atlantic Salmon Research Board

Knockranny House Hotel & Spa, Westport, Ireland

2 & 4 June 2024

1. Opening of the Meeting

1.1 The Chair, Martha Robertson (Canada), opened the meeting and welcomed members of the International Atlantic Salmon Research Board (the Board), their scientific advisers, the Chair of the Board's Scientific Advisory Group (SAG) and observers to the meeting. She noted that the Canadian and Russian Federation Board members were joining the meeting through the virtual platform.

1.2 A list of participants is included in Annex 1.

2. Adoption of the Agenda

2.1 The Board adopted its Agenda, ICR(24)11 (Annex 2).

3. The Inter-Sessional Process to Consider the Overall Vision, Scope and Purpose of the Board

3.1 During its 2022 Annual Meeting, the Board considered the 'Report of the Review of the Metadatabase of Salmon Survey Data and Sample Collections of Relevance to Mortality of Salmon at Sea', ICR(22)03. That report recommended that the Board may wish to:

- consider its overall vision, scope and purpose;
- assess whether the funding available to the Board is commensurate with its vision, scope and purpose;
- identify the priorities the Parties now have for the Board; and
- consider establishing a process for requesting and reviewing proposals.

3.2 The Chair had noted that it would be difficult to give these recommendations sufficient time and attention at that meeting. Therefore, the Board agreed to an inter-sessional process, including an inter-sessional meeting of the Board.

3.3 At its 2023 Annual Meeting, the Board considered 'The Report of the Inter-Sessional Meeting of the International Atlantic Salmon Research Board', ICR(23)02 and reached a number of decisions, including, but not limited to:

- recommending revised Terms of Reference for the Board and its SAG to Council. These were adopted by Council and are available as ICR(23)18; and
- agreeing Terms of Reference for the International Atlantic Salmon Research Board's Scientific Advisory Group to Identify Potential Research Priorities, ICR(23)14 and to hold an Inter-Sessional Meeting of the Board in February 2024 to consider the SAG's work.

3.4 The Board held its Inter-Sessional Meeting in February 2024 to consider the 'Report of the Meeting of the Scientific Advisory Group of the International Atlantic Salmon Research Board to Identify Potential Research Priorities', ICRIS(24)02.

a) Report of the Inter-Sessional Meeting of the International Atlantic Salmon Research Board

3.5 The Board Chair introduced the 'Report of the Inter-Sessional Meeting of the International Atlantic Salmon Research Board', ICR(24)03. She reminded the Board members that, at that meeting, the Board had agreed its future research priorities and issued a 'Statement of the International Atlantic Salmon Research Board on Future Research Priorities', ICR(24)01.

3.6 The Chair noted that, during its 2024 Inter-Sessional Meeting, the Board had also discussed whether new research was a possibility for the Board and whether it was best to develop a project and seek funding for it once a detailed proposal was in place, or whether to seek funds and then begin developing a new project proposal. The Board had agreed to task the SAG with drafting an outline that describes the requirements of a basin-wide marine growth project based on adult scales and adopted 'Terms of Reference for the International Atlantic Salmon Research Board's Scientific Advisory Group to Outline a Marine Growth Study Proposal', ICRIS(24)08 (see Item 4 below).

b) Decisions taken in the light of the Review of the Overall Vision, Scope and Purpose of the Board

3.7 The Chair noted that a number of matters arising from the review of the vision, scope and purpose of the Board remain unresolved.

3.8 At its 2023 Inter-Sessional Meeting, the Board had considered four 'high-level discussion points' namely: 1) the proactive or reactive nature of the Board over the next five years; 2) the chicken and the egg of funding; 3) sources of funding; and 4) big or small (projects). The Board had agreed that it should be proactive over the next five years in identifying research needs, developing research ideas, and requesting proposals and seeking funds. However, no other decisions were taken.

3.9 With regards to requesting proposals, the Chair reminded the Board that during the 2023 Inter-Sessional Meeting, the Board had agreed that it would review and revise its 'Guidelines on Submitting Proposals for Research, Workshops, Symposia and Other Activities for Support by the IASRB', ICR(09)10. The then Acting Board member for the UK worked with the Chair and Secretariat to draft a revised document for consideration at the 2023 Annual Meeting of the Board. However, it became apparent that this could not be finalised until such time as the Board had considered the results of the SAG's work to develop a prioritised list of research needs. Therefore, during its 2023 Annual Meeting, the Board agreed to postpone consideration of this matter.

3.10 The Secretary introduced 'Draft Guidelines on Submitting Proposals for Support by the International Atlantic Salmon Research Board', ICR(24)05rev. After consideration of this document, the Board adopted 'Guidelines on Submitting Proposals for Support by the International Atlantic Salmon Research Board', ICR(24)12, Annex 3.

3.11 The Chair reminded participants that, at its 2023 Inter-Sessional Meeting, the Board had noted that it would be doing its best work when involved in international co-ordination and co-operation. However, the Chair noted that large-scale projects requiring new fieldwork activities would require a long timeframe, significant preparation and a scientific lead willing and able to take on such a role. It had been

suggested that the Board could support the use of existing data that is available from all jurisdictions throughout the North Atlantic to answer questions in smaller 'desktop type' projects that could lay the foundation for larger projects. The Board noted that, while it was actively pursuing a large-scale basin-wide project through the work being conducted by the SAG under Agenda item 4, it remained open to the possibility of supporting projects of any size where possible.

3.12 The Board considered whether to continue actively seeking a successor project to SALSEA-Track while the project discussed under Agenda Item 4 was being developed. The Board noted that the attributes of the SAG's project outline aligned with the previously agreed attributes of any successor to SALSEA-Track. However, it was noted that it would be helpful for the SAG to consider these attributes in its scoping workshop to ensure the SAG's proposal was aligned. The Board agreed that it would continue seeking a successor project, but this would not be a standing item on the Agenda. It was noted that referring to the successor project as a 'potential successor to SALSEA-Track' implied that it would entail investigation of marine migration, which is not a requirement for a successor project. The Board, therefore, agreed to refer to any successor project as a 'signature project' in future.

4. Report of the Inter-Sessional Meeting of the Scientific Advisory Group to Outline a Marine Growth Study Proposal

4.1 During its 2024 Inter-Sessional Meeting (Item 3.a) above), the Board tasked its SAG with drafting an outline that describes the requirements of a basin-wide marine growth project based on adult scales and adopted Terms of Reference for this work, ICRIS(24)08.

4.2 The SAG had held informal discussions in the fringes of the ICES Working Group on North Atlantic Salmon meeting in March. The SAG also held a hybrid meeting immediately prior to the first session of the Board's Annual Meeting.

4.3 During the first session of the Board's Annual Meeting, the SAG Chair (Peder Fiske, Norway) presented the work of the SAG in addressing its Terms of Reference. This presentation is available as document ICR(24)13 (Annex 4). The Board held lengthy discussions on the draft outline and asked the SAG to consider, in advance of the second session of the Board's meeting, the following questions:

- is the SAG aware of an individual who would be an appropriate person to lead the initial stages of the proposed project and develop its scope?
- could the SAG provide a note of scientific questions the proposed project may be able to answer?

4.4 The Board also noted that an outline of the potential outcomes and management implications of the project may be useful in attracting external interest and / or funding, especially if it included some more inspirational possible benefits.

4.5 At the Board's second session, the SAG Chair advised the Board that the SAG had held a second meeting to discuss the draft outline in the light of feedback from the Board.

4.6 Nora Hanson (UK) had been identified as the person to lead an initial scoping workshop, with assistance from Tim Sheehan (USA).

4.7 The SAG had agreed that a series of online meetings would be held as a scoping workshop. The scoping workshop would not require financial assistance from the Board at this time, as it would involve in-kind participation from the Parties. It was also noted

that it would not require support from the Secretariat.

4.8 The objectives of this scoping workshop would be:

- to agree the standardisation of obtaining images from scale samples;
- to consider the tools to extract data from the images; and
- to further plan the project.

4.9 The SAG felt that representatives of each jurisdiction and other scientists that could bring more insight should attend the scoping workshop. A smaller group would then develop a project proposal and comparison of the potential methods. This smaller group would also consider how the SAG's Terms of Reference, ICRIS(24)08, could be further answered.

4.10 The report of the smaller group would be considered by the SAG and a final report would be available to the Board by 31 January 2025. The SAG would not require support from the Secretariat and anticipated that the Board could then hold a short, half-day, virtual Inter-Sessional Meeting to consider the SAG's report in advance of the Board's Annual Meeting.

4.11 The SAG Chair noted that some of the scientific questions the proposed project could answer were:

- can large-scale drivers of salmon growth and survival be identified, and to what extent does growth in salmon vary in synchrony among larger regions?
- can the critical periods that might affect survival be identified? Growth in scales can be partitioned into seasonal timeframes so it may be possible to identify, for example, whether spring, mid-summer, autumn or winter is most critical.

4.12 The SAG Chair also noted that questions such as what determines age at maturity may be answered through data extracted from the scales for genetic analysis and that the list of scientific questions the project may be able to answer would be further developed during the scoping workshop.

5. Review of the 2023 Inventory of Research

5.1 The Chair noted that, at its 2020 Annual Meeting, CNL(20)12, the Board had agreed changes to the 'Inventory of Research Relating to Salmon Mortality in the Sea'. The Board had asked the Secretary to engage with the website designer to improve the prominence, searchability and utility of the new Board website and the presentation of the Inventory on that website. It was also agreed that the Secretariat should consider how the utility of the updated website can best be evaluated with the use of hit statistics and related metrics, and that these statistics should be presented annually to the Board to understand the extent to which the Inventory is used.

5.2 The Chair referred the Board to the 'Review of the 2023 Inventory of Research', ICR(24)06. The Board considered whether it would be useful to include information on how future projects reported on in the Inventory relate to the agreed priority research areas. The Board agreed that this information should be added to future Inventory update requests.

5.3 The Secretariat was requested to ask Board members to update and check the information held in the Inventory relevant to their Party / jurisdiction in November 2024. Board members should return their updates to the Secretariat by 31 December 2024. The Secretariat was asked to post an updated Inventory spreadsheet on the

website by the end of January 2025.

6. Projects of Interest to the Board and its Work

6.1 At its 2020 Annual Meeting, the Board agreed to retain an Agenda item to allow for updates on projects of interest to the Board and its work. The Chair referred to the document entitled 'Projects of Interest to the Board and its work' ICR(24)10. No questions or comments were raised on this document.

6.2 The Chair reminded the Board that, at its 2022 Annual Meeting, it had endorsed the concept of composing a new North-East Atlantic salmon genetic baseline for the purpose of assigning salmon samples to region of origin, as contained in document ICR(22)08. In 2023, the Board agreed to provide up to €3,000 to support a hybrid workshop in relation to the project and agreed to consider providing further funding once the results of that workshop were known.

6.3 On behalf of the project consortium, Philip McGinnity (University College Cork, Ireland) presented a 'Proposal for an Updated Comprehensive trans-European Genetic Reference Baseline to Assign Atlantic Salmon (*Salmo salar*) to Rivers and Region of Origin across the Eastern North Atlantic', ICR(24)07. The presentation is available as document ICR(24)14 (Annex 5). The updated proposal also contained the report of the hybrid workshop and sought funding of €16,000 from the Board's International Atlantic Salmon Research Fund for 200 post-doctoral hours to produce a report outlining data availability, power analysis and an outline for agreed future direction in baseline development.

6.4 In its consideration of this funding application, the Board recognised the importance of the work being undertaken and reiterated its support for the project. The Board noted that a further workshop would be held in autumn 2024, but that the information that the Board had hoped to see from the initial hybrid workshop (referred to in paragraph 6.2 above) was not yet available and it felt unable to commit further funding to the project until such information (e.g. whether micro-satellite or SNP information would be used) was available. The Board noted that the project consortium could consider submitting a clearer proposal back to the Board in the future (or to other funding sources), in line with the applications procedure agreed in document ICR(24)12.

6.5 The Board had also received a 'Funding Proposal to Convert to Opensource Application a Semi-Automated Approach to Analyse Atlantic Salmon Digitised Scale Images' ICR(24)08. This proposal sought funding of £9,600 from the International Atlantic Salmon Research Fund. The Board discussed the relevance of this proposal to the Board's top research priority and to the draft outline proposal being developed by the SAG on a basin-wide marine growth study. It was noted that the methods for standardising scale processing would be considered at the scoping workshop referred to under Agenda item 4. The Board felt that it was premature to consider funding this project at this stage, but that if the method was deemed to be useful to the SAG's outline proposal at the scoping workshop, funding could be considered at that time if a new application was submitted.

7. Finance and Administrative Issues

7.1 The Chair referred to the 2023 Accounts for the International Atlantic Salmon Research Fund, ICR(24)09. The decision had been taken not to have the 2023 accounts audited and the Secretary had been asked to prepare income and expenditure statements instead. She asked the Secretary to introduce the accounts.

7.2 The Secretary reminded the Board that much of the funds in the accounts were ring-fenced for various projects. The remaining balance in the sterling accounts was approximately £24,900. She reminded the Board that it had previously indicated that it is desirable to retain a reserve of £4,000 – £5,000.

7.3 The Board agreed to accept the 2023 accounts.

7.4 The Chair reminded the Board that, at its 2006 Annual Meeting, it recognised that it was not necessary to have the accounts audited annually and agreed that, in future, the Board's accounts should be audited as required in relation to the funds held. For years in which an audit is not conducted, details of the Board's income and expenditure statements would be circulated to the members of the Board and discussed at its Annual Meeting. Based on previous costings, an audit of the Board's accounts would likely cost approximately £2,500.

7.5 The Board agreed not to have its 2024 accounts audited. The Secretary was asked to provide income and expenditure statements for consideration at the 2025 Annual Meeting.

7.6 The Board considered the £4,000 that had been ring-fenced in 2018 to support a second ROAM workshop if required. The Board noted that it was unlikely that such a workshop would be held in the near future. The Board also noted that there was a further £40,150 voluntary contribution from the United States that had been ring-fenced with the purpose of funding projects under the SALSEA-Track or ROAM initiatives. The Board agreed to re-allocate the £4,000 previously ring-fenced for a potential second ROAM workshop back into the general funds.

8. Other Business

8.1 There was no other business.

9. Report of the Meeting

9.1 The Board agreed a report of its Meeting.

10. Date and Place of the Next Meeting

10.1 The Board agreed that it would hold a short, virtual Inter-Sessional Meeting to discuss the report of the SAG's consideration of the scoping workshop referred to under Item 4 of the Agenda. The timing of this meeting will be agreed once the calendar of NASCO's business has been finalised.

10.2 The Board agreed to hold its next Annual Meeting in conjunction with the Forty-Second Annual Meeting of NASCO.

11. Close of the Meeting

11.1 The Chair thanked participants for their contributions and closed the meeting.

Annex 1

List of Participants

Canada

**Cindy Breau (virtual participant)
Martha Robertson (Chair)
Julien April

Denmark (In respect of the Faroe Islands and Greenland)

**Rebekka Nygård Bak

European Union

**Cathal Gallagher
Jaakko Erkinaro
Ignacio Granell
Mick Millane

Iceland

**Guðni Magnús Eiríksson

Norway

**Raoul Bierach
*Helge Dyrendal
Peder Fiske (SAG Chair)

Russian Federation

**Sergey Prusov (virtual participant)

United Kingdom

**Nora Hanson

United States

**Tim Sheehan
*Dan Kircheis

NGOs

Ken Whelan (Nominated NGO Representative)
Heinz Ackmann
Maria Ackmann
Noel Carr
Thomas Chrosniak
Øyvind Fjeldseth
Sam Jones
Dwayne Shaw
Alan Wells

Secretariat

Emma Hatfield
Clare Cavers
Louise Forero

**Nominated Board Member
*Board Adviser

Annex 2

ICR(24)11

Twenty-Third Meeting of the International Atlantic Salmon Research Board

Knockranny House Hotel & Spa, Westport, Ireland

2 & 4 June 2024

Agenda

1. Opening of the Meeting
2. Adoption of the Agenda
3. The Inter-Sessional Process to Consider the Overall Vision, Scope and Purpose of the Board
    a) Report of the Inter-Sessional Meeting of the International Atlantic Salmon Research Board
    b) Decisions taken in the light of the Review of the Overall Vision, Scope and Purpose of the Board
4. Report of the Inter-Sessional Meeting of the Scientific Advisory Group to Outline a Marine Growth Study Proposal
5. Review of the 2023 Inventory of Research
6. Projects of Interest to the Board and its Work
7. Finance and Administrative Issues
8. Other Business
9. Report of the Meeting
10. Date and Place of the Next Meeting
11. Close of the Meeting

Annex 3

ICR(24)12

Guidelines on Submitting Proposals for Support by the International Atlantic Salmon Research Board

Background

The North Atlantic Salmon Conservation Organization (NASCO) is the inter-governmental organization charged with conserving, restoring, enhancing and rationally managing salmon in the North Atlantic Ocean. In 2000, in response to concerns about increased marine mortality of salmon, NASCO established the International Atlantic Salmon Research Board (the Board). The purpose and scope of the Board are to promote and initiate collaboration and co-operation on research into the causes of marine mortality of Atlantic salmon and the opportunities to counteract this mortality through a number of identified activities, see ICR(23)18. Additionally, the Board has agreed its vision:

> '*Factors causing salmon mortality at sea are understood to the level that supports the development of management actions by Parties to reduce mortality to recover, protect and conserve salmon stocks*').

The Board has established and maintains an inventory of research (the Inventory) relating to the mortality of salmon at sea, which is available on the Board's website, www.salmonatsea.com.

Proposals for Research

In the past, the Board has funded major international research, workshops and symposia related to improving understanding of mortality of Atlantic salmon at sea, such as SALSEA. In addition, it has endorsed initiatives, such as the concept of composing a new North-East Atlantic salmon genetic baseline for the purpose of assigning salmon samples from Greenland to region of origin, ICR(22)15.

Proposals submitted to the Board in support of the Board's scope, purpose and vision will be evaluated by the Board's Scientific Advisory Group (SAG) in relation to a number of criteria including relevance to the Board's research priorities (ICR(24)01), the extent of collaborations, value added (in relation to research included in the Inventory) and potential to be successful (in terms of making progress towards the Board's vision).

Proposals for research, workshops, symposia or other activities may be submitted to the Board, that:

- seek only endorsement by the Board; or
- seek funding support from the Board.

The Board will consider major multi-disciplinary and collaborative research projects but also smaller projects and support for workshops and symposia. Where funding is provided from the Board it may be in full or on a partial or matching basis, subject to the Board's 'Revised Financial Rules of the International Atlantic Salmon Research Fund' ICR(23)15.

Application Procedure

1. Research Projects and Other Activities Seeking Endorsement by the Board.

Proposals to the Board should be sent to the Secretary. Submissions will be evaluated and a decision taken by the Board.

A detailed proposal is not required for applications seeking only endorsement by the Board. However, the following information is required:

- Project title;
- Name(s) and details of appropriate expertise of leading Scientist(s) and details of co-operating organizations;
- Project summary (including objectives, timelines, methods, costs); and
- Perceived relevance to the Board's scope, purpose, vision (see ICR(23)18) and research priorities (see ICR(24)01).

2. Applications Seeking Funding from the Board

It should be noted that the Board often has very limited funds to support proposals.

Proposals to the Board should be sent to the Secretary by 1 March. The Secretariat will then conduct an initial review of the proposal to ensure that all the information sought in Annex 1 has been provided. If the application is complete, the Board will be asked, by correspondence, to agree Terms of Reference for the SAG to evaluate each submission. Submissions will be evaluated by the SAG in late April or early May (to be decided by the SAG Chair in consultation with the Secretariat) and a decision taken by the Board at its next Annual Meeting.

In the case of proposals for research projects, the applicant should provide the information detailed in Annex 1, as is proportionate to the funding requested.

Proposals for funding of workshops or symposia must provide the same information as required for endorsements (see above), together with details of how the output from the workshop or symposium will be disseminated.

Guidance on Applications for Research Proposals Seeking Funding by the Board

The detail required in any application for funding must be commensurate with the funding being requested. An application may include the information below, as appropriate and proportionate to the proposal.

Summary Project Information

1. Project title

Give the application a brief title which describes the work to be done.

2. Applicant – Institution / Company Responsible for the Project

As a general rule, an institution or company should be the formal applicant, with legal responsibility for ensuring that the conditions attached to an allocation of funds are met.

3. Project Leader

This should be the name of the person responsible for the project.

4. Project Summary

Provide a brief project description, with an emphasis on describing the objectives of the project, the most important R & D challenges and the potential for application of the project results to address the Board's scope, purpose, vision (see ICR(23)18) and research priorities (see ICR(24)01).

The project summary will be made available on the Board's website. For this reason, the text should be capable of being understood by non-experts and should not exceed 200 words.

5. Principal Goal and Sub-Goals

Describe the results that are expected to be obtained during the project period. Formulate individual demonstrable and SMART sub-goals which lead to the principal objective.

Describe the legacy anticipated from the project once the funding has ceased.

6. Milestones and Timetable

Indicate milestones for the principal activities that fulfil the principal goal and sub-goals of the project (e.g. data acquisition, fieldwork, main activities in study plan and final report) and include a calendar or Gantt chart).

7. Cost Summary

The cost plan for the project should be summarised and broken down into sub-costs (e.g. capital costs, contracts or services, consumables, travel and subsistence). Costs should be presented in £ sterling.

8. Finance Summary

The finance plan should summarise how the costs shown in the cost plan are to be financed and the amount sought from the Board, and the amounts sought from other funders, if relevant.

9. Partners

Enter national and international partners who will participate in the project, either through providing matched funding, benefits in kind, or directly contributing to deliverables. Provide names of persons, universities, institutes, companies, programmes, bodies, etc.

10. Project Publication Plan

The Board considers that dissemination of information about the projects it supports is very important. Provide brief details of the dissemination plan, including identification of the options for making data available publicly (e.g. FAIR data standards).

Please provide details of how the visibility of Board funding will be included in the project dissemination / publication plan.

Should a proposal be funded, annual updates to the Board should be provided to the NASCO Secretariat when requested.

ICR(24)13

Draft outline of basin wide scale growth project

SAG

Many studies of growth and survival have already been performed

- Most of them on a regional or river by river scale
- Need for across-basin studies
- New methods may make studies with larger datasets more feasible

Scales are “flight data recorders” for individual fish

- Only information from the survivors
- Large collections of scales exists
- Extracting data from scale is labor intensive
- New methods have the potential to speed up the analysis
  - AI methods
  - Several initiatives are already working with new methods for developing AI assisted ways of extracting data from scales
- Standardization of input data from the start is vital for ensuring that data can be compared across rivers/regions
  - First step should be standardization workshop

Initial phase of the project

- Workshop to agree on standardization of how images are taken
- Development of AI generated data collection
- Identification relevant scale collections from all regions

Four steps for moving forward

- Standardization workshop
  - How to take images
  - Identifying available scale collection
- Gathering (taking) scale images
- Processing the images
- Analyzing the images

Budget (difficult at present, dependent on process)

- First step
  - Parties agrees to support participation on a standardization workshop (scoping meeting)
  - Online or in person?

ICR(24)14

Proposal for an Updated Comprehensive trans-European Genetic Reference Baseline to Assign Atlantic Salmon (*Salmo salar*) to Rivers and Region of Origin across the Eastern North Atlantic

Presentation to the IASRB, NASCO

Annual General Meeting, Westport, Ireland.

2 June, 2024

Ensing, D., Gilbey, J., McGinnity, P., Verspoor, E., & Wennevik, V.

Statement of the International Atlantic Salmon Research Board on Future Research Priorities

Given that the vision of the International Atlantic Salmon Research Board (the Board) is:

> '*Factors causing salmon mortality at sea are understood to the level that supports the development of management actions by Parties to reduce mortality to recover, protect and conserve salmon stocks*'

and in the context of the climate change emergency, the Board has undertaken a review of its immediate research priorities. In doing so:

The Board has agreed the need to prioritise research into the future prospects for Atlantic salmon populations towards 2050, on both a basin-wide and regional scale, so as to support an adaptive management approach to their protection and conservation into the future.

The top research priorities for the Board in support of this, ranked in order of importance to the Board, are:

1. Basin-wide patterns of marine growth and survival of Atlantic salmon.
2. Migration of salmon at sea.
3. The impact of freshwater environment on mortality occurring at sea.
4. Potential interactions between pink salmon and Atlantic salmon.
5. Quantification of the mortality of Atlantic salmon caught as bycatch in pelagic and coastal fisheries.

The Board wishes to be informed of, and support in any way it can, research into each of these priority areas. However, the Board has agreed to pursue new research activities into addressing the top ranked area at this time, namely 'Basin-wide patterns of marine growth and survival of Atlantic salmon'.

Current State-of-the-Art in respect of European baseline

- International trans-European microsatellite genetic baseline for populations NE Atlantic salmon populations (developed in SALSEA), which has been incredibly valuable for elucidating the biology of regional stock specific groups in the sea and elucidating the nature of multiple mixed stock fisheries.

- Making the case for enhanced resolution - Upgrade timely, principally to increase the stock, regional, river specific resolution of assignments (strongly encouraged by recent efforts in the Barents Sea):

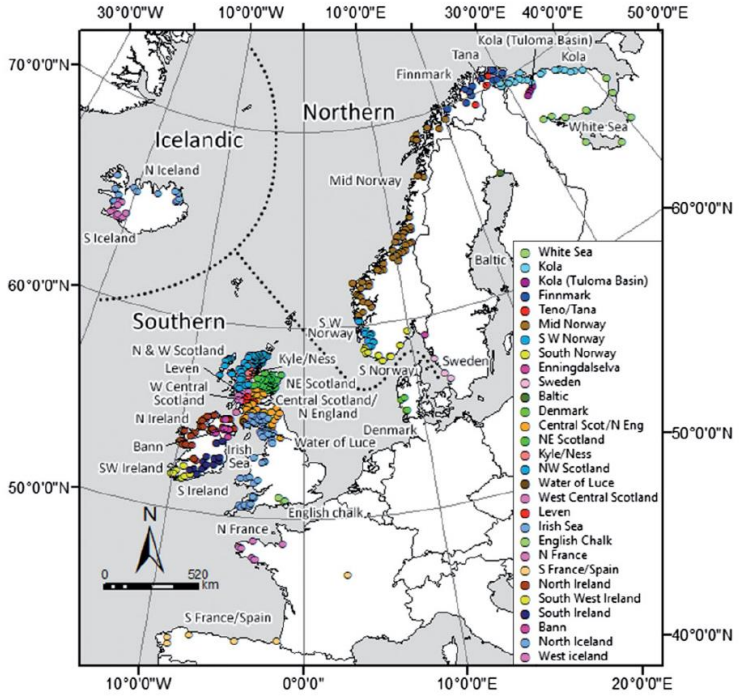


Table 1. Available genetic regional reference baselines for salmon in the eastern Atlantic.

Geographic Coverage	Samples	Markers	Assignment Resolution	Reference
Trans-Atlantic	80 fish, 2 rivers	11 microsatellites	2 units, EU/NA	King *et al.* (2005)
Trans-Atlantic	12 rivers	1 microsatellite, 1 mtDNA haplotype	2 units, EU/NA	Gilbey *et al.* (2005)
Trans-Atlantic	4,942 fish, 46 rivers	11 microsatellites	3 units, EU/US/CAN	Sheehan *et al.* (2010)
Trans-Atlantic	1,930 fish, 46 regions	6 microsatellites	2 units, EU/NA	Gilbey *et al.* (2017)
Trans-Atlantic	3,406 fish, 285 populations	96 SNPs	28 units	Jeffery *et al.* (2018)
Trans-Atlantic	319 populations	96 SNPs	30 units	Bradbury *et al.* (2021)
Eastern Atlantic	26,822 fish, 282 rivers, 467 sites	14 microsatellites	18 units	Gilbey *et al.* (2018)
Barents sea	185 populations	33 microsatellites	26 units	Ozerov *et al.* (2017)
Scotland and NE England	3,787 fish, 147 sites, 27 rivers	288 SNPs	18 units	Gilbey *et al.* (2016)
Northern Ireland	673 fish, 27 sites	7 microsatellites	6 units	Ensing *et al.* (2011)
Ireland	7,924 fish, 322 sites, 143 rivers	15 microsatellites	20 units	Anon (2008)
Southern Europe	3,730 fish, 57 rivers	12 microsatellites	8 units	Griffiths *et al.* (2010)
France	199 fish, 6 regions	17 microsatellites	6 units	Perrier *et al.* (2009)
Baltic Sea	2,337 fish, 32 stocks	8 microsatellites	3 units	Koljonen (2006)
Baltic Sea	3,394 fish, 36 locations	33 microsatellites	28 units	Vähä *et al.* (2016)
Baltic Sea	39 stocks	14 microsatellites	14 units	Koljonen *et al.* (2021)
Western Atlantic	9142 fish, 50 sites	3000 SNPs	14 units	Moore *et al.* (2014)
Western Atlantic	12,409 fish, 194 rivers	15 microsatellites	12 units	Bradbury *et al.* (2016)
Western Atlantic	1,485 fish, 35 populations	101 microsatellites	26 units	Bradbury *et al.* (2018)

Critical applications

- Mixed Stock Fisheries (East Greenland Fishery -initial motivation for project D. Ensing; West Greenland Fishery);

- Ongoing and Future efforts to elucidate the biology of the salmon at sea (critical for climate change) – non biased sampling (i.e. not depending on directed fisheries);

- Parameterising the new life cycle model (ICES WKSALMON; E. Rivot);

- Marine spatial planning (national & international re. decisions around locating offshore salmon farms and offshore power generation);

- Ongoing sampling programme (Norway) returns of post-smolts and older pre-adult stages; including reanalysis using higher resolution baseline (31 usats).

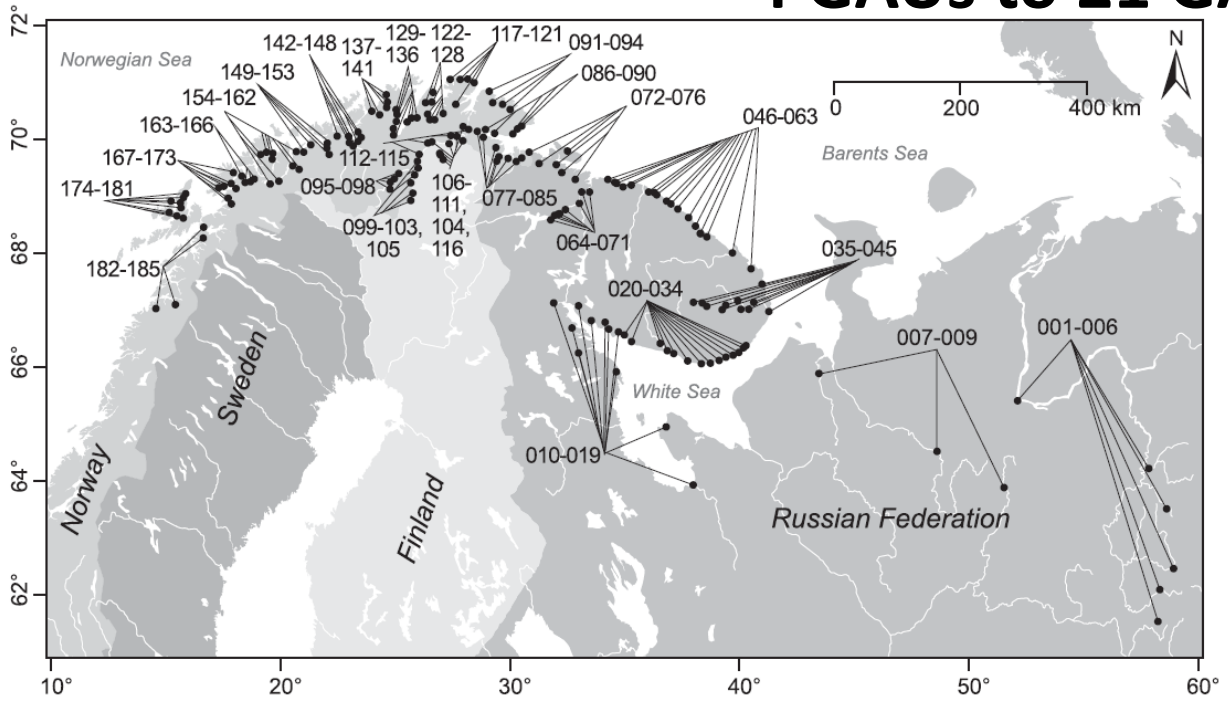
ICES Journal of Marine Science

ICES Journal of Marine Science (2017), doi:10.1093/icesjms/fsx041

Comprehensive microsatellite baseline for genetic stock identification of Atlantic salmon (*Salmo salar* L.) in northernmost Europe

Mikhail Ozerov[1,2†‡], Juha-Pekka Vähä[1,3*†‡], Vidar Wennevik[4], Eero Niemelä[5], Martin-A. Svenning[6], Sergey Prusov[7], Rogelio Diaz Fernandez[1], Laila Unneland[4], Anti Vasemägi[2,8], Morten Falkegård[6], Tiia Kalske[9], and Bente Christiansen[9]

Increasing Assignment Resolution
4 GAUs to 21 GAUs



NASCO WORKSHOP FOR NORTH ATLANTIC SALMON AT-SEA MORTALITY (WKSALMON2)

Recommended format for purpose of citation:

ICES. 2023. NASCO Workshop for North Atlantic Salmon At-Sea Mortality (WKSalmon, outputs from 2022 meeting). ICES Scientific Reports.

Editors

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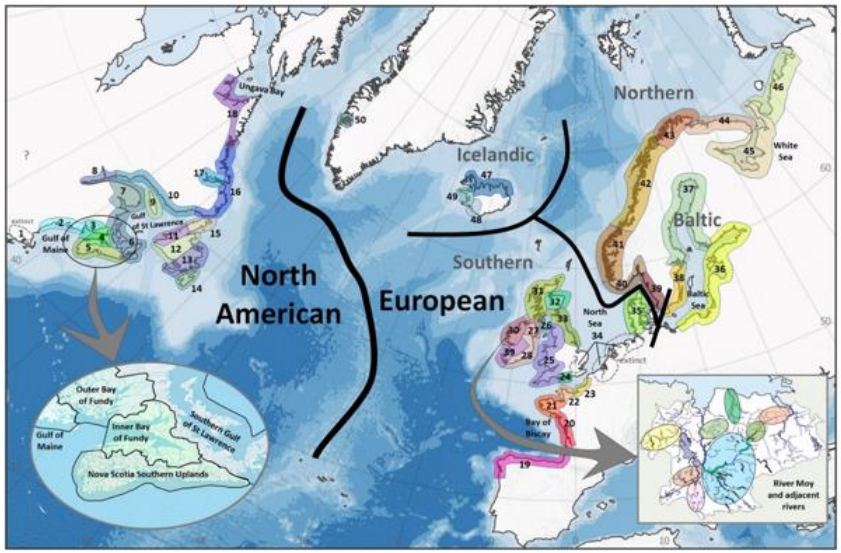

Figure 1. A synthesis of trans-range phylogeographic structuring observed across studies in Atlantic salmon resolved by screening of phylogenetically informative nuclear microsatellite and SNP variation. Figure is from Verspoor et al., (in prep)

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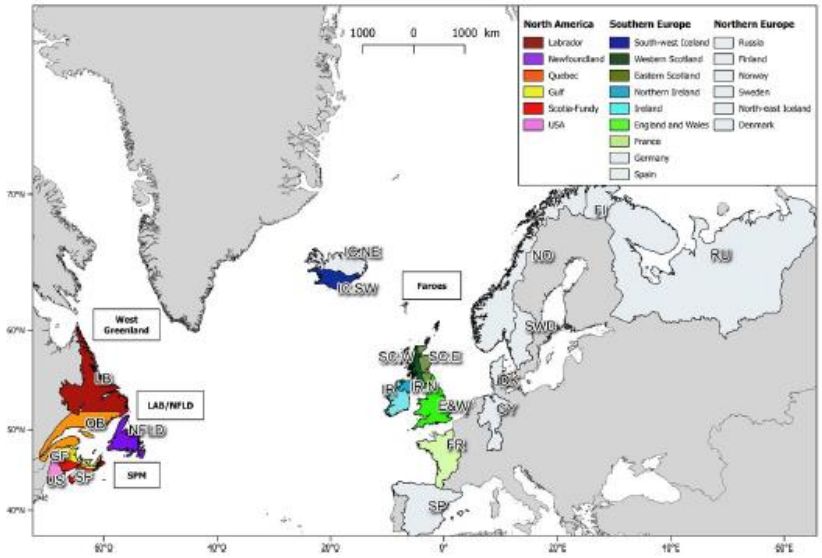
DOI: 10.1111/faf.12345

ORIGINAL ARTICLE

WILEY FISH and FISHERIES

Evidence for spatial coherence in time trends of marine life history traits of Atlantic salmon in the North Atlantic

Maxime Olmos[1,2] | Félix Massiot-Granier[3] | Etienne Prévost[4] | Gérald Chaput[5] | Ian R Bradbury[6] | Marie Nevoux[1,2] | Etienne Rivot[1,2]



Elucidating stock units for new Life Cycle Model for ICES

(E. Rivot)

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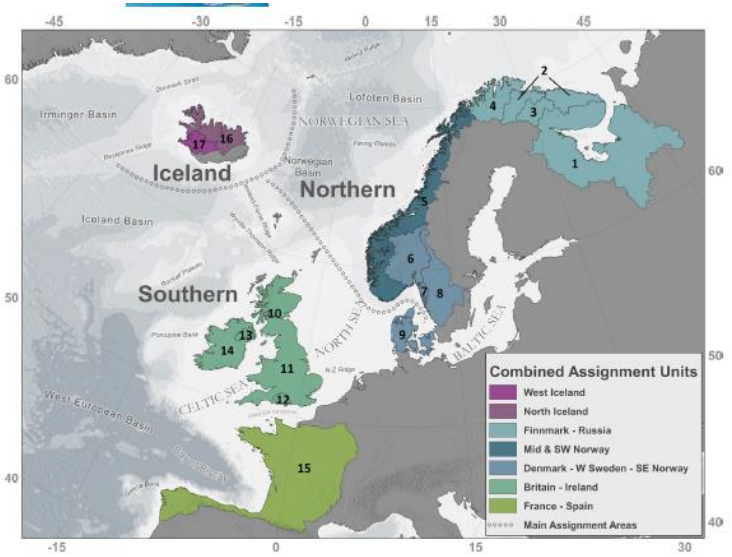
DOI: 10.1111/faf.12587

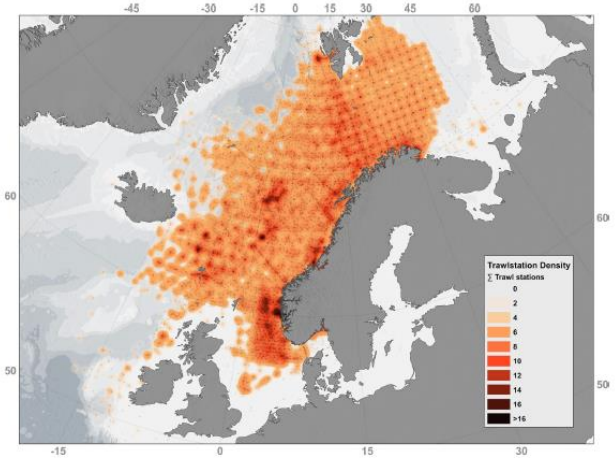
ORIGINAL ARTICLE

FISH and FISHERIES WILEY

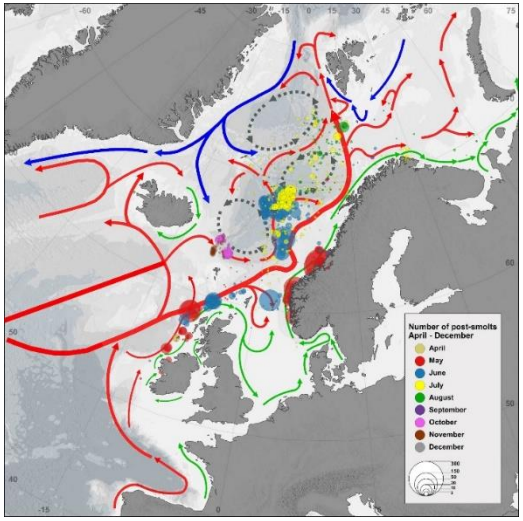
The early marine distribution of Atlantic salmon in the North-east Atlantic: A genetically informed stock-specific synthesis

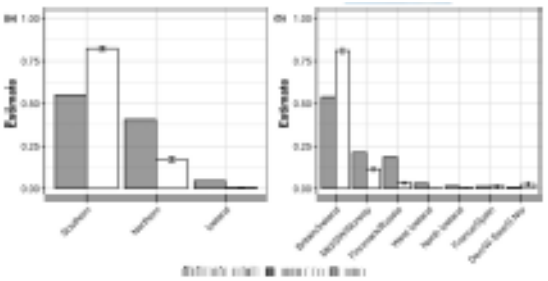
John Gilbey[1] | Kjell Rong Utne[2] | Vidar Wennevik[2] | Alexander Christian Beck[2] | Kyrre Kausrud[3] | Kjetil Hindar[4] | Carlos Garcia de Leaniz[5] | Corrine Cherbonnel[6] | Jamie Coughlan[7] | Tom F. Cross[7] | Eileen Dillane[7] | Dennis Ensing[8] | Eva García-Vázquez[9] | Lars R. Hole[10] | Marianne Holm[2] | Jens Christian Holst[11] | Jan Arge Jacobsen[12] | Arne J. Jensen[4] | Sten Karlsson[4] | Niall Ó Maoiléidigh[13] | Kjell Arne Mork[2] | Einar Eg Nielsen[14] | Leif Nøttestad[2] | Craig R. Primmer[15] | Paulo Prodöhl[16] | Sergey Prusov[17] | Jamie R. Stevens[18] | Katie Thomas[13] | Ken Whelan[19,20] | Philip McGinnity[7,13] | Eric Verspoor[21]





Mixed Stock Fisheries, Biology & Distribution





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journal homepage: www.elsevier.com/locate/fishres

Genetic stock identification of Atlantic salmon caught in the Faroese fishery

John Gilbey[a,*], Vidar Wennevik[b], Ian R. Bradbury[c], Peder Fiske[d], Lars Petter Hansen[d], Jan Arge Jacobsen[e], Ted Potter[f]

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Original Article

Genetic stock identification reveals greater use of an oceanic feeding ground around the Faroe Islands by multi-sea winter Atlantic salmon, with variation in use across reporting groups

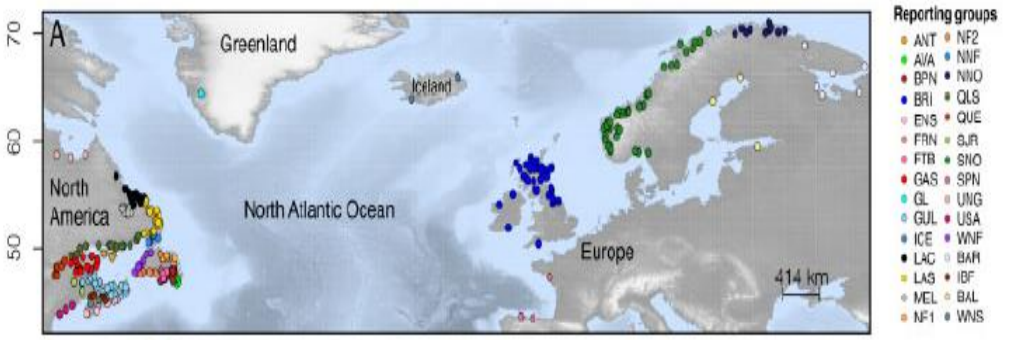
Ronan James O'Sullivan[1,*], Mikhail Ozerov[2], Geir H. Bolstad[3], John Gilbey[4], Jan Arge Jacobsen[5], Jaakko Erkinaro[6], Audun H. Rikardsen[6,7], Kjetil Hindar[3] and Tutku Aykanat[1]

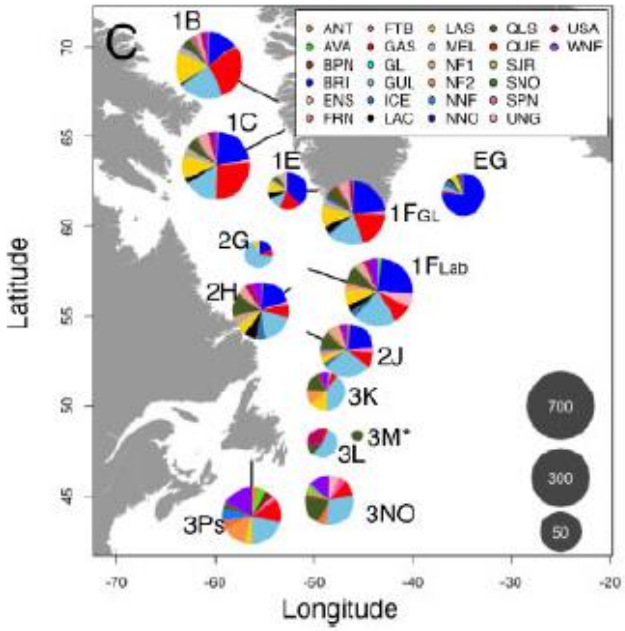
ICES Journal of Marine Science

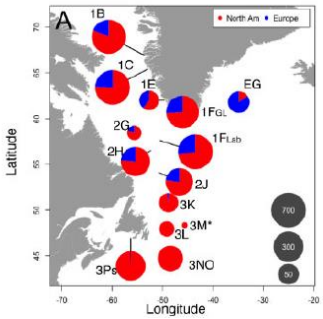
ICES Journal of Marine Science (2021), doi:10.1093/icesjms/fsaa152

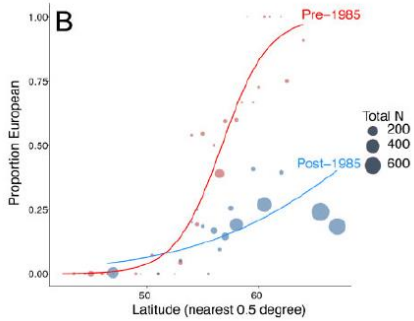
Range-wide genetic assignment confirms long-distance oceanic migration in Atlantic salmon over half a century

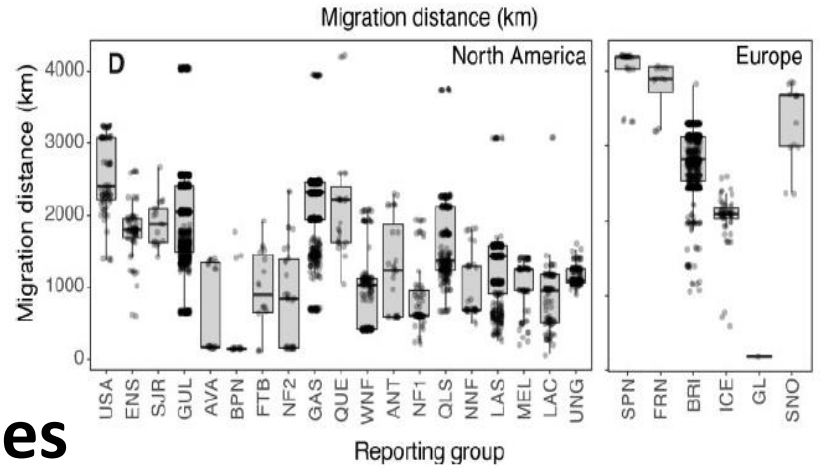
I. R. Bradbury [1,2]*, S. J. Lehnert[1], A. Messmer[1], S. J. Duffy[1], E. Verspoor[3], T. Kess[1], J. Gilbey[4], V. Wennevik[5], M. Robertson[1], G. Chaput[6], T. Sheehan[7], P. Bentzen[2], J. B. Dempson[1], and D. Reddin[8]





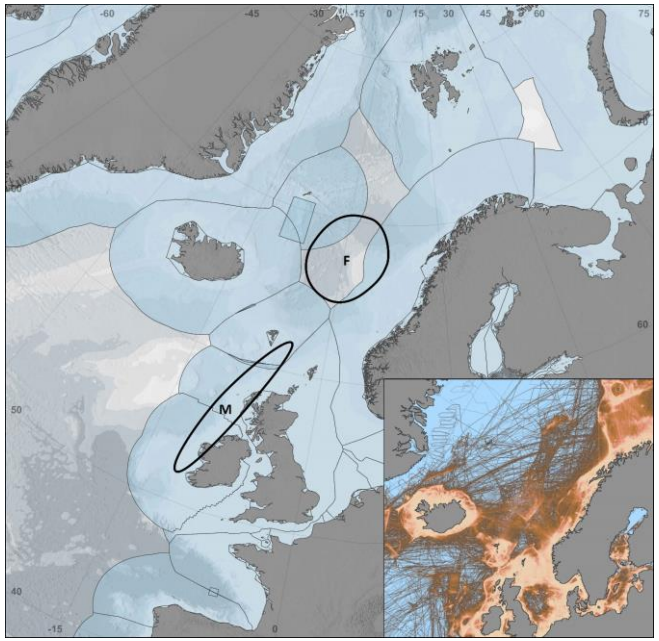




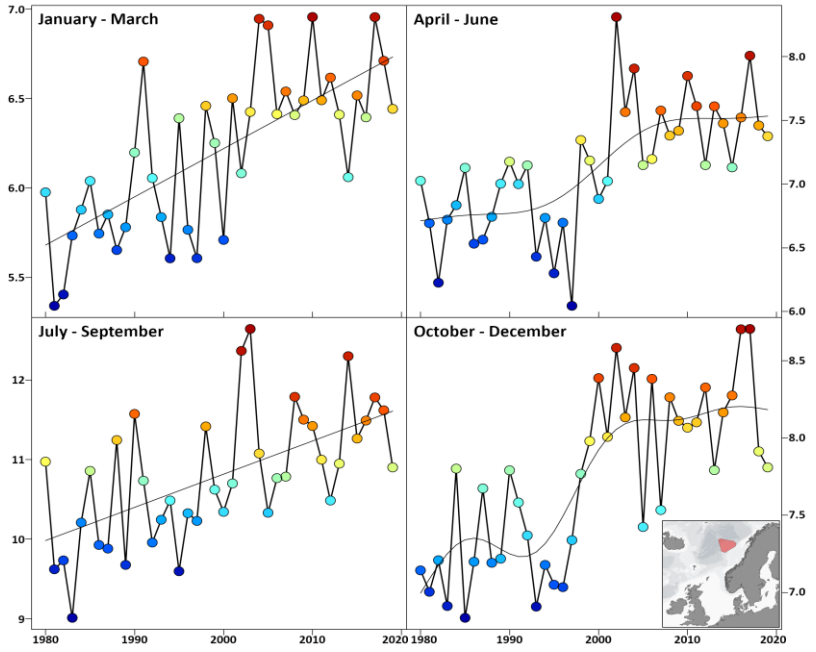


Potential of combining baselines

Pelagic fleets in international waters



Climate change



Examples of questions for discussion in the Autumn meeting would include:

- Whether a single trans-range (west and east Atlantic) baseline with the same set of markers would be optimal?
- Whether a single reference baseline required, or a hierarchy of baselines and associated hierarchical assignment analysis?
- What sort of marker type/s and technologies should the focus be on in any new development?
- Should the screening be done in individual laboratories, or could/should a commercial option and/or a central laboratory be utilised?
- Whether to include adaptive loci?
- Is there an opportunity and would it be useful to include other metrics into the assignment structure (e.g. otolith/lens/scale microchemistry/stable isotope)?
- Is there any requirement for GSI analytical method development to be incorporated in usable R packages, especially if a hierarchical approach is to be considered (e.g. Hsu and Habicht, 2024).

Report on Progress on IASRB Funded project

- Two day workshop was held in Ireland at the Marine Institute Facility in Newport Co. Mayo, 5-7 March 2024 with a summary report of discussions forwarded to NASCO;

- A summary of the discussions was presented (V. Wennevik) at ICES WGNAS in Galway, March 11-21 2024; valuable feedback received;

- Interest in participating in the next step, a virtual workshop to be held in October 2024, was received following survey from institutions undertaking genetic analysis in 14 countries - ;

- An exploration of the new 31 microsatellite panel developed for the KolArctic project to increase assignment resolution is currently being tested for Southern Norwegian, Scottish and Irish populations;

- Exploring possibility currently of extending assignment capacity of the Canadian snp panel (I. Bradbury) and baseline by screening Norwegian, Scottish and Irish samples (n=80 rivers).

Medium-term (over next 6 months-2 years)

Update May 2024: Medium-term goals to be addressed following short term discussions as set out above.

- Set-up consortium/project to update reference baseline across the species range in the eastern Atlantic
- Screen samples from across eastern Atlantic with optimum marker set
- Perform and publish marker set and power analysis
- Publication of Report to ICES WGNAS and IASRB
- Establish a large-scale international collaborative project and in conjunction with partners from the western Atlantic to update and apply the enhanced baseline across the species range to address questions of international importance relating to the biology of Atlantic salmon at sea
- Acquire appropriate- scale funding for this project (estimated at €1.0-3.0 million)

Longer-term (2+ years)

Update May 2024: Longer-term goals to be addressed when possible.

- Screen marine samples from areas of interest, and/or to address specific questions of importance and use enhanced resolution to examine stock specific distributions
- Establish an open Database of genetic baseline data
- Communicate project findings to stakeholders such as ICES Expert Groups and NASCO