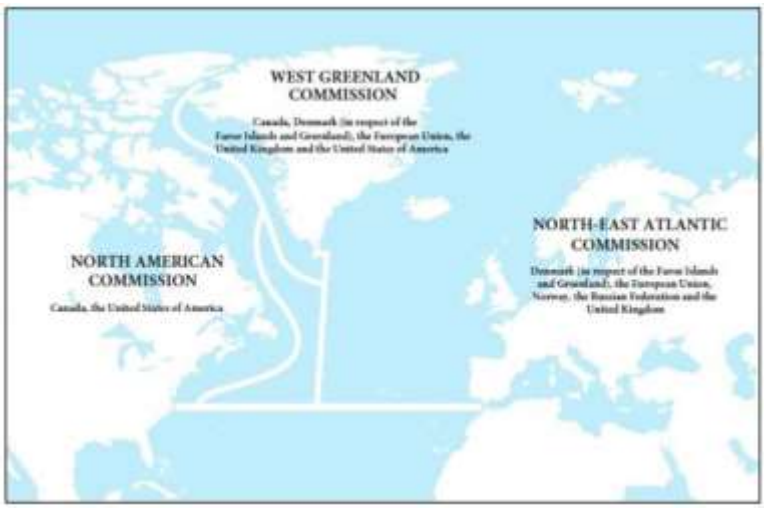
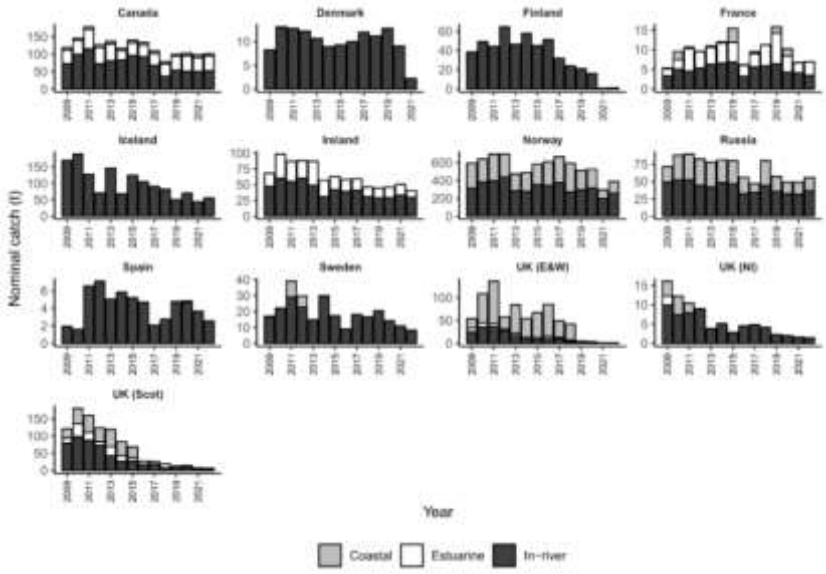
NASCO ANNUAL MEETING, 4-9th JUNE 2023

REPORT TO IFM

Nigel Milner (IFM Observer)



The NASCO Commission areas.



Trends in salmon catch 2009-2022 (from CNL(23)08) in coastal, estuarine and in-river fisheries. No catch in US.

HEADLINES

1. **ICES assessment for 2023 shows that salmon stocks remain in poor condition. ICES advice, remains that no harvest is permissible in interceptory fisheries, or in individual rivers unless stocks exceed the Conservation Limit.**
2. **Regulatory measures for the Faroes and West Greenland fisheries. No change from last year. WG catch was 28.93mt (vs quota of 27mt)**
3. **Salmon by-catch in marine fisheries (inshore and offshore) is now a high profile topic, control decisions are hampered by limited monitoring and assessment data.**
4. **The Theme-Based Special Session on Climate Change made numerous recommendations to NASCO to improve messaging, engagement with and managing climate impacts on salmon.**
5. **The NASCO External Performance Review (EPR) reported, making 46 recommendations, including several made by IFM and wider NGO Group during the consultation stage.**
6. **NASCO is considering EPR recommendations through a Working Group on the Future of NASCO to report in 2024 on revised strategy, a NASCO Action Plan focussed on salmon conservation, recovery and restoration (shifting from previous focus on high sea fisheries management).**
7. **A Special Session on Indigenous Peoples and Atlantic salmon was hugely influential and hopefully marks a sea change in their participation in NASCO.**
8. **Iceland to rejoin NASCO fully by 2024.**

1. INTRODUCTION

This report describes key events and outcomes of the 40th Annual Meeting of NASCO, held in Moncton, New Brunswick, 5-8 June 2023, as seen through the Non-Governmental Group (NGO) Group of 45 NGOs through which the IFM has a formal observer representation.

As usual in this report reference is made to reports that are available on the NASCO website. The meetings schedule is in CNL(23)03 and annotated agenda in CNL(2302) and a summary of all the business is in CNL(23)87. Note that much NASCO business is done during the year between the annual meetings.

NASCO annual meetings conform to a fixed agenda revolving around the routine work of the three commissions (American, West Greenland and Northeast Atlantic) NASCO's support committees and boards, notably the International Salmon Research Board (IASRB), with Special Sessions on selected topics. Three topics this year were (i) Conclusions of the ternal Review Group, (ii) Informing a Strategic Approach to Address the Impacts of Climate Change on Wild Atlantic Salmon and (iii) Indigenous Perspectives and Roles in Atlantic Salmon Conservation

2. INTERNATIONAL ATLANTIC SALMON RESEARCH BOARD (CNL(23)10)

Revision to Terms of Referenced. This was done intersessionally and the revised ToR were accepted and passed to the Council for adoption. The IASRB vision remains: *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. Unfortunately (in my view), there was no shift to additionally include research topics that might address common mortality factors in freshwater. Further detail is in ICR(23)13.

A next key action to be completed intersessionally by next meeting in 2024 is for the Scientific Advisory Group (which reports to the IASRB) to develop a prioritised list of research projects. I have fed some input to that through the NGO Group.

A successor to SALSEA-Track (closed in 2020) has yet to be chosen.

The Metadatabase on salmon survey data of relevance to mortality at sea has been closed, with a latest and final version left on the IASRB's website.

3. RESEARCH PROJECTS OF INTEREST TO NASCO (ICR(23)09)

The focus was on three projects: the Likely Suspects Framework, SAMARCH and the SMOLTrack projects (Details in ICR(23)09).

The Likely Suspects Framework. This initiative proposed by Walter Crozier in 2017, taken up and delivered by the Atlantic Salmon Trust for the Missing Salmon Alliance and led by Dr Colin Bull. Several papers have been published since last year reflecting strong progress made in all its work packages. Emerging outputs are a wide ranging, publicly useable data resource (SalHub); a Decision Support Tool (DST), being a statistical full life cycle and life-history-based framework that enables managers to interrogate and use the core SalHub data and test the effects of their own interventions; a novel analysis of coast and oceanic productivity indices (prey-predator-environment-based) that influence salmon mortality. The LSF is applying modern powerful statistics and modelling to big data and makes big demands on our understanding of salmon population dynamics, life history theory and marine ecosystem ecology and dynamics. The LSF is linked with ICES (through WKSalmon I, II and III) and other groups in Atlantic and Pacific basins where similar preoccupations with the big knowledge gaps are leading to innovative research and practical applications. An important element of the LSF noted by ICES is SalHub, a comprehensive database that includes amongst much else all tag return data that was previously scattered. SalHub is intended for anyone to contribute to and use by contacting Graeme Diack (graeme@atlanticsalmontrust.org).

SAMARCH. A seven year project funded by the EU Interreg France (Channel)-England Programme, this is a 10-partner collaborative project led on the English side by the Wildlife and Game Conservation Trust (WGCT) concluded in March 2023, with a very impressive list of research outputs and practical outcomes, especially important new information on salmon and sea trout protection in coastal zones, now a major topic of concern (see SAMARCH website for details). More is to come from SAMARCH as the considerable body of data and information continues to be processed and published.

SMOLTrack programme

SMOLTRACK PROJECTS The EU has provided funding to NASCO to support the following SMOLTrack projects:

• **SMOLTrack I** (completed)**.** Understanding and comparing early mortality of European salmon populations at sea;

• SM**OLTrack II** (completed). Comparing mortality of European salmon populations at sea using multiple-method telemetry studies;

• **SMOLTrack III** (completed). Quantifying smolt survival from source to sea: informing management to optimise returns; and

• **SMOLTrack IV** (ongoing). Quantifying salmon survival from river exit to return as adult: Collecting thermal and behavioural data to refine smolt to adult survival indices. 400 smolts have been tagged with Star-Oddi DST nano-T tags in the Erriff and Bush. Tagging was in 2021 and 2022 and data will be collected from trapped returning fish. The studies include testing methods to catch adult salmon in a suitable state for tagging along Iceland's east coast.

The SMOLTrack V project is under discussion with the EU at the time of writing. The website for the projects is: SMOLTRACK. There is also information on the Board website.

4. ICES (WGNAS) ASSESSMENT AND ADVICE

See also full WGNAS report (ICES. 2023. Working Group on North Atlantic Salmon (WGNAS). ICES Scientific Reports. 5:41. 477 pp. https://doi.org/10.17895/ices.pub.22743713)

West Greenland Commission (WGC)

In 2022 a major change was agreed that sets multi-year regulations for WG which build in a lag time for catch-recording to set an early warning system setting closure at 49% of the TAC (TAC is 27t). This was successfully applied and the final declared catch across the four fishery segments (two management areas (north and south) and two fishery types (professional and recreational)) was 28.93tonnes in 2022.

Northeast Atlantic Commission (NEAC) Catch Advice (CNL(23)08)

The background to the advice is…."*Abundance of salmon is affected by similar non fishing influences throughout the North Atlantic. Despite major changes in fisheries management two to three decades ago and increasingly restrictive fisheries measures since then, returns of most salmon stocks are at near-historical lows. The continued low and declining abundance of many salmon stocks, despite significant fishery reductions, strengthens the conclusion that factors acting on survival in the first and second years at sea, at both local and broad ocean scales, are constraining abundance of Atlantic salmon. Declines in smolt production are also contributing to lower adult abundance.*

The advice is… *"The advice provided in 2021 remains valid for the 2023/2024 fishing season (see ICES 2021a). ICES was advised by the NASCO NEAC Framework of Indicators (FWI) Working Group that, when the FWI was applied in January 2023, it did not indicate that the pre-fishery abundance (PFA) forecast for 2022 had been underestimated. This meant that no re-assessment of the existing management advice for the Faroes fishery was required from ICES in 2023 and that the 2021 ICES advice remains valid. That advice states that*

when the MSY approach is applied, there are no mixed-stock fisheries options on the four constituent NEAC complexes at the Faroes for the 2023/2024 fishing seasons.

ICES advises that: all non-fisheries related anthropogenic mortalities should be minimized (direct effects on salmon survival); and the quantity and quality of salmon habitats should be restored; connectivity should be restored, as well as the physical, chemical, and biological properties of those habitats (indirect effects).”

Note: The point about this account above is that the Framework of Indicators is used as a trigger for full ICES Assessment and indicated that this was not necessary because according to the FoI, the stock abundance forecast was not underestimated (which would warrant a reassessment of fisheries options).

Stock Status

Southern NEAC catches continue to decline despite greatly reduced exploitation (Figure 1).

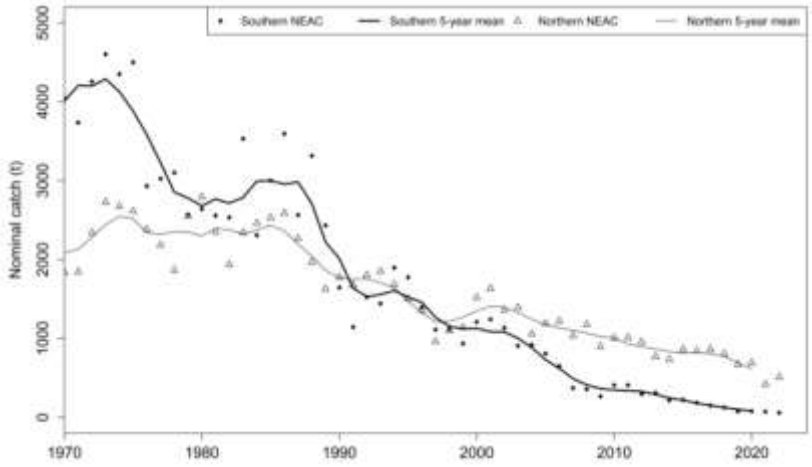


Figure 1. Nominal catches of salmon and 5-year running means in Southern and Northern NEAC areas, 1971-2022. From CNL (23)08, ICES Advice.

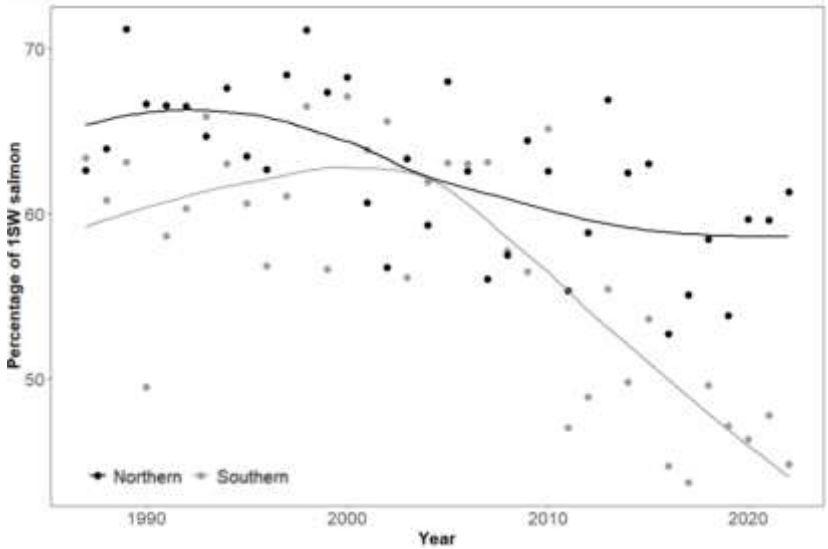


Figure 2. Percentage of 1SW salmon in reported catch for the Northern (black dots and line) and Southern (Grey dots and line) stock complexes, with Loess smoother (span = 85%).

The proportion of 1SW in the catch has continued to decline since early 2000s (Figure 2).

Maturing 1SW and non-maturing 1SW (*prior to the distant water fisheries*) have both declined since the 1970s, but to different patterns such that non-maturing (presumptive MSW fish) suffered greater decline relative to their spawning escapement reserve (the collective total equivalent to meeting the home-water conservation limits), with some recovery to 2010 since when both groups have declined. (Figure 3). Since around 2010 total Southern NEAC stock complex *spawners* has seen relative greater decline in 1SW compared with MSW salmon (Figure 3).

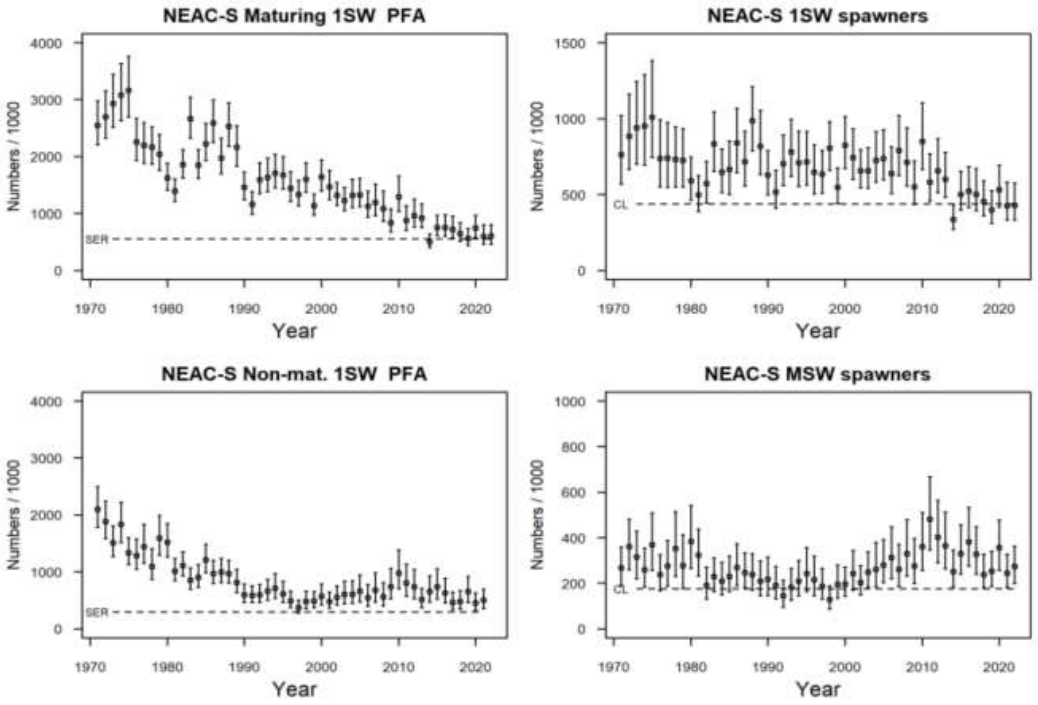


Figure 3. Estimated pre-fishery abundance (PFA – recruits; left panels) and spawner escapement (right panels), with 90% confidence limits, for maturing 1SW (1SW spawners) and non-maturing 1SW (MSW spawners) salmon Southern (NEAC-S) NEAC stock complexes. The dashed horizontal lines are the respective 2022 SER values (left panels) and CL values (right panels)

At country level, prior to distant water fisheries, returning fish and spawners were suffering reduced reproductive capacity (RRC) in England and Wales, Northern Ireland, Ireland and France in 2021 and 2022, whereas the non-maturing 1SW stock and MSW returns and spawners were at full reproductive capacity for both years.

In contrast, in Scotland, maturing and non-maturing stocks were at full reproductive capacity prior to distant water fisheries and in returns and spawners, except for MSW spawners in 2021 which were at risk of RRC.

Return rates of smolts estimated to before the home water coastal fisheries indicate relatively stable rates in 1SW group over last 10 years compared with an upturn of 1MSW rates since

around 2000 (Figure 4). Because of the difficulty in disentangling shifts in maturation rates from changes in true survival the two processes cannot be distinguished in these data, but combining the age groups overall decline is evident.

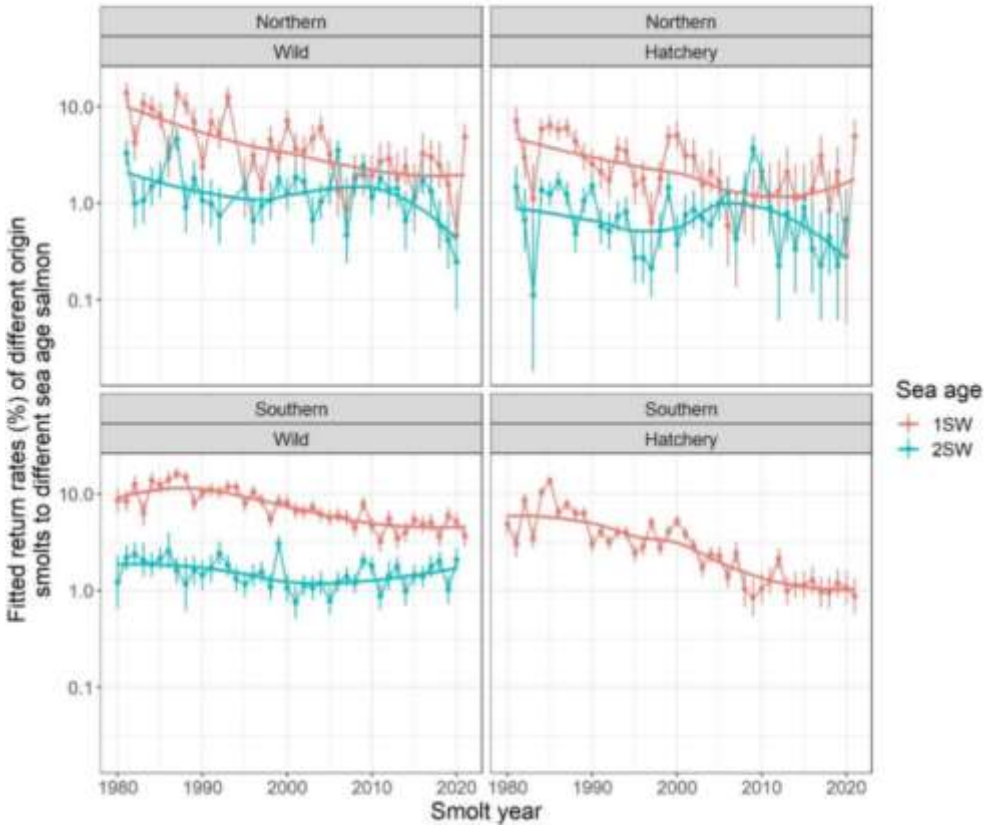


Figure 4. Least squared (marginal mean) average annual return rates (in %) of wild (left panels) and hatchery-origin (right panels) smolts of 1SW and 2SW salmon to Northern (top panels) and Southern (bottom panels) NEAC areas. For most rivers in Southern NEAC, the values represent returns to the coast prior to the homewater coastal fisheries. Mean annual return rates for each origin and area were estimated from a general linear model assuming quasi-Poisson errors (loglink function). Error bars represent standard errors. Trend lines are from locally weighted polynomial regression (LOESS) and are meant to be a visual interpretation aid. Following details in ICES (2023a; Tables 3.3.6.1 and 3.3.6.2), the analyses include estimated return rates (in %) for 1SW and 2SW returns by smolt year. From CNL (23)08, ICES Advice.

IUCN Conservation status of salmon

Atlantic Salmon (*Salmo salar*) has most recently been assessed for the IUCN Red List of Threatened Species in 1996 and for Europe in 2014. *Salmo salar* is listed for Europe as Vulnerable under criteria A2ace (Freyhof, 2014). A new assessment is underway. In addition, there are regional and national Red List assessments.

Emerging Threats

Coronavirus. Reductions in fishing effort in 2019 and 2020 were adjusted for in Ireland and Scotland.

***Infectious Salmon Anaemia (ISA*)**. This has caused problems in many countries since first recorded in Norway in 1984. It was reported for the first time in Iceland in 2022.

Red Skin Disease (RSD). Continuing reports in many rivers. Mainly a disease in European stocks, mainly in MSW stocks in E & W & Scotland, but in 1SW fish in Ireland.

Gyrodactylus salaris in Norway. A further river, the Driva, has a been declared clear of GS. Treated with Rotenone (last in 2022) no GS have been since 2016 and a further new treatment of monochloramine was applied in (brand name 'Monokloramin'). Thus kills the parasite but not the fish if administered in the correct dosage, eliminating the problems created by rotenone killing all the fish in the river.

Offshore farming in Norway. Proposed development is being evaluated and is considered to present numerous potential impacts on marine offshore ecosystems including post smolt migration.

Cormorants. WGNAS was asked to summarise information on marine and freshwater predation by cormorants on smolts. In relation to the UK they noted that the sub-race *Phalacrocorax carbo sinensis* was the more likely to be the greater threat because of their substantial increase in recent decades (10k breeding pairs in 1970 to 233k in 2006). The picture is geographically variable but in cases where there has been a reduction in marine species prey, predation pressure on salmon smolts are more significant and in places substantial. They reported that many salmon-related studies had not meet criteria to be included in meta-analysis and that more focussed, robust studies are needed.

Opportunities

Review and benchmarking of assessment models. Taking forward French developments in hierarchical Bayesian modelling, this aims to test revised models that integrate catch data from nets, rods and freshwater production, scaled to FW production areas. Being tested by ICES with intention of using in 2024 ICES assessment for NASCO and replacing current methods.

Effects of catch and release and temperature on salmon reproductive success (Bouchard et al 2022) This new and important study shows effects of thermal stress in subsequent survival of offspring of angled and released spawners. Molecular parentage analysis to link parents with their young-of-the-year progeny shows that at least 83% of caught-and-released salmon successfully reproduced, including fish that had been released in water warmer than 20°C. However, the reproductive success of caught-and-released female salmon was only 73% of the reproductive success of non-caught salmon. This has significant implications for salmon conservation practice and advice and was picked up as a recommendation in the EPR.

Climate change. This all pervasive threat to salmon (as well as much else) has been a backdrop to many of the discussions on research, regulation, and management NASCO in recent years. It was the subject of NASCO's Theme-Based Special Session (TBSS) in 2023 and the IFM NGO representative was on the Steering Committee. The TBSS included reviews of climate change state and impacts on salmon in marine and freshwater and informative accounts from the parties on how they were addressing CC issues in their jurisdictions.

The final report was completed in November and submitted to NASCO, and its recommendation will be considered intersessionally, to be presented at the 2024 meeting.

Aquaculture

In 2022 continuing concern over the effects on salmon prompted NASCO to commission a systematic review of the scientific evidence on the impacts of lice and farm escapes on wild salmon to be led by Dr Paddy Gargan. Progress on this was reported (CNL(23)13) and the final report with recommendations will be considered at the 2024 meeting. See also offshore farming in "Threats" section.

Marine Bycatch

This potentially important pressure on salmon was reviewed by ICES following a specific request by NASCO stimulated by a question from the NGO group in 2022. ICES summary follows:

The review of risk of bycatch conducted by ICES identified that, although it was clear that salmon are currently caught as bycatch in coastal areas when they migrate to and from their natal rivers, the information that exists on coastal fisheries is insufficient to evaluate coastal bycatch risk. From this review of literature on salmon bycatch, ICES has identified the following data deficiencies, monitoring needs and research requirements:

1) Improve understanding of post-smolt and adult salmon migration route in time.

2) Move to a quantitative analysis of the risk of exposure and bycatch risk to stocks, which requires access to gearand fisheries-specific fishing effort data (both inshore and offshore data) at an ICES rectangle by month.

3) Include salmon as a species in official bycatch data calls.

4) Standardise salmon bycatch monitoring programmes across countries, including minimum effort per fishery and standards for data recording and reporting.

5) Improve at-sea and onshore observer screening, including better salmon identification guidance. Minimum data to be collected are: date, fishery, catch location, number of salmon bycatch, fork length (preferably) and/or weight. The screening of discards from factories should also be explored (recommendation from ICES Study Group on Bycatches of Salmon in Pelagic Fisheries [SGBYSAL], 2004) via close collaboration with factories operators.

6) As bycatch data collection is difficult to access at present, eDNA data collection from scientific and commercial pelagic trawls may help improve detection of salmon and improve knowledge of their migratory pathways. Uncertainty estimates from these analyses are required.

See ICES. 2022. Working Group on Bycatch of Protected Species (WGBYC). ICES Scientific Reports. 4:91. 265 pp. https://doi.org/10.17895/ices.pub.21602322

5. THE NASCO THIRD PERFORMANCE REVIEW

This keenly awaited major review of NASCO's organisation, roles and performance took evidence from all quarters (IFM submitted comments and contributed to the NGO joint evidence); it began in 2022 and reported in 2023.

The EPR Report is available on the NASCO web site https://nasco.int/wp-content/uploads/2023/03/CNL2317_Report-of-the-Third-NASCO-Performance-Review.pdf

The EPR made 46 recommendations and an early commentary on these from IFM perspective is given in Appendix I. NASCO Council is now reviewing these through a Working Group on the Future of NASCO (WGFN) with ToR that include a revised NASCO strategy, a NASCO Action Pan and an expansion of focus from fishery management to conservation, raising public awareness, more direct engagement with higher levels of jurisdiction decision making and attention to climate impacts. The WGFN has begun work, and it will be interesting to what the come up with. The NGO Group (thus IFM) is represented by the Group co-chairs (Steve Sutton of Canada and Nils Gjone of Norway).

6. INDIGENOUS PEOPLES AND SALMON MANAGEMENT IN CANADA

Salmon rivers have always been crucial to the First Nation peoples of North America, serving as transportation corridors and a source of food, especially the salmon which is embedded as a deep symbol in their culture more strongly that I have seen anywhere. This was evident during the special session on indigenous peoples' management and practices where moving presentations described their close bonds with nature and rivers. There is much to learn from them about how to value, respect and look after natural resources that has been lost to much of western "culture". The Canadian Government through DFO is engaged in important salmon restoration programmes collaborating closely with tribal groups. We saw this first hand on a field trip to the Bay of Fundy Salmon Recovery Partnership. In this, salmon rivers are being restored from the damage done by dams, riparian and in-channel habitat destruction wrought by the logging industry, supplemented in modern times by climate pressures. The essence of this is bypassing the very heavy marine losses in the Bay of Fundy, thought to be mainly climate-driven, by stocking adults reared in sea pens from smolts naturally bred in rivers and captured on their descent. The overall performance in terms of kick-starting complete natural life cycles is not yet clear, but there have been demonstrable ecosystem improvements in nutrient dynamics and trophic web structures attributed to having the spawning and juvenile rearing phases restored in rivers.

Nigel Milner

23/10/2022

APPENDIX I

Comments on NASCO EPR Report from IFM perspective.

1. Overall, this is a constructive, well-argued Review that covers most of the suggestions and comments made in the IFM and NGO consultation submissions.
2. A theme of the IFM consultation response was that, to cover the full range of risks to salmon, NASCO **adopts a more proactive effective approach to evaluation and management of pressures on salmon in home waters including freshwater environments.** This is there repeatedly in the EPR. The Report (p22-24) refers unequivocally to the river-specific nature of many salmon problems and makes a recommendation on raising salmon political status (Rec 46). By implication, Rec 1 (*"…to investigate why PFA has continued to decrease in the face of stabilised marine returns")* may lead to more focus on FW pressures. Also, the Panel comments that the current nature of ICES scientific advice tightly focussed on fisheries could usefully be expanded to include factors such as climate change (p31-32). This (narrow focus on marine fisheries) concern was raised in the IFM consultation and the EPR concurred. No specific recommendation was made, apparently because the Panel felt this was allowed for in the revised (2022) MOU between NASCO and ICES (p32). Maybe, but this needs to be watched to see if it is effectively implemented. The EPR clearly noted the limited effectiveness of Parties in dealing with anthropogenic factors (p 46).
3. The **CL process review and the anomalies** evident in current pooled regional stock assessments were clearly identified (p30) as requiring review and revision (as raised in IYS Tromsø Symposium) (Rec 4).
4. The Panel's attention to mortality and productivity reduction of **released angled fish** is welcome (Rec 5).
5. Bycatch risk, raised by NGO question in 2022, was clearly addressed (Rec 6).
6. **Habitat mapped inventories and more targeted FW habitat management** was well-covered with the Recs 8, 15 and 16 on Habitat Restoration and Protection Plans (HRPP).
7. The EPR recommends (rec 17) **multi-sector National Salmon Standing Management (Conservation) Committees** to oversee formulation and delivery of HRPP. This would be a major development and could change how well wild salmon are conserved and managed in a more coherent way, with greater status.
8. **Climate change** was specifically raised in Rec 9. Further recommendations will come out of the TBSS in June 2023.
9. **Failings with respect to Aquaculture** received clear attention with some useful recommendations (Recs 18-23). Obviously, success depends on how well NASCO and Parties take them up.
10. The need to consider **ecosystem** processes is referred to (in marine context mainly, but there are FW implications too that the EPR hints at (p32)) but was not strongly pushed, maybe reflecting its difficulty and the early stage of understanding in relation to salmon.
11. The **Ecosystem Approach to Fisheries** management (EAF) was considered by the Panel to be effectively covered in the Parties Implementation Plans (IP) and requires no further actions (p38). This begs the question about the effectiveness of the IP process.

12. Getting NASCO (and Parties) to be **more outward looking** is important and covered in Recs 34 and 35 suggesting an Outreach Strategy and raising public awareness, which is very welcome.
13. The EPR suggests making **NASCO more influential** on Parties' / Jurisdictions' actions by some element of ministerial presence (Rec 46), presumably to raise salmon profile and the leverage on governments. This is a good idea if taken up effectively.
14. Lastly, a major generic concern across NGOs is NASCO's lack of teeth *vis a vis* Parties' accountability and willingness to deal firmly with salmon conservation through environmental management. This was covered by a constructive consideration of the Precautionary Approach (PA) (S2.4.2) and of implementation through IPs/APRs (S2.5.1, e.g. p47) and multiple recommendations across the review (see above for some e.g. 8, 15, 16, 17) intended to improve accountability and "operationalise" existing resolutions, agreements and guidelines. But Rec 7, to endorse the previous (2nd) EPR and for NASCO to update the 1998 PA document, felt a bit underwhelming.

Nigel Milner 12/5/2023

Comments on specific recommendations

Annex 3: Consolidated List of Panel Recommendations

Conservation and management
Status of living aquatic resources
1. Considering that marine survival appears to have stabilized or increased, the Panel recommends that the reasons for the continuing decreasing PFAs in the NEAC need to be investigated to evaluate if more conservative (i.e. higher) SERs and CLs are needed to stop or revert the declining trends. 2. The Panel recommends that NASCO i) makes a special effort to ensure that there are no unreported catches in the NAC and ii) estimates the effect of mortality or lower reproductive success associated with the release of fish in recreational fisheries.
Data collection and sharing
3. The Panel recommends that NASCO requests ICES to develop an integrated, seamless process to input data into a common database from a web-based application. This should be integrated with the assessments to produce the necessary tables and graphs to document the assessment. 4. The Panel recommends that NASCO arranges for a careful review of the most appropriate basis to set CLs for stock complexes and for individual river stocks; i.e. should pseudo stock and recruitment relationships be used or are other approaches to be preferred. CLs should be revised accordingly if necessary.
Quality and provision of scientific advice
5. The Panel recommends that NASCO requests ICES to ensure that its catch statistics on catch and release fisheries acknowledge the fact that some of the released salmon will die.
Adoption of conservation and management measures
6. The Panel recommends that NASCO should commission an assessment of the by-catch of salmon in the large-scale fisheries for small pelagics in the North

East Atlantic and, if the by-catch is determined to be significant, take measures to address this.

Maguire, McGinnity and Molenaar

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7. In addition to endorsing recommendation EPR 41 of the Second NASCO Performance Review, the current Panel recommends that NASCO considers updating its 1998 Agreement on the Precautionary Approach to better reflect NASCO's entire objective and its subsequent practice.

NASCO's Resolutions, Agreements and Guidelines

8. The Panel recommends that NASCO arrange for the development of Salmon Habitat Protection and Restoration Plans, produced on an individual river system basis.

9. As regards climate change, the Panel recommends that NASCO

a) develops a dedicated instrument (e.g. a Plan of Action) on climate change or fully and systematically integrates considerations of climate change into its Resolutions, Agreements and Guidelines;

b) agrees that the IPs for the next reporting cycle will include a new section on 'Adaptations to Global Warming/Climate Change';

c) specifies that climate change 'Adaptations' be included in individual Salmon Habitat Protection and Restoration Plans; and

d) convenes a Theme-based Special Session to identify a suite of practical Adaptive Strategies and their effective deployment that could be used by managers to protect salmon freshwater habitats from hydrological and thermal stress.

10. The Panel recommends that, as coastal, estuarine and in-river mixed stock fisheries are taking a large number of fish overall, NASCO should be updated regularly on their operation and the justification for their continued prosecution.

11. In recognizing that substantial population structuring occurs within many large river systems and that this can have ramifications for the management of fisheries and the protection of biodiversity – especially in the case of genetic introgression from farm escapes – the Panel recommends that NASCO considers developing innovative approaches deploying available technologies (sampling, genetics, electronic fish counters).

12. The Panel recommends that NASCO addresses the absence of reliable data on salmon in respect of pelagic fisheries (e.g. potential for overlapping marine distribution and fisheries in space and time) at the earliest opportunity, taking account of the imminent data call by WKSALMON2 in this respect. In addition to ongoing scientific pelagic surveys and on-board observer programs, a dedicated sampling program with robust experimental sampling design, replicating regular fishing activity, would be valuable.

Report of the Third NASCO Performance Review

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13. The Panel recommends NASCO to encourage efforts to extend and improve knowledge of the distribution of salmon in the sea. Such efforts could, building on SALSEA and other recent initiatives, include experimental long-line fisheries, telemetric and genetic-based distributional studies, combining their respective strengths, and using them to develop, parameterize and test migrational models such as those based on particle tracking.

14. The Panel recommends that NASCO follows through with its commitment in paragraph 5 of the 1998 Agreement on Adoption of a Precautionary Approach (CNL(98)46) to operationalize the Precautionary Approach for the by-catch of salmon in other fisheries. As part of this effort, NASCO and its Parties:
a) should aim to identify a suite of technical measures that might be deployed to protect salmon while at the same time limiting the impact on the fisheries. Such measures could include area-based management tools such as (dynamic) areas closed to certain types of fishing during certain times of the year; and
b) should cooperate and coordinate with NAFO and NEAFC where appropriate.
15. The Panel recommends that NASCO considers facilitating the operationalization of the IPs by directing Parties and jurisdictions to develop specific Salmon Habitat Protection and Restoration Plans as envisaged and set out in CNL(01)51 and operationalized further in CNL(10)51.
16. The Panel recommends that NASCO directs Parties and jurisdictions to adopt a pressure and actions mapping tool approach for targeting habitat stressors in aquatic environments equivalent to that under development in Scotland, including sensitivity to climate change.
17. The Panel recommend that NASCO and its Parties consider the establishment of multi-sectoral 'National Salmon Standing Management (Conservation) Committees, similar to the National Standing Scientific Committees that currently operate in most Parties and jurisdictions. These could support and agree the formulation of river-specific Protection and Restoration Plans.
18. The Panel recommends that NASCO Parties create dedicated, independent government inspectorates with accompanying legal regulatory powers to effectively implement relevant NASCO instruments to address the impacts of sea lice and farmed escapes.
19. To assist the work of these inspectorates, the Panel recommends that NASCO prescribes that physical tagging of farmed salmon using conventional tagging methods such as coded wire tags or passive integrated transponder tags be

mandatory for salmon smolts introduced into sea farms. The use of genetic methods is not recommended for this purpose. While these are capable of accurate tracing, they are less practical in this context and are open to challenge because of the statistical nature of assignments.
20. As is being currently trialed in Canada to facilitate the farming of European origin fish, the Panel further recommends that sterilization of farmed salmon should be considered a viable option for reducing genetic impact of farm escapes in all salmon farming areas.
21. To aid with management and adherence to regulation, the Panel recommends that the routine and systematic monitoring of rivers for the quantification of genetic introgression in individual rivers be undertaken by Parties and jurisdictions across the species distribution similar to those programs being deployed currently in Norway and Scotland.
22. To aid with management and adherence to regulation, the Panel recommends that the Norwegian sea lice pressure assessment protocol be adopted in all salmon farming areas across the species range taking account of lice loads, lice contact zones and estimates of lice drift.
23. The Panel recommends that, further to the Tromsø recommendation above on

stocking, NASCO further investigates both the scientific and management protocols for gene banking and develops Guidelines in this regard.
Compliance and enforcement
24. The Panel concurs with and endorses Recommendations EPR 63 and 64, and encourages NASCO to continue its associated implementation actions. 25. The Panel recommends that NASCO and its Parties strengthen their efforts to decrease unreported catches in all salmon fisheries conducted by NASCO Parties. NASCO could consider commissioning an external independent assessment of unreported catches. 26. The Panel recommends that NASCO should consider adopting port State measures if there are indications of significant IUU fishing for salmon on the high seas and by foreign vessels within coastal State maritime zones, and port State measures are determined to be an effective response.
Decision-making and dispute settlement

27. The Panel recommends that NASCO should consider the following actions to prevent the spread of *G. salaris* and its eradication: a) Replace the title of the Road Map with wording that better reflects the seriousness and urgency of the situation (e.g. Action Plan) and its action oriented content (e.g. measures to be taken instead of merely cooperation in that regard); b) Integrate all the recommendations made by the GSWG at its 2022 meeting; and c) Revise the terms of reference of the GSWG to give it a more action-oriented mandate, including making specific recommendations for measures to prevent the further spread of the parasite and for its eradication in areas where it has been introduced, rather than merely developing recommendations to enhance cooperation in that regard. 28. The Panel recommends that NASCO strengthens its instruments on addressing the adverse effects of salmon farming by further operationalizing them and thereby ensure, among other things, that their content becomes more specific, stringent and prescriptive. 29. The Panel recommends that in certain scenarios – for instance when improvements in the status of salmon stocks allows for significant expansions in marine salmon fisheries, or when a decision has been made to revise the NASCO Convention – NASCO should consider adjustments of the decision-making rules and procedures of its Commissions to better align them with best practices. 30. The Panel recommends that NASCO should consider the development of a modern dispute settlement mechanism, which would be included in the Convention by means of an amendment.
International cooperation
31. The Panel recommends that NASCO should consider options to ensure that convening meetings by the Council and its Commission in the format of HoDs meetings becomes the exception rather than the rule. One such option could be to determine that converting from plenary sessions into the format of HoDs meetings requires an explicit decision supported by a simple majority of the members of the Council or a Commission, where applicable. 32. The Panel recommends that NASCO should consider revising CNL(06)49 to,

among other things, codify NASCO's existing practices on participation by NGOs, take account of best practices by other international organizations, align the sequence of the paragraphs relating to NGOs more with the sequence of the

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procedure for applying for observer status, and group related issues better together.
33. The Panel commends NASCO for its current transparency in terms of information and its continued efforts to improve this further. As part of future efforts, NASCO could consider updating its Handbook of Basic Texts – for instance to reflect the UK's accession to the NASCO Convention and perhaps include the text of (a revised version of) CNL(06)49 – and to include some information on the origins of NASCO, the negotiation of the NASCO Convention and its preparatory meetings.
34. The Panel commends NASCO for its various communication and outreach activities since 2012 and invites NASCO to consider developing a dedicated communications and outreach strategy, while taking account of the various options and recommendations proposed by the Second NASCO Performance Review Panel.
35. NASCO could be more active in communicating the troublesome status of wild Atlantic salmon and the many threats it faces to the general public.
36. The Panel recommends that NASCO should continue to cooperate with France (in respect of St. Pierre and Miquelon) and Iceland, and seek their cooperation with NASCO, including by requesting them to join NASCO, to implement NASCO measures voluntarily, to provide relevant (scientific) information - including on their catches and efforts on the conservation, restoration, enhancement and rational management of salmon stocks – and to participate in NASCO meetings as observers. In NASCO's engagement with France (in respect of St. Pierre and Miquelon) and Iceland, reference should also be made to their obligations under international instruments such as the UNCLOS and the CBD that are relevant to the conservation, restoration, enhancement and rational management of salmon stocks; that these obligations also require cooperation – not only on fisheries issues but also on non-fisheries issues – ; and that such cooperation would be beneficial to them as well as to NASCO Parties, for instance in addressing transboundary problems such as the spreading of pink salmon and *G. salaris*.
37. NASCO could consider making a determination whether the current salmon fishing by France (in respect of St. Pierre and Miquelon) and Iceland undermines the objective of the Convention and, if so, what action could be taken to deter it.
38. The Panel recommends that NASCO should strengthen its cooperation with (other) RFMOs and other relevant international organizations. For instance by:

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a) reviewing current relationships with international organizations and exploring the usefulness and desirability of commencing new cooperative arrangements,[310] for example with other relevant international river basin organizations (or: 'transboundary water management organizations');
b) including 'Cooperation with international organizations' as a standing item

on the agenda of the NASCO Council; and c) reviewing relevant output of other relevant international organizations and identifying opportunities to actively engage directly with them.
Financial and administrative issues
39. The Panel recommends that the NASCO Secretary should assess the needs for training and that training should be provided where considered necessary. 40. The Panel recommends that the Secretariat complete documenting its standard operating procedures at an accelerated pace. 41. The Panel recommends that NASCO develops a NASCO Carbon Policy to ensure that NASCO's carbon emissions are in line with best practices on achieving carbon neutrality.
NASCO's overall effectiveness
42. The Panel recommends that NASCO should consider strengthening the NASCO Convention by adopting selected amendments or a complete convention revision. Either option should provide the NASCO Council with a mandate to adopt legally binding instruments on non-fisheries issues. Care must be taken to ensure that these negotiations do not diminish NASCO's ongoing efforts on salmon conservation. 43. The Panel recommends that NASCO should consider using the tool of agreed interpretations in case there is insufficient support for formal amendment of the NASCO Convention. This could for instance be used to agree that the NASCO Council has a mandate to adopt legally binding instruments on non-fisheries issues. 44. The Panel recommends that NASCO considers initiating an exercise similar to the Next Steps-process that commenced in 2004, but with a particular focus on the challenges posed by climate change, aquaculture interactions and the

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expanding body of international rules and standards relating to the conservation of biological diversity. 45. The Panel recommends that the NASCO Council should consider strengthening its existing instruments by further operationalizing them and thereby ensure, among other things, that their content becomes more specific, stringent and prescriptive. This could be carried out by means of a systematic, step-by-step approach for all of the existing instruments. 46. The Panel recommends that NASCO should consider other actions aimed at elevating salmon conservation to a higher political level, for instance by periodically convening high-level (Ministerial) segments to Annual NASCO Meetings. A possible topic for such a high-level segment could be the management of Atlantic salmon aquaculture