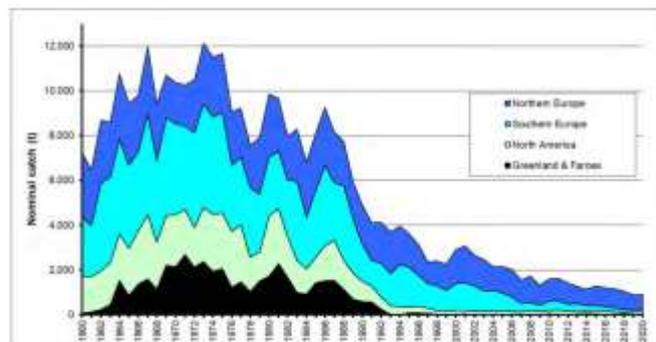


NASCO ANNUAL MEETING, JUNE 2021



REPORT TO IFM

Nigel Milner



From WGNAS (2021)

HEADLINES

- **ICES assessment shows some minor upturn in Southern NEAC salmon stock status in 2020, but stocks still in poor condition following decline since 1980s.**
- **ICES advice remains at no catch permissible in interceptory fisheries, or at individual river level unless stocks >Conservation Limit.**
- **New regulatory measures for the Faroes and West Greenland fisheries.**
 - **No quota set for Faroe fishery, 2021-23.**
 - **Disagreement over West Greenland quota. Reduced from 30t to 27t in one-year 2021 interim measure, despite catch in 2020 being 10t over-quota.**
- **NASCO receives radical recommendations for increased control of sea lice and farmed salmon escapes to protect salmon from marine salmon farming but puts a key one on hold pending further discussion.**
- **Potential major new research programme (IMMSI) proposed to replace SALSEA-Track.**

INTRODUCTION

This report describes key events and outcomes of the 38th Annual Meeting of NASCO in 2021 as seen through the Non-Governmental Group (NGO) Group through which the IFM has a formal observer representation. This is the first year that the UK has been a separate party to NASCO having been, pre-Brexit, part of the EU delegation.

As in 2020 the constraints imposed by the Covid-19 pandemic meant that NASCO's annual meeting and related business had to be through virtual meetings, which proved problematic at times although the business was completed.

As usual in this report reference is made to reports that are available on the NASCO website. The meetings schedule is in CNL(21)05 and a summary of all the business is in CNL(21)62. Various matters were dealt with by inter-sessional correspondence and sub-meetings; but this report outlines points from the following events.

- (i) 5/5/2021. Webinar on the Evaluation of Implementation Plans under the Third Reporting Cycle (2019-2024)
- (ii) 26/5/2021. Meeting of the International Atlantic Salmon Research Board (I)
- (iii) 27/5/2021. Theme-based Special Session: Minimising Impacts of Salmon farming on Wild Atlantic Salmon: Supporting Meaningful and More Rapid Progress Towards Achievement of the International Goals for Sea Lice and Containment.
- (iv) 28/5/2021. Meeting IASRB (II)
- (v) 31/5/21. Meeting of NASCO Council
- (vi) 1/6/2021. Meeting of North-East Atlantic Commission (I)
- (vii) 2/6/2021. Meeting of North-East Atlantic Commission (II)
- (viii) 3/6/2021. Special Session of the Council: Evaluation of Annual Progress Reports under the 2019-2024 Implementation Plans.

WEBINAR. EVALUATION OF IMPLEMENTATION PLANS

Since the inception of country-specific Implementation Plans (IP) and their follow-up Annual Progress Reports (APR) the process has been challenged on the grounds that the plans were insipid and failed to tackle effectively the major challenges facing salmon and that progress reporting lacked rigour and critical objectivity. Moreover, even the internal NASCO reviews to enhance the IP/APR process have been criticised as lacking constructive, meaningful advice.

The process is entering its third cycle (2021 to 2023) and during 2020/21 the overall process was rigorously reviewed and now has a more coherent structure based around SMART objectives, transparent guidelines and a clear timetable. The evaluation of IPs was outlined by Cathal Gallagher and most are now in a good or much better position to help salmon conservation and enhancement. The 3rd cycle is a much more stringent process with opportunities for Parties to demonstrate commitment to NASCO's Resolutions, Agreements and Guidelines and to demonstrate that resources are allocated to actions. This latter point is crucial and personally I have yet to see this convincingly demonstrated in any IP, but we will see.

There was an open and constructive question and answer session, with questions mainly coming from the NGO representatives (as usual), including an IFM originating question for the UK Delegation. Also usual, much attention was paid to the impacts of marine salmon farming, which remains a serious problem in major salmon producing countries.

INTERNATIONAL ATLANTIC SALMON RESEARCH BOARD MEETING (CNL(21)12)

Review of metadatabase (established in 2014) of salmon survey data and sample collection. This was recommended because it needs updating and linking to the Research Inventory and is a resource for the Likely Suspects Framework. Main outcomes were adoption of ToR for a review and to seek information on archival scale collections from Parties. The database will be managed through a working group and maintained on NASCO's website to serve as a communication rather than decision tool.

Review of Research Inventory. This was reviewed in 2020. It is supported by the Board's website (ICR(21)09) and has similarities and overlap with the Missing Salmon Alliance inventory that need to be managed in view of the duplication of effort to contribute to both.

SALSEA-Track Final Report (see ICR(21)04). This successful project on salmon movements at sea began in 2013 and supported 12 named projects, namely:

1. Drifters and Bioprobes (NAC). Gear deployment and development project, several marine migrating taxa.
2. *New Receiver Lines / Arrays / Grids* (US and Norway). Gear deployment and development project, several marine migrating taxa.
3. *"Platforms of Opportunity"* (NAC). Developing networked use of existing platforms and buoys, several marine migrating taxa.
4. *Kelt satellite* tracking (NAC, mainly Canada)
5. *Generic Index rivers* (NEAC). Aim is to establish 4 index rivers from which to measure marine survival, through two subprojects, SMOLTtrack I and II (both now completed), giving interesting PIT data on survival during freshwater – transition – sea migration in

10 rivers European rivers (Skern, Tamar, Erriff, Bush, Minho, Stora, Taff,Ulla, Göta Älven and Hogvadsan). A key result is the estimate of high losses incurred during this critical phase (adding to earlier work in Scottish rivers), in wild fish averaging 37% (range 5-64%) and 33% (range 1-80%) in Project I and II respectively. In hatchery fish mean return rate was 39% (range 23-71%). Bird predation rates could be calculated in some rivers and studies were carried out into physiological readiness for smolting as a possible mortality risk factor. SMOLTtrack III (Start Jan 2020) is a 3yr extension to investigate the cause of smolt mortality including the effects of tagging.

6. **Malin head to Islay Array.** Integrated into SeaMonitor and COMPASS INTERREG VA projects, this has been described in previous IFM/NASCO reports . The intended array is shown below, comprising 108 Automatic Listening Stations in the North Channel and 40 in Irish Coastal zones. The plan is to tag 250 smolts annually across the region.



Map of Malin Head to Islay receiver array

In due course results will feed into the Foyle and Clyde Salmon Management plans.

The INTERREG VA COMPASS Project compliments the SeaMonitor Project in addressing the SALSEA Malin Head to Islay Receiver Array (NEAC) Outline Project. The Salmonid Workpackage of the COMPASS project is to identify and define the habitats used by outward migrating salmon and resident marine phase sea trout through a network of moored acoustic receivers. Recent data confirm that Irish east coast salmon smolt use the North Channel migration route.

7. **North Sea Loose Arrays** (NEAC). Aims to make use of existing buoys and other structures in area between Northern Scotland and Southern Norway. No progress reports available.
8. **West-Coast Scottish Arrays** (NEAC). Aims to examine salmon smolt migration routes and their exposure to aquaculture risks with targeted arrays, coupled with lice dispersion models. Pilot work in Loch Linnhe is underway.
9. **Studies of migration along the European shelf edge and into the Norwegian Sea using drifters / AUVs etc.** (NEAC). A potential project concept to study details or hydrographic processes governing smolt migration along the shelf current west of Ireland and Scotland. It is integrated into the SeaMonitor project. An AUV will be used to track smolts along the shelf edge. Ends 31/12/2022.

- 10. Kelt satellite tagging** (NEAC). Using kelt migrations to study stock mixing, migration strategies and mortality. No progress reports available.
- 11. Sub-adult satellite tagging at Faroes.** To study mortality of life stages; fine-scale population mixing; stock-specific and population structure, homeward migration strategies; mortality in relation to habitat and oceanographic conditions. No progress reports available.
- 12. Adult satellite / acoustic tagging at Greenland** (NAC) Tracking n genetic assignment used to study migration routes and mortality in 2nd sea year. Five year study started in 2018. Fish caught by trolling, 17 and 25 in 2018 and 2019 respectively. Fish tracked by the ROAM project.

Replacement for SALSEA-Track. Two major programmes are candidates (ROAM and IMMSI, see below)

ROAM (reported by Tim Sheehan, see ppt presentation in CNL(21)12)) This is the ambitious, ongoing ocean tracking programme using pingers, i.e. signal emitting buoys that allow position fixing of fish fitted with receiver tags. Covid plus some technical hitches have delayed progress but wider deployment of equipment across the NW Atlantic area is planned for 2021.

ISMMI International Atlantic Salmon Modelling and Management Initiative (introduced by Ken Whelan, see ppt presentation in CNL(21)12))

This is a major new initiative for 4 yr programme (2023 – 2026) bridging the gap between the Likely Suspects Framework (sponsored by NASCO/IASRB/MSA) and the Life Cycle Model (developing through WGNAS, the NASCO/ICES advisory Group) and ensuring that the science is what the managers want and can use. It has four elements.

1. Further development of decision support tools for managers (taking forward LSF and LCM).
2. Alignment of existing salmon stock assessment and management (e.g., commonality of criteria and methods).
3. Ecosystems approach to salmon management (recognising that salmon are part of and dependent on food webs).
4. Developing an Atlantic basin-wide international funding bid (because salmon stocks mix in the sea and many future issues such as climate will be on basin scale).

Of these the ecosystems approach enters a particularly exiting and scientifically demanding arena, that has proved challenging in the marine fisheries field for many years. The traditional science and management of salmon as a single species is hard enough, but integration within freshwater and marine ecosystems is another level of study. Nevertheless, the benefits of presenting salmon in that holistic framework may be considerable and the IFM noted that point in our contribution to the NGO Statement to the NASCO annual meeting.

The ambition and scale of the ISMMI project and its connections with and differences from existing projects require further consideration and that will happen over the next few months through intersessional meetings of the IASRB and its Scientific Advisory Group.

WEBINAR. THEME-BASED SPECIAL SESSION ON MINIMISING IMPACT OF SALMON FARMING ON WILD ATLANTIC SALMON

This important TBSS had been postponed from last year due to Covid and was attended by about 90 people. Threats to wild salmon from marine salmon farming is a major topic for NASCO and actions to deal with it (specifically lice infestation and escapes) are obligatory in all Ips. Failure to present effective SMART action was the most common reason for IP rejection by the Review Group. The NGO group has maintained critical focus and pressure on this topic for some years. As context, farmed salmon production in 2020 globally was the highest on record.

The aim of the TBSS was to regenerate urgent concern over this impact and to push for demonstrable progress by industry and regulators in sorting it.

The NASCO high level goals for sea lice are:

100% of farms have effective sea lice management such that there is no increase in lice-induced mortality of wild salmonids attributable to the farms.

100% of farmed fish to be retained in all production facilities.

Several talks covered four subjects of

1. Reviewing the achievement of NASCO's goals
2. Updating the current state of knowledge on impacts of lice on wild salmon
3. Highlighting advances on best management practice (BMP), new technology and their implementation.
4. Exploring how parties and jurisdiction can move faster to achieve goals

Technological problems beset the meeting, leading to some disjunction of the running order and the concluding Q&A session. Nevertheless, there were some interesting papers and the standouts for me were:

The 3rd Cycle (of IP/APRs) review of progress which was constructively critical of the IP weaknesses. There remain some serious gaps between the stated aspirations and assurances of the industry and the realities of implementation.

In a Norwegian study the timing of events in lice and salmon life cycle was shown to strongly determine the outcome in terms of salmon mortality. Outputs of hydrodynamic lice dispersion models in Norwegian fjords explained why this extensive dispersal coupled with spatial and seasonal temperature dynamics make lice infection worse in upstream areas. The Norwegian lice monitoring programme is well-funded and comprehensive example of what can be done with good supporting science. But, as was noted in later discussion, good monitoring while essential is not a substitute for actual lice control.

The impact of gene introgression into wild populations was reported in the context of "Pace of Life Syndrome" (POLs), i.e. across all animals there is size-based demographic predictable range in life history features from fast (e.g. mouse) to slow (e.g. elephant) and this also occurs within species. The point being that farmed salmon are selected for faster growth which, if they breed with wild fish, transfers along with other POLs related features, to wild salmon. Introgression effects arise in age at smolting and maturation with an overall shift to earlier reproduction (at younger age). Most of this effect was because earlier smolt age and growth

rates increased with increasing relatedness to farmed fish. The POLS hypothesis also concurs with the many literature observations of faster growth, higher levels of aggression, increased dispersal, smaller eggs, downregulated immune genes, and unregulated protein synthesis metabolism. The consequences of farmed fish gene introgression for wild salmon are (1) reduced productivity (through lower survival, lower fitness more variable populations, lower population growth rate), (2) Reduced resilience against future challenges (erosion of genetic variation of adaptively important traits), (3) Ecosystem effects (through foraging behaviour and top-down impacts on trophic webs).

Effective closed containment (CC) of salmon farms, preferably on land, is the holy grail for salmon protection and developments were described by several industry speakers. Much effort has gone into floating CC and examples where this has reduced or eliminated lice infestation in the farmed fish look promising; but any floating structures in the sea inevitably present damage risks.

Of more long-term benefit from the salmon's perspective may be the land-based recirculation aquaculture systems (RAS) and these have developed significantly around the world, and accounts were given of Norwegian and Canadian developments. These are promoted by the industry as sustainable production, but they still present impacts through environmental contamination from waste products and lice in pumped wastewater. There are many variations in technology that is collectively called closed circulation and they are not equally effective in resolving the contamination problems. Nevertheless, there is good progress in some areas.

A final paper summarising progress by the International Salmon Farmers Association (ISFA) was a disappointment due to its uncritical and overly optimistic view of how well the industry is managing its impacts on wild fish and ecosystems. There have been undoubted significant advances in the right direction in control of lice and escapes which should be applauded; but the rate of progress is glacially slow, BMP is often disregarded and much remains to be done. An important issue that is coming more to the fore is that of fish welfare, both of salmon and, where they are used, cleaner fish species. This is another reputational topic for the industry in addition to the varying degrees of damage it does to wild salmon and their environment.

Recommendation of TBSS. The recommendations include some radical proposals for salmon protection and are worth reproducing in full.

1. Council establish a Working Group to draft a NASCO report which provides the latest scientific knowledge on the impacts of sea lice and escaped farmed salmon on wild salmon (State of Knowledge Report on lice and escaped farmed salmon). The Secretariat will explore if this report could be a NASCO / ICES joint venture.
2. A NASCO statement be issued to:
 - a) promote adoption of innovative and alternate technologies, at sea and on land, to help achieve 100% containment of farmed fish and for 100% of farms to have effective sea lice management such that there is no increase in sea lice loads, for the protection of wild salmon and sea trout;
 - b) *state that any Implementation Plan action that allows 1) any level of wild salmon smolt mortality due to sea lice or 2) genetic introgression of salmon stocks (or escaped farmed salmon in the spawning population), caused by*

salmon farming cannot be considered as progressing the relevant party or jurisdiction towards achieving NASCO's goals and therefore will be assessed as unsatisfactory by the Review Group.

3. A renewed request be made from the NASCO Council that all Parties and jurisdictions with salmon farming produce SMART actions in their revised Implementation Plans for the management of lice and escapes. These actions should reflect strong and sustained progress towards meeting the goals of 100% containment of farmed fish, and for 100% of farms to have effective sea lice management. Monitoring of sea lice and escapes is important but should only be a secondary activity to research or assess the effectiveness of the main action.

The NASCO Council later agreed recommendations 1, 2a) and 3, but 2b) would be subject to further discussion because some Parties felt that the wording failed to recognise where progress had been made. In Council discussion there was pressure from the NGO and EU that NASCO needs to make a strong and unambiguous statement with respect to the serious threats to salmon of marine salmon farming.

RESEARCH PROJECTS OF INTEREST TO NASCO

There are several active projects mainly on smolt migration and life at sea. These were listed in previous reports to IFM and are outlined in the IASRB section above. Of particular note to watch are the Life Cycle Model and the related Likely Suspects Programme, which apply modern powerful statistics and modelling, but make big demands (to be met in some cases by related studies) on our understanding of salmon population dynamics, life history theory and ecology.

ICES (WGNAS) ASSESSMENT AND ADVICE

The ICES stock assessment is in the WGNAS Report (ICES. 2021. Working Group on North Atlantic Salmon (WGNAS). ICES Scientific Reports. 3:29. 407 pp.

<https://doi.org/10.17895/ices.pub.7923>). The overall presentation to Council is available as document CNL(21)58, information relating to NEAC is in presentation NEA(21)03.

Focusing on NEAC(S) area, the % of rivers passing their CLs were 44, 69, 33, 27 and 3% in Scotland, Northern Ireland, England and Wales, Ireland and France respectively. An upturn was seen in 2020 in Scotland and England and Wales.

Marine survival, indexed by return rates, for 1SW salmon showed some small upturn in 2020 against a long-term decline since the 1980s (Fig 1). 2SW survival has trended upwards since about 2005, giving no long term overall trend, after a long period of decline since the 1980s. The proportion of 1SW in the catch has declined across all NEAC countries.

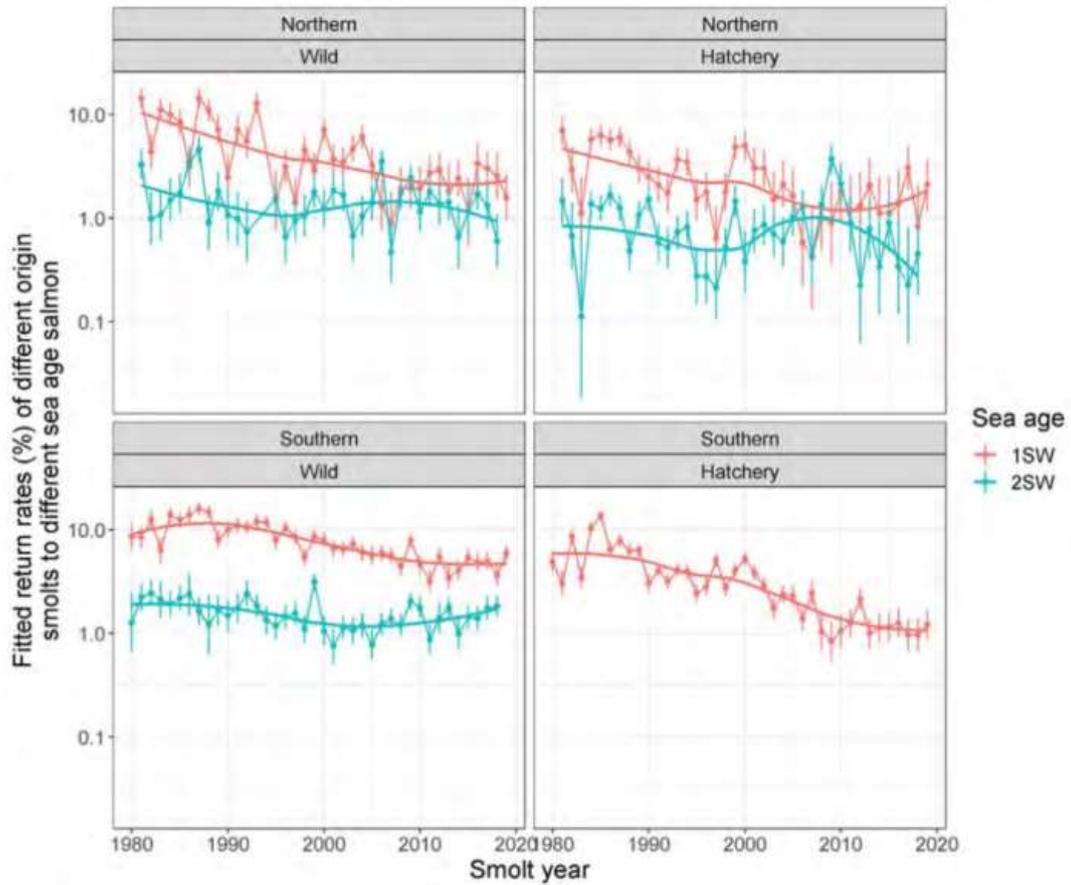


Fig 1 Marine return rates for NEAC wild and hatchery salmon (WGNAS 2021)

Regarding catch options, the ICES assessment showed that spawning stock is less than the agreed spawning escapement reserve (Fig 2). The maturing 1SW fish failed the test of being at full reproductive capacity and non-maturing 1SW fish are just at full reproductive capacity but with a risk of failing over the next 5 years (Fig n)

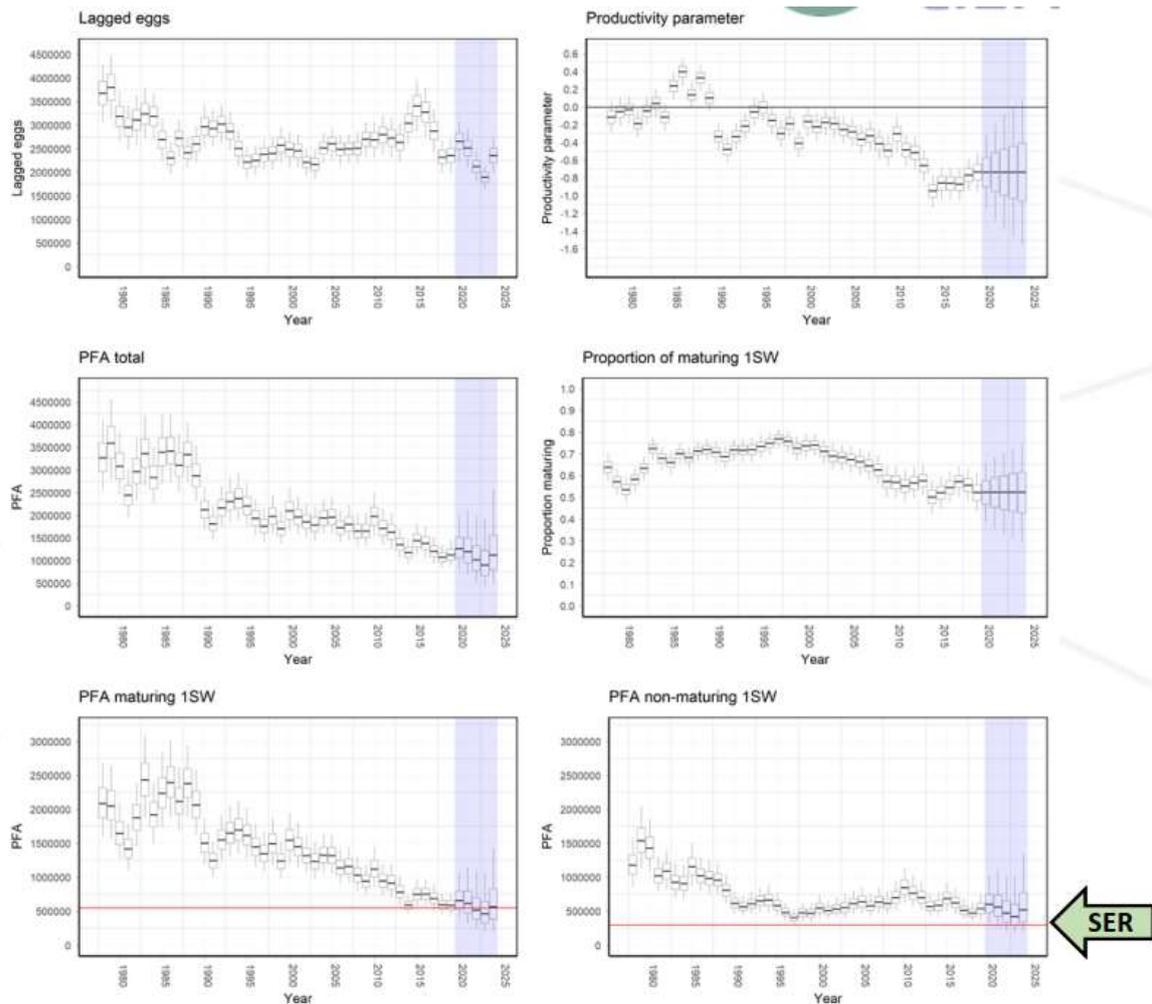


Fig 2 Key assessment metrics from ICES salmon catch advice presentation (NEA(21)03). Pre-Fishery (PFA) forecasts for all NEAC southern region.

The NEAC (N) regions stocks are faring rather better than NEAC(S), but for all NEAC the forecast is that there is no probability that the NEAC stock groupings or at country level will exceed the SER. Note that in 2020 the SERs have been reduced due to revised procedures for setting CLs in Scotland which accounts for about half of the NEAC(S) PFA. Similarly (although displaying an even worse stock level, stock complexes in the NAC region were failing their SER, therefore there continue to be no safe catch options for 2021 to 2023 for Faroes or West Greenland.

WEST GREENLAND COMMISSION (WGC)

The background is that for several years scientific catch advice has been no permissible catch at West Greenland, nevertheless there is a 30t quota. In 2020 the agreed quota of 20.7t (reduced from the nominal 30t due to overfishing in 2019) was exceeded by 11t, the final reported harvest being 31.7t. This fishery's exploitation of NEAC(S) stocks was estimated as 0.7%, greatly reduced from the peak of 32% in 1975 at the height of the West Greenland fishery. An interim catch quota of 27t for West Greenland was agreed for 2021 in addition to 3t for East Greenland (which lies within NEAC area), and various measures to control fishing and to improve monitoring (WGC (21)18), with the intention of further discussion and reassessment for 2022. This followed major disagreement between NAC, EU and UK and

Denmark (in respect of the Faroe Islands and Greenland), the latter refusing to accept a quota less than 30t or further overharvest payback provision (overharvest of 6-10t occurs each year). They even, worryingly, noted the domestic pressures to leave NASCO (WGC(21)19).

NORTHEAST ATLANTIC COMMISSION (NEAC)

Faroes fishery. No quota to be allowed for next 3 years, unless the Framework of Indicators indicates that a reassessment of stocks is warranted.

East Greenland Fishery. This is a low level, sporadic (because of ice preventing fishing) fishery, lying in the NEAC area, that has taken up to 3t annually; although it is not subject to regular monitoring and assessment and its source populations are not well-known. But it could increase with climate change and represents high seas mixed stock exploitation in the same way as the much larger West Greenland fishery. Therefore, it will be better described and evaluated.

THE THIRD PERFORMANCE REVIEW

This is a keenly awaited major review of NASCO's organisation roles and performance. A first meeting of the Review Panel will be this summer and it will report in 2023.

CLIMATE CHANGE

This all pervasive, huge threat to salmon (as well as much else!) was a backdrop to many of the discussions on research, regulation, and management. It will be the subject of NASCO's Special Session in 2023.

INTERNATIONAL YEAR OF THE SALMON LEGACY ACTIVITIES

Council agreed that a NASCO / NPAFC (North Pacific Fisheries Commission) Concluding Symposium be held in October 4-6, 2022, including a session at which progress with the recommendations of the Tromsø IYS Symposium would be reviewed.

NJM 22/6/2021