

# Report to IFM Council on the 36<sup>th</sup> NASCO Meeting, Tromsø, Norway, June 5-7<sup>th</sup>, 2019

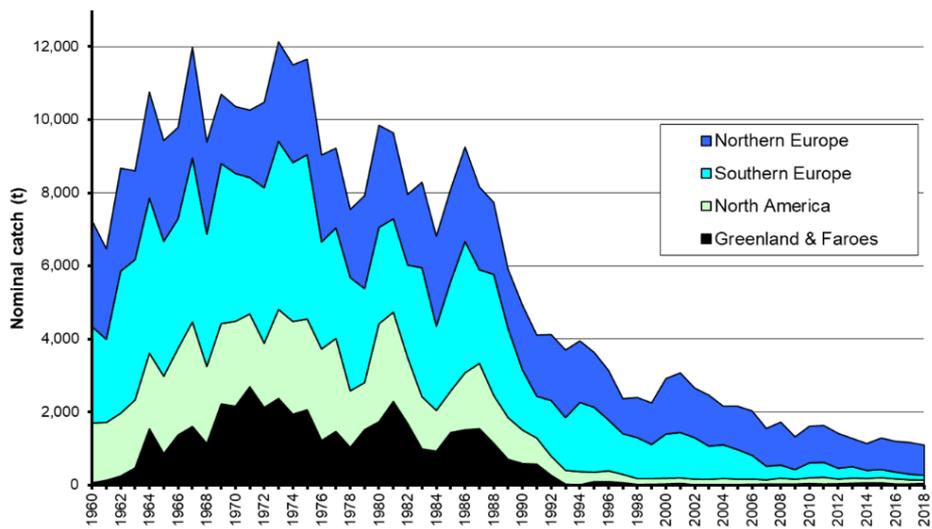
By Nigel Milner (Bangor University and APEM Ltd)



The venue, Scandic Hotel, Tromsø



The Meeting



Total reported nominal catch of salmon (tonnes round fresh weight) in four North Atlantic regions, 1960–2018

## The context

## Introduction

I represented the IFM on the Non-Governmental Organisation (NGO) Group at the 36<sup>th</sup> annual meeting of NASCO in Tromsø, Norway, 5-7<sup>th</sup> June, 2019. The NASCO meeting was preceded (2-3<sup>rd</sup> June) by the International Year of the Salmon (IYS) Symposium at which I gave a talk on salmon Conservation Limits and which is attached with this report. This report covers both events, focussing on items relating to the British Isles (lying within NEAC South). The IYS Symposium meant that the NASCO business was restricted to three days rather than the usual four. These are challenging times for Atlantic salmon throughout the North Atlantic and mirror a similar plight of the Pacific salmon species, with common pressures at sea from climate change and aquaculture in addition to multiple freshwater effects, although the latter are more diverse between the continents. Hence IYS has a global perspective and range of activities.

The primary outputs of the annual NASCO meeting are reviews of salmon stock assessments, related management actions and science-led catch advice for Atlantic salmon fisheries around the North Atlantic. This reflects NASCO's origins in 1984 and its initial primary task of bringing order and controls to the then extensive and highly exploitative fisheries of Greenland and the Faroes and to various coastal mixed stock interceptory fisheries in home waters of the participating countries. As the high seas fisheries declined, NASCO's role and influence has extended to best practice guidance on salmon conservation, restoration, enhancement and outreach in home waters. An increasingly prominent role is the coordination and commissioning of collaborative, large scale research programmes, particularly those into marine phase migrations and development of life cycle modelling to support integrated stock assessment.

2019 highlights were:

- the IYS Symposium preceding NASCO and the recommendations from that;
- the start of the 3<sup>rd</sup> cycle (in NASCO's lifetime) of the Implementation Plans and Annual Progress Reports of member countries, complemented by a review of the IP process presented in a Special session.
- In the face of continuing poor stock status, catch advice remains the same for all fisheries and jurisdictions, but a readjustment was made to the Greenland quota to correct for inadvertent overfishing in 2018.

This report summarises the IYS symposium (2-3 June and the NASCO meeting (4-5 June). The meat of the NASCO meeting is contained within 80+ reports, available through the NASCO website <http://www.nasco.int/>, many of which were updated and revised during the meeting. There were two post-meeting trips: to Sommarøy and to the Lyngen Alps and rivers. I give a very brief description of these. An outline of how NASCO works, given in the previous reports, is now put in an Appendix I, for information.

For the assessment and research details please see NASCO CNL(19)08 and ICES 2019 (Report of the Working Group on North Atlantic Salmon (WGNAS) 25 March-4 April, Bergen Norway, ICES Scientific reports, 1:16. 368pp <http://doi.org/10.17895/ices.pub.4987>

I want to record that Ian Russell of Cefas retired this year from Cefas and NASCO where he has made major contribution to the work of the ICES Working Group on North Atlantic salmon and to the wider work of NASCO, as well as (as most of us know) to salmonid work in England and Wales. He was given a good send-off at the NASCO dinner. Thank you Ian.

## A personal comment on NASCO in 2019.

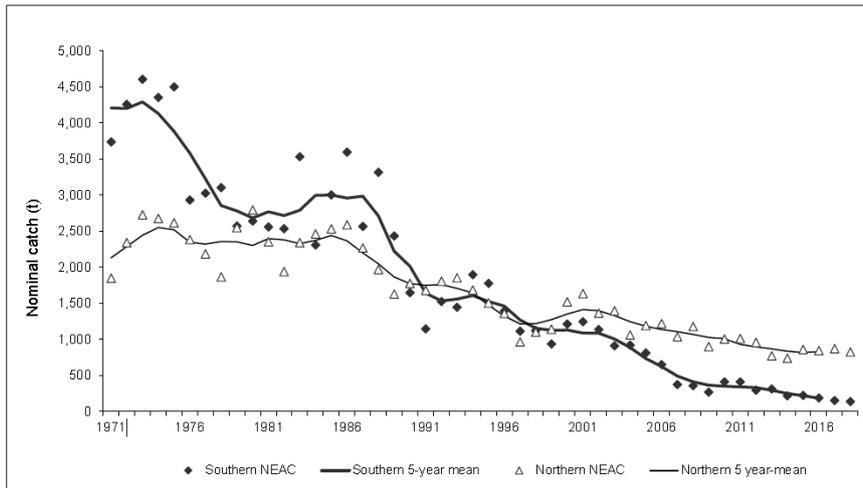
This year there was a sense amongst the NGOs that, while NASCO's role remains essential, its scope for pushing meaningful, radical action to conserve salmon has stalled somewhat, particularly with respect to home water activities. This may be a consequence of its success, because NASCO is efficient and effective at what it does in high seas fisheries controls. As those matters have been managed, NASCO's ability to address contemporary issues may be constrained by its 1984 convention objectives. Those remain vital, but may be less appropriate for the present day urgent challenges of salmon conservation in the face of climate change and the pressures that lie within home water coastal and freshwater jurisdictions over which NASCO has less direct control. NASCO's reliance on recommending best practice (excellent though that is) renders it lacking in bite, because there are no sanctions. This means that the Parties (i.e. the groups comprised of home country member governments) can more or less act as they please. This is of course a matter of national sovereignty; but the effect is that the commitment of Delegations to take meaningful actions across the range of pressures appears weak in some cases. It is weakened by an unwillingness to specify clearly and specifically in the Implementation Plans what they *need* to do, in exchange for watered down proposals to what they think they *might be able* to do, given their resources. This may appear to be a worthy pragmatic response to the realities of funding; but the effect is an increased risk of simply managing a downwards trend in service delivery. I think that they (mixture of EA, NRW and Cefas for England and Wales) should present a more ambitious, visionary and robust plan, and if that cannot be met, then say why not and state the consequences. Hopefully this will be addressed in the forthcoming NASCO Performance review (see next) and review of its objects.

## Implementation Plans and Annual Progress Reports

NASCO set up a system in 2013 to record and check progress with member states' actions to conserve salmon. This has two stages of (1) Implementation Plans that describe what will be done in the next 3 year cycle and (2) Annual Progress Reports that describe what has been done each year. There has been criticism of the process and rigour in the drafting and use of IPs and APRs. The results of a review were reported in Tromsø (CNL(19)14). New IPs and APRs are now being produced for the 3<sup>rd</sup> cycle and revised versions will be available online for public scrutiny from 30<sup>th</sup> November 2019. This is an important task: NASCO is the only international body that oversees this work which is at the heart of salmon protection and restoration, so it needs to be done rigorously. The effectiveness of the IP/ APR process will feed into NASCO's external performance review in 2020. IFM plays a role by commenting on the IPs through the consultation, both directly and through the NGO Group.

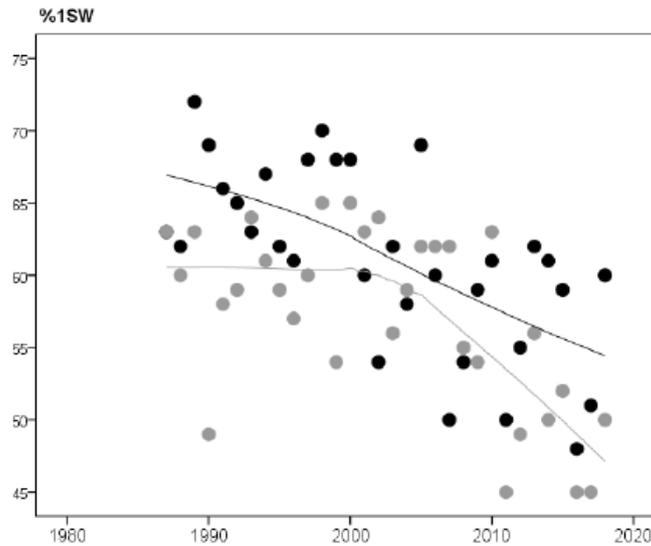
## Salmon Catches and Stock Status

The provisional nominal catch in the NEAC area in 2018 (960 t) was 60 t below the updated catch for 2017 (1020 t) and 7% and 20% below the previous five-year and ten-year means respectively. Catches in 2018 were close to or below long-term means in all Southern NEAC countries (Fig 1). Much of this is due to reduced fishing effort, and better indications of stock status lie in comparisons with Conservation Limits (CL) and Spawning Escapement Reserve (SER, i.e. what is left after the high seas fisheries (Greenland and Faroes), should they operate), see below.

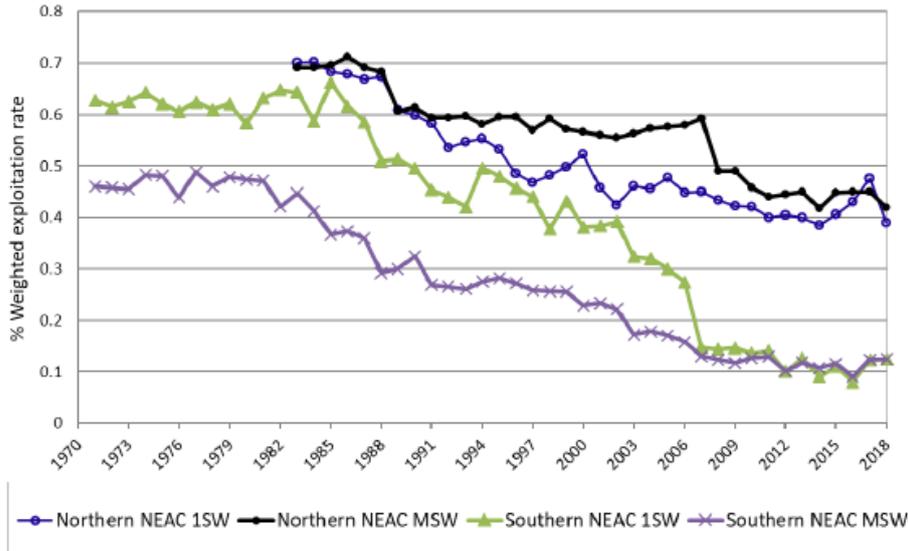


**Fig 1. Nominal catches of salmon in NEAC areas. From CNL(19)08 Figure 3.1.4.1. Nominal catches of salmon and five-year running means in the Southern and North-ern NEAC areas, 1971–2018.**

Age composition of returning salmon continues to change towards MSW fish. In the Southern NEAC area, the percentage of 1SW fish in catches averaged 60% (range 49% to 64%) in 1987–2000 and 55% (range 45% to 63%) in 2001–2018. Comparing the two periods, the percentage of 1SW salmon has decreased in all Southern NEAC countries (Fig 2). Exploitation rates have continued to decrease in both age categories, but overall have been similar in both in the NEAC(S) area (Fig 3).



**Fig 2. Changing proportion of 1SW salmon From WGNAS 2019 Figure 3.1.6.1. Percentage of 1SW salmon in the reported catch for the Northern (black) and Southern (grey) stock complexes, 1987–2017.**



Exploitation rates of 1SW and MSW salmon in homewater fisheries in the Northern (1983–2018) and Southern (1971–2018) NEAC areas.

**Fig 3. (From WGNAS 2019, Figure 3.1.9.1). Mean annual exploitation rate of wild 1SW and MSW salmon by commercial and recreational fisheries in Southern NEAC countries from 1971 to 2018.**

### Stock Status

A reminder: stocks status is assessed and reported at different scales, for different age groups and against different reference points. Thus, scales can be: river, country (e.g. England and Wales, Ireland, Northern Ireland) and geographic group or stock complex (e.g. North America, NEAC North and NEAC South). Life stages are (1) PFA (pre-fishery abundance, i.e. fish just before the high seas fisheries exploitation) which is assessed relative to the SER (Spawning Escapement Reserve, being the numbers of new 1SW recruit fish on 1<sup>st</sup> January required to meet Conservation Limits in home water rivers, allowing for intervening natural mortality between then and time of return, 6-9 months); (2) spawner abundance assessed relative to river-specific Conservation Limits pooled for each country where possible, and stock complexes and also trends of CL attainment for individual rivers of each country within stock complexes. In all cases the assessments are replicated for maturing fish (1SW) and non-maturing fish (MSW). NASCO recognises 3 status categories:

1. *At full* current stock has >95% probability of being >CL
2. *At risk of suffering reduced reproductive capacity*: current stock has between 50% and 5% probability of being >CL
3. *Suffering reduced reproductive capacity*: current stock has less than 5% probability of being >CL

Salmon Pre-Fishery Abundance (PFA) has declined from 8m to 10m in the early 1980s to around 3m - 4m in recent years. This decline in spite of big reductions in fishing is attributed primarily, but not exclusively, to still poorly understood mortality processes in the sea and changes in the marine environment. Most of the contemporary international research effort therefore lies in this broad field, as updated below. In contrast to the Northern NEAC complex, which is at full reproductive capacity, in the Southern NEAC complex, 1SW and MSW stocks were considered to be suffering reduced reproductive capacity prior to the commencement of distant-water fisheries in 2018.

I refer readers to the CNL(19)08 and ICES 2019 for the considerable detail in the assessments, but a convenient summary of performance against CLs is in Table 1.

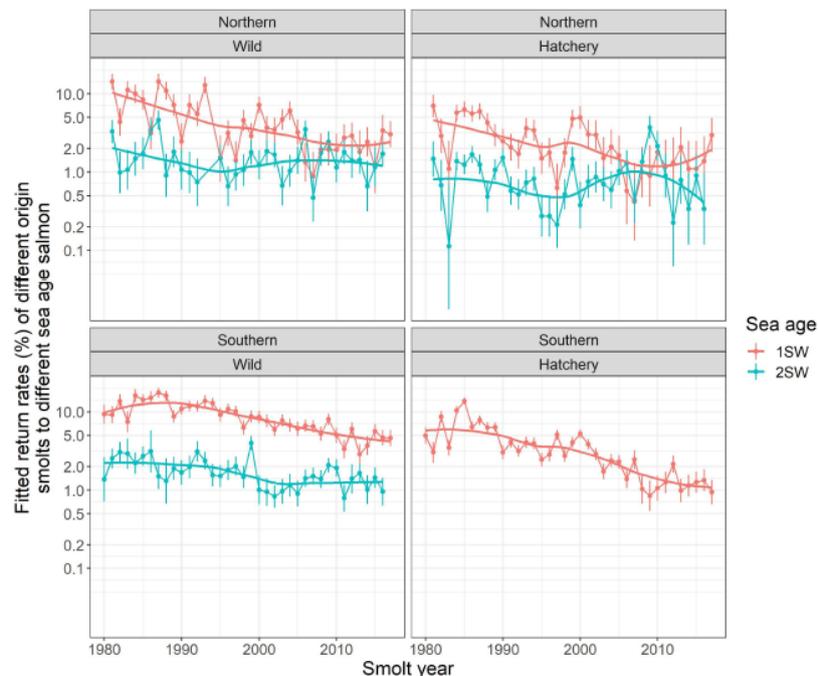
Country/Jurisdiction	Number of rivers with CLs	Number of rivers assessed for compliance	Number of rivers attaining CL	% of assessed rivers attaining CL	Trend statement
Northern NEAC					
Russia	85	8	7	88	No trend
Finland/Norway (Tana/Teno)	25	15	6	40	Increasing
Norway	439	191	170	89	Increasing
Sweden	24	23	7	30	Stable (data for 2016 to 2018 only)
Southern NEAC					
UK (Scotland)	173	173	84	49	Decreasing
UK (Northern Ireland)	19	16	7	44	Increasing
UK (England and Wales)	64	64	14	22	Decreasing
Ireland	143	143	41	29	Decreasing
France	35	35	21	60	Stable

**Table 1 Summary of the attainment of CLs in 2018 (2017 for Norway and UK Scotland) and trends based on all available data in the NEAC area. Further details can be found in ICES (2019b). From CNL(19)08.**

An inconsistency in Conservation Limit methodology around the NASCO parties has now been recognised as a matter to resolve and will be the subject of forthcoming ICES workshops. In Scotland important and innovative advances have been made in 2018, closing a gap in the UK CL list. In England and Wales, formerly ahead of the game in developing CLs, the shortfalls in the antiquated methods have been recognised (see my talk to IYS) and proposed refinements are included in the current E&W Implementation Plan; delivery of which the NGOs will watch with interest.

### Return rates

Time series for smolts return rates as 1SW and MSW, wild and hatchery fish are shown in Fig 4, more decline is seen in 1SW, partly influenced by shifts in life history choice, perhaps driven by marine conditions (or could be also freshwater condition via smolt age/size shift).



**Figure 9** Return Rates: Annual least squared (marginal mean) estimates of return rates (%) of wild (left-hand panels) and hatchery origin smolts (right-hand panels) to 1SW (red) and 2SW (blue) salmon to Northern (top panels) and Southern NEAC areas (bottom panels). For most rivers in Southern NEAC, the values are returns to the coast prior to the homewater coastal fisheries. Annual means derived from a general linear model analysis of rivers in a region with a quasi-Poisson distribution (log-link function). Error bars are standard errors. Note the y-axis scale is on a log scale.

**Fig 4. Return rates of smolts, Southern NEAC in lower panels. From ICES (2019)**

### Catch advice

ICES advice for all stock complexes was unchanged, see CNL(19)08.

NAC. US harvest fisheries are closed and stocks continue to decline. However, St Pierre and Miquelon fishery (small) continues and is regarded as potential threat to recovery of North American stocks.

WGC. All the fishermen are now licensed and the sale of fish is restricted to Greenland open air markets only. Factory fishing continues to be banned. In 2018 a total catch of 40.5t exceeded the 30t TAC quota, a high value that occurred because of catch recording difficulties. Accordingly for 2019 a quota of 19t was agreed to adjust for the overfishing.

NEAC. No fishing at Faroes is the continuing ICES advice, but Denmark (in respect of the Faroes and Greenland) retains the right to conduct scientific surveys. For home waters, ICES advice remains that exploitation be allowed only on stocks at full reproductive capacity, i.e. a 95% chance of being above the Conservation Limit. In many NEAC (N) rivers stock status does permit some harvest. In the NEAC(S) stock complex as a whole, both 1SW and MSW abundances have declined since 2010/11. At NEAC(S) individual country scale (except NI) total 1SW spawner returns suffered reduced reproductive capacity in 2018. In contrast, MSW salmon (except for Scotland) are regarded as being at or above full reproductive capacity.

Smolt return rates for wild 1SW fish in NEAC(S) continue to decline; but in the 2SW group, following a long period of decline, have fluctuated but overall stable since around 2000.

## Salmon research and assessment

See CNL(19)08 for summary and ICES 2019 for details.

These were reported via SAG and IASRB (IASRB is advised by the SAG and I attended the meetings of both). New rules have been set for the SAG which in future may not meet every year and only at the specific request of the IASRB. The research focus continues to be on salmon marine movements, ecology and population dynamics. The major investment in and expansion of marine tracking programmes around the North Atlantic continues. Those directly involving or targeting UK are

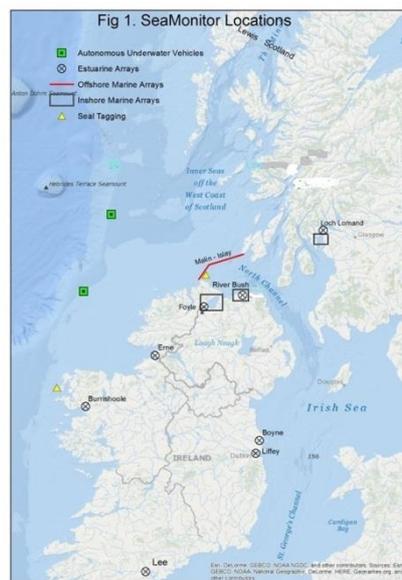
*SALSEA-Track.* NASCO's flagship research programme aims to understand pressures at sea affecting marine survival. As a follow-on to Salsea, it has been established to identify the migration routes of emigrating post-smolts and to quantify the mortality occurring at different points along the migration route, how this mortality varies from year to year and the factors causing the mortality, e.g. predation, aquaculture or renewable energy installations. It links with the "Likely Suspect's Programme" through life cycle modelling to understand the impact of mortality factors acting in key space-time domains of the salmon's life cycle.

*Sea Monitor (a network of marine tracking studies).* This INTERREG V application has now been approved. Niall Ó Maoiléidigh leads as the NASCO link. The total proposed budget is €4.7m. Details are the same as reported to IFM in 2018. The Loughs Agency is lead partner with other partners being:

- AFBI
- Marine Institute
- University of Glasgow
- Queens University Belfast

- University College Cork
- Galway, Mayo Institute of Technology
- Ocean Tracking Network (Canada)
- UC Davis (California)

The project aims to investigate migration of mobile marine species using acoustic tracking technology and follows up the IBIS studies which highlighted a potential loss of salmon and eels on their migration through Lough Foyle. NASCO have identified the Malin / Islay gateway (Fig 5) as one of the priority areas for an acoustic array because could monitor movements of smolts out of the Irish Sea as well as the AFBI / DAERA ICES Index River Bush. The Malin / Islay gateway has also been identified as priority by the European Tracking Network and is one of 6 such areas to be highlighted across Europe.



**Fig 5. Location of Sea Monitor arrays and equipment deployment**

The project comprises an acoustic network around the north coast of Ireland and west coast of Scotland in conjunction with two Autonomous Underwater Vehicles (UAV's) on the continental shelf (Fig 5). It aims to monitor multiple taxa. Target fish species are salmon, sea trout, eel, bass, sun fish, common skate, porbeagle, blue and basking sharks. Hydrophones will be deployed to investigate cetacean distribution and common seals will be satellite tagged on the Irish east coast. The proposed receiver locations are Loch Lomond and Clyde estuary, R. Bush, River and Lough Foyle, Malin Head to Islay, receivers in each of the following estuaries Boyne, Liffey, Lee, Burrishoole and Erne (Fig 5).

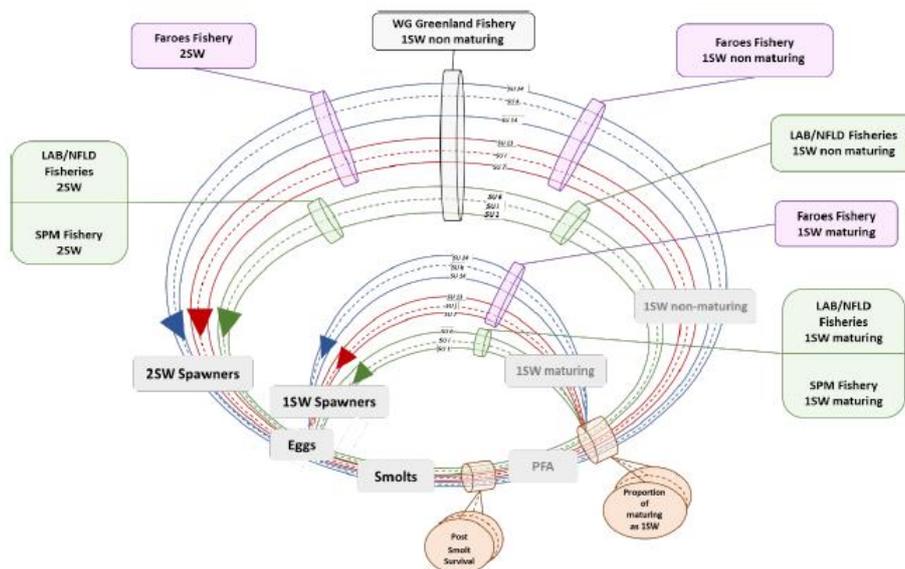
*SAMARCH*: England-France part Interreg funded, this 5 yr project (2017-2022) studying salmon and sea trout in English Channel, has 4 work packages: 1.Tracking in estuaries and coastal zone to study migration and mortality; 2. Genetic Tool development (mainly brown trout); 3.Salmonid stock assessment models, including growth rate changes from scales; 4 Stakeholder engagement and training to improve and develop new policies for fisheries management in estuaries and coastal waters.

Further information about SAMARCH is available online at [www.samarch.org](http://www.samarch.org)

*The Missing Salmon Project*: AST initiative on tagging and tracking studies into the fate of UK salmon smolts, on the Moray Firth and Scottish west coast, is being promoted by the AST's and they are

seeking £1m through a crowdfunding programme. See <https://www.crowdfunder.co.uk/themissingsalmonproject>

*Life cycle modelling.* Development continues of this ICES stock assessment model (Fig 6). This has made significant advance since 2018 and is now a single Bayesian model of full life cycle is now applied simultaneously to NAC and NEAC. Its outputs will be Pre-fishery Abundance estimates (PFA) and life cycle parameters (post-smolt M and proportions of PFA maturing salmon). It can be used to test the effects of changes in environmental factors such as food availability and temperature. It has to pass ICES benchmarking process that is applied to all new assessment models. It is hoped to start using its PFA outputs for catch advice in 2021, which illustrates the level of technical review and long lead time for such developments.



**Fig 6.** Schematic of the life cycle model applied to the 24 stock units of NEAC–N, NEAC–S, and North America. Variables in light blue are the main stages considered in the stage-structured model. The smolt-to-PFA survival (post-smolt survival) and the proportion of maturing PFA are estimated for the time-series (1971 to 2014). Stock units of the NEAC–N and NEAC–S complexes are potentially harvested by the mixed-stock fishery operating around the Faroe Islands as 15W maturing and non-maturing fish, and as 25W fish. Stock units of the NAC complex are potentially harvested by the mixed-stock fishery operating around Labrador, Newfoundland, and Saint Pierre and Miquelon as 15W maturing and non-maturing fish, and as 25W fish. Stock units of the NEAC–N and NEAC–S complexes are potentially harvested by the mixed-stock fishery operating at West Greenland as 15W non maturing fish. (from CNL(19)08).

*Conceptual Framework on Marine Mortality – the Likely Suspects Framework (LSF) update.* This important AST initiative, proposed in 2017, continues to develop. The life cycle model was applied to examine environmental drivers (sea surface temperature, primary production, large scale climate forcing metrics (e.g. NAO) and the population mechanisms of the widespread decline in salmon marine survival rates in the North Atlantic. They examined the degrees of synchrony in the post-smolt survival (actually in return rates, as a proxy for survival) in 13 stock units to investigate if the declines were related to survival in the early post-smolt phase when they are in transitional habitats or later in their full marine migration phase. Preliminary results show strong coherence in post-smolt survival, describing a decline by factor of 1.8 between 1971 and 2014. Synchrony was strongest amongst stock units within stock complexes and temporal patterns were best explained by sea

surface temperature and primary production. The results supports the idea of simultaneous salmon responses driven by bottom-up environmental factors. Incidentally, this was shown recently also for sea trout in the Irish Sea by the Celtic Sea Trout Project which identified spring SST as a likely key factor.

In addition to the above, reports were given on:

- International Ecosystem Summer Survey of the Nordic Seas (IESSNS): a collaborative programme between Iceland, Faroes and Norway based on pelagic marine fish surveys, on salmon movements and factors affecting survival on the North Atlantic.
- SeaSalar: New Norwegian programme (started 2018, for 4 years) on factors affecting salmon growth and survival using genetics, isotopes, fatty acids and electronic tagging
- PIT automatic tag screening: at pelagic marine fish processing factories (23 in UK, Iceland, Norway, Demark, Faroes) to study marine bycatch of post-smolts.
- Coastal tagging and arrays in Gulf of St Lawrence: now extended to coastal arrays off Labrador coast. Studies migration routes, timing and smolt survival.
- ROAM (RAFOS Ocean Acoustic Monitoring) project. Popup Satellite tagging at West Greenland: started in 2018, ongoing, aiming for 50 tags to be deployed in 2019 on adult fish caught by trolling. Studies marine distribution, migration routes and environmental factors.

For NASCO research inventory, see: <http://www.nasco.int/sas/research.htm>

## New or emerging threats to salmon

This regular item at NASCO is covered in CNL(19)08 and ICES 2019 (Report of the Working Group on North Atlantic Salmon (WGNAS) 25 March-4 April, Bergen Norway, ICES Scientific reports, 1:16. 368pp <http://doi.org/10.17895/ices.pub.4987>

*Red Vent Syndrome (RVS)*. Monitoring in England and France showed that incidence was highest in the time series in some rivers. It was noted that RVS (infection by *Anisaki*s) heals in freshwater.

*Gyrodactylus salaris*. No change. Norway reported that of 50 rivers originally infected, 32 are designated clear through rotenone treatment, 11 are expected to be clear soon and 7 remain infected.

*“Disease”*. A worrying increase was reported in the incidence of UDN-type disease seen in Sweden and Russia, leading to severe *Saprolegnia*- like secondary infection and mortalities. This was thought to be due to warm water in 2018.

*Sea Lice*: Norwegian monitoring continues. This programme is designed to target high risk areas identified by a hydrodynamic model. Use of chemicals to treat on farms is decreasing (38% reduction since 2017) as farmers move to other methods (thermal and mechanical). A new regulation regime was introduced last year based on risk of increased lice-induced mortality in 13 production areas, Note that a “red” (= bad) zone is identified if lice-induced mortality is >30% of total M. One area had this red level. Decisions on what to do about production will be made late in 2019. To the NGOs, 30% M seems rather high as a threshold (is it therefore OK to have increased M up to 30%?).

*Climate*. Around the North Atlantic 2018 was an exceptionally hot year, with variously low river flows and big floods reported. As we know, many E&W rivers experienced flow < 50% long term average in May – August 2018. Depending on their timing these various changes can have effects on salmon mortality (see above), on rod catches (decrease) and coastal net catches (increase). 83% of

Canadian river fisheries were closed at various times during 2018 because of high water temperatures and closures happened elsewhere.

*Conservation and management.* Two items were reported: the ongoing salmon reinstatement of the German rivers Rhine, Elbe, Ems and Weser; and the interesting results from the 11 year River Frome PIT study. In this it was clearly shown that salmon smolt survival was related to smolt size (Fig 7) such that 12cm smolt had return rate of 0.95% compared with 3.42% for a 16cm smolt. The study (Gregory *et al.* 2018) also showed that, on the Frome, MSW return rate was 0.5 of that for 1SW.

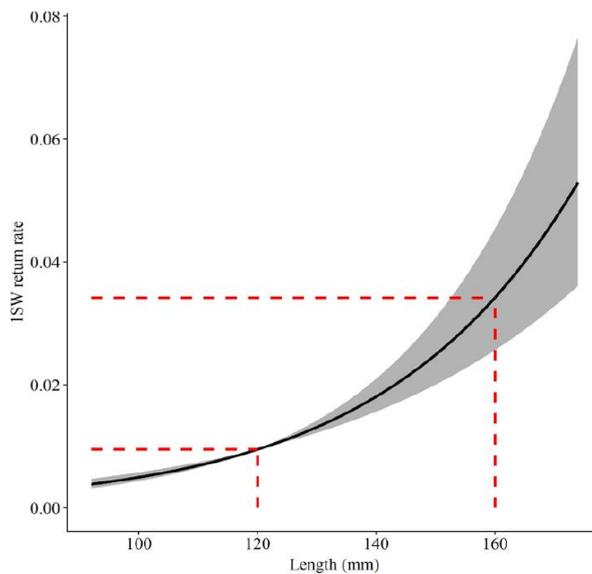


Figure 2.3.4.1. Estimated marine return rate after one winter at sea (1SW) as a function of fork length of individual Atlantic salmon (*Salmo salar*) smolt emigrating from the River Frome (Dorset, UK). Black solid line is the estimated effect and grey bands delimit the estimated 25 to 75% Bayesian credibility interval band around that effect (approximate standard errors).

**Fig 7 salmon return rates related to smolt size on River Frome. From ICES 2019.**

## International Year of the Salmon: Salmon and People in Changing World.

IYS has 5 themes.

1. Status of salmon: to understand present status of salmon and their environments.
2. Salmon in a changing “Salmosphere”: to understand and quantify the effects of natural environmental and anthropogenic factors on salmon distribution and abundance and to project future changes.
3. New Frontiers: to develop new technologies and analytical methods to advance salmon science and explore the uncharted regions of the salmosphere.
4. Human Dimension: to investigate those cultural, social and economic elements which depend upon sustainable salmon populations.
5. Information Systems: to develop an integrated archive of accessible electronic data collected during IYS and tools to support future research.

The IYS Symposium was held 3-4 June in Tromsø. It was a constructive and informative meeting with around 200 attendees. It focussed on climate change and the current challenges for salmon conservation, with an emphasis on those things that NASCO might be able to take forward in

supported action on key research and improvements to assessment. The organising committee produced a meeting summary and recommendations in report entitled “*Managing the Atlantic salmon in a rapidly changing environment - management challenges and possible responses*” see CNL(19)16. The executive summary is given here in Appendix II. Its main outcomes were recommendations to further control the impacts on salmon production through an ecosystem-based approach by protecting the genetic integrity of stocks, enhanced water quality and habitat protection including improving access for salmon to important habitats, and minimizing human impacts reducing growth and survival in rivers and coastal areas. It drew attention to shortcomings in current monitoring and assessment, and it further reiterated recommendations to tighten controls on marine farming and on hatchery stocking. The most notable new development was the emphasis on better inclusion of the wider public in decision making, specifically first nation people in America and Scandinavia, whose interests have been underrepresented in the past. Additional recommendations were made on actions that NASCO should take. For slogan-lovers, the oft-repeated mantra that summarised everything was “Control the Controllables”.

In a special NASCO IYS session, presentations on the Symposium outputs (Appendix II) and on the global perspective of salmon issues and IYS activities. The same issues arise in the Pacific and Atlantic basins. For example effects of a warm oceanic “blob” in 2016-2018 are still being seen in E & W Pacific, and thermal habitat changes in the North Atlantic are thought to account for growth and survival changes in our species of salmon. Meetings and collaborations between NASCO and NPAFC (North Pacific Anadromous Fish Commission) staff and representative scientists have been extensive and productive in developing high seas research into salmon migrations and environment and promoting outreach programmes. There was an IYS opening meeting Oct 2018, Vancouver that brought together 1<sup>st</sup> nations and federal government reps. Pacific / Atlantic collaboration through IYS has underpinned the Likely Suspect project (see above), with the next meeting to be held in Copenhagen in August, 2019 Aug). Numerous IYS-driven events have been logged, such as climate change workshop, big data workshops, outreach and fundraising and of course the Tromsø IYS Symposium. Hundreds of activities and events were reported across all Pacific and Atlantic rim countries. A video was shown of North American events, mainly outreach and communications.. *State of North Atlantic Salmon* a NASCO small glossy report was produced to inform wider public. A really good Norwegian film on salmon was shown at Tromsø and wide public promotional displays of IYS were evident, including at airports – big displays at Tromsø airport. Norway has engaged particularly well with the IYS. The AST and NASCO produced the excellent short feature film narrated by David Attenborough. IFM supported the Salmon and Trout Conservation IYS related meeting in Built Wells in April 2019. Other activities can be found at the websites:

<https://yearofthesalmon.org/>

<http://atlanticsalmonrestoration.org/opportunities/international-year-of-the-salmon>

[https://www.npafc.org/new/science\\_IYS.html](https://www.npafc.org/new/science_IYS.html)

We now need to assess the value and success of IYS in achieving its big ambitions. The IYS summary, while largely repeating previous advice gives a re-energising refocus on current thinking.

## Implementation plans and Annual Progress reports

There has been much criticism of the process and rigour in the use of IPs and APRs, which are the main means by which performance of member states in managing and conserving salmon stocks in their home waters and rivers is assessed. A review has been conducted since last year and was reported in a special session in Tromsø (CNL(19)14). This is timely because new Implementation Plans and APRs are being produced for the 3<sup>rd</sup> cycle (and were scrutinised before and at the 2019 NACO meeting) and revised versions will be available online for public scrutiny from 30<sup>th</sup> November.

They will continue to focus on stock status and catches, the management of salmon fisheries, habitat protection and restoration and aquaculture. Following the review, key changes were requests for improved SMART targets with quantitative measures of progress.

### Next NASCO meeting

To be held in the Faroes, June, 2019.

## Post meeting visits

The Norwegian hosts and NASCO laid on two fun visits to Sommarøy and to the Lyngen Alps and rivers. These coach trips took us through amazing fjord country. Sommarøy is an island and small, active fishing village off the NW coast that has been developed by its owners as a quiet, get away tourist attraction. Stunning scenery and musical entertainment from the owner and his daughter made it a great trip and necessary recovery after the week long meetings (i.e. we had meetings for a week, they weren't each a week long, although sometimes...).

The day long sight-seeing trip to the Lyngen Alps was only slightly marred by low cloud and torrential rain; but Lawrence Talks and I reenacted moving scenes from the Titanic at a small port stop (I will not be Kate Winslet next time). We visited the conservation area of the Lyngen Alps and were told about the protection afforded to the environment, flora and fauna there and later visited the fishery enforcement service who gave a comprehensive account of their work to protect salmon. Illegal netting is a big problem in Troms county and so is plastic rubbish. The Norwegians were wonderful, generous hosts throughout the week and they made even the rainy day a good one in spite of the weather.

Some photos follow...



Simon Toms gets into Norwegian haddock stocks



Alan Walker cleans up the coalfish



0200, as dark as it got



Tromsø harbour codling



Lawrence, me and Mark Saunders  
(Pacific Anadromous Fish Commission)  
at Sommarøy



Sommarøy island



Barbie in the rain at Sørlandaglatn



Fishery enforcement talk



Your correspondent correctly identifies a river



I have no idea who these two are...

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## APPENDIX I

### How NASCO works

The overall business addresses the aims of the NASCO Convention and is ordered by the structure of three major geographical commissions covering spatially distinct salmon fishery areas: North American (NAC), West Greenland (WGC) and North East Commissions (NEAC). The latter is further divided for stock assessment purposes into a Northern group comprising Russia, Norway, Sweden, Faroes and a Southern group comprising Scotland, England, Wales, NI, Ireland, France, Spain and Portugal. The 6 Parties to the NASCO Convention are: Canada, Denmark (in respect of the Faroes and Greenland), the European Union, Norway, the Russian Federation and the USA. Each of these Parties sends a Delegation to the annual meeting and they are the formal negotiating Parties. A further grouping is formed by Observers from 38 Non-Governmental organisations (NGOs), co-chaired by Paul Knight of Salmon and Trout Conservation UK and Dr Stephen Sutton of the Atlantic Salmon Federation, Canada.

Stock assessments, reviews of various scientific issues and catch advice are provided by the independent ICES Advisory Committee (ACOM), responding to formal questions annually raised by NASCO. The ACOM is informed on technical assessment by the Working Group on North Atlantic Salmon (WGNAS). The UK rep on WGNAS is Ian Russell, Cefas. The ACOM Report, this year referenced CNL(18)08, is the “go to” summary report on assessments and scientific issues, so is a very useful document for anyone involved in salmon matters, with the WGNAS full report on which it is based giving the detail. NASCO has an over-seeing Council and an International Atlantic Salmon Research Board (IASRB), set up initially to manage the research into salmon in the sea, to which reports a Scientific Advisory Group (SAG). The whole edifice is supported by a small, highly efficient secretariat, headed as from last September by Dr Emma Hatfield.

The core meeting is organised around reports made to the Council in plenary sessions from

- the IASRB/SAG,
- the individual Commissions and
- the WGNAS.

An important recent feature is the preparation of 5 year Implementation Plans (IPs) by each Delegation (sub-structured by country) setting out their proposed practical actions to enhance and conserve salmon through all means (for example the EA’s 5 Point Plan). Progress against IPs is reported in in Annual Progress Reports (APRs) which are subject to scrutiny and questioning by a

NASCO Review Group. Further, in an open public session, all Parties and the NGOs have a chance to ask questions about each country's progress on their measures as set out in their APR. This is intended as a genuinely transparent and inclusive aspect of NASCO's work; but has come in for criticism due to the perceived weaknesses in some IPs and in the quality and rigour of the APRs and in 2018 a reviews of the process was reported.

## APPENDIX II IYS Symposium Executive Summary (see CNL(19)16)

# Managing the Atlantic salmon in a rapidly changing environment - management challenges and possible responses

Symposium held in Tromsø, Norway

June 3 - 4, 2019

ahead of the North Atlantic Salmon Conservation Organization's (NASCO) Annual Meeting

### REPORT FROM THE SYMPOSIUM STEERING COMMITTEE EXECUTIVE SUMMARY

This executive summary is a short compilation of results from the NASCO International Year of the Salmon Symposium entitled "Managing the Atlantic salmon in a rapidly changing environment - management challenges and possible responses". Two summaries are presented here: the advice for all agencies and organizations who are involved in the conservation and protection of Atlantic salmon; and, recommendations to NASCO.

#### Summary of Advice for Agencies and Organizations:

1. **Managers and conservation organizations** need to promote strong, healthy, and resilient populations of local wild salmonids in rivers and estuaries in order to reduce the impacts of changing ecosystems. A primary strategy to achieve this is protecting the genetic integrity of stocks, enhanced water quality and habitat protection including improving access for salmon to important habitats, and minimizing human impacts reducing growth and survival in rivers and coastal areas.
2. Salmon management traditionally has focused on managing harvest and artificially stocking rivers to offset salmon mortality or population decline. In the face of a rapidly changing environment, management approaches and decision-making should be broadened to include ecosystem protection of rivers, estuaries and marine environments including water quality, habitat quality and other valued components of the ecosystem.
3. **Aquaculture managers** need to have a strong focus on preventing any escape of farmed salmon from pens and/or consider using sterile salmon within their operations. They should reduce the mortality of wild fish caused by salmon lice and pathogens by implementing stricter disease and parasite control programs. This should be supported by rigorous monitoring and reporting to agencies concerning the prevalence of escapes and disease outbreaks.
4. In light of current knowledge concerning the risk and benefits of stocking, all **agencies, managers and conservation organizations** involved in stocking to artificially supplement populations of any life stage, should adhere to the following principles:
  - a. Stocking with hatchery fish of any life stage to augment natural wild Atlantic salmon populations should be an action of last resort, after all other conservation activities have been tried (e.g. optimizing river habitat and water quality), and primarily for preserving endangered populations. If deemed necessary, after carefully evaluating the risks and benefits, stocking should be conducted in a way that minimises or eliminates potential negative effects and maintains genetic integrity and genetic variation of the wild population to the maximum extent possible.
  - b. If deemed necessary, stocking should only include the use of local, wild broodfish, emphasize stocking of early life stages, always minimizing time in captivity, and,

- balance the number of stocked fish to the number of broodfish and the number of naturally reproducing fish
- c. In any stocking program, all hatchery produced fish of any life stage should be tagged in some way to be traceable and the effects of stocking should be evaluated.
5. **Agencies, managers and conservation organizations** considering introductions or managing invasive species should consider the following principles:
    - a. Discourage any introduction, intentional or otherwise, of non-native species into salmon rivers;
    - b. If established, invasive species should be eradicated where possible, and prevented from spreading when eradication is not feasible;
    - c. Work with other organizations to ensure strong and healthy populations of local Atlantic salmon to mitigate the potential impacts of invasive species.
  6. To optimize species productivity under future conditions **fisheries managers and conservation organizations** should ensure the highest number of wild smolts in the best condition leave from rivers and near-coastal areas to the ocean.
  7. **Fisheries managers and scientists** should continue studies to understand the magnitude and causes of mortality for Atlantic salmon during the marine phase of their life cycle to identify the importance of reduced sea survival due to ocean ecosystem effects versus human impacts in rivers and near-coastal areas and to predict spawner numbers for management. Such research must also include studies in the beginning of the sea migration (i.e. in estuaries and coastal areas).
  8. **Fisheries managers and scientists** should continue to meet and to augment the exchange of information and ideas on how salmon management related to biological reference points is done in different regions as a way to encourage greater consistency among the countries in the use of biological reference points, cataloguing habit types and amounts of different habitat. NASCO could facilitate such knowledge exchanges.
  9. **Managers, scientists, conservation organizations and governments** should recognise that people are a critical element of the conservation process. Addressing human dimensions requires incorporation of traditional and local knowledge and indigenous perspectives in activities related to salmon science, conservation and management.

## Recommendations for NASCO

The IYS Symposium Committee has identified a numbers of areas where NASCO could either start new initiatives, update and modernize existing guidelines, work with the Parties, or facilitate the development and dissemination of information to promote the future conservation of Atlantic salmon:

11. To remain relevant in a period of rapid environmental and social change NASCO needs a renewed strategy to respond to the challenges facing wild Atlantic salmon. To begin this process NASCO should specifically identify strategic activities to deal with climate change and its cascading effects on salmon and salmon habitat, possibly by updating its 2005 “Strategic Approach for NASCO’s ‘Next Steps’”.
12. Given the advances that have been made in the last 15 years in understanding genetic effects of artificial population supplementation, i.e. stocking, and given the conclusions of the 2017 NASCO “special session on Understanding the Risks and Benefits of Hatchery and Stocking Activities to Wild Atlantic Salmon Populations”, NASCO should immediately update its 2004 “Guidelines on the Use of Stock Rebuilding Programmes in the Context of the Precautionary Management of Salmon Stocks” with reference to the summary of advice given above (No. 4).
13. Given the importance of habitat and water quality conservation as a key strategy to conserve salmon into the future, NASCO should update its 2010 “Guidelines for the Protection, Restoration and Enhancement of Atlantic Salmon Habitat”. Updated guidelines should not only consider the physical environment and include estuaries but should also

seek to optimize water quality by considering the chemical and biological quality (e.g. toxic substances, diffuse agricultural pollution, persistent organic pollutants) as well as availability and distribution of prey in the future.

14. Given the advances in the understanding of human dimensions and the importance of incorporating indigenous and local knowledge into salmon conservation, NASCO should update and modernize its 2004 “Guidelines for Incorporating Social and Economic Factors in Decisions under the Precautionary Approach”. This update should include recent advances in human dimensions and the incorporation of traditional and local knowledge and indigenous perspectives.
15. Recognizing the importance of salmon to indigenous peoples and the role that indigenous peoples play in salmon conservation, NASCO should improve the participation of indigenous people in NASCO.
16. NASCO should continue efforts, begun under the International Year of the Salmon, to raise global awareness about the status of wild Atlantic salmon, the threats they face, potential solutions, and actions that can be taken.
17. NASCO should facilitate co-operation between Parties when there is a need for international collaboration to prevent or reduce the threat to salmon stocks from invasive species.
18. Given the continued impacts of domestic salmon farming on wild salmon, NASCO should strengthen compliance to the agreed international goals of “100% farmed fish to be retained in all production facilities and, 100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms”. This is as stated in the 2009 “Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon”.
19. NASCO should establish a new goal to prevent the spread of disease pathogens from fish farms to wild fish consistent with the existing goals on containment and sea lice in the 2009 “Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon”, and the 2016 “Theme-based Special Session: Addressing Impacts of Salmon Farming on Wild Atlantic Salmon”.
20. Given the need to identify the importance of reduced sea survival due to ocean ecosystem effects versus human impacts in rivers and near-coastal areas and to predict spawner numbers for management, NASCO should support and continue to encourage research on mortality for Atlantic salmon at the beginning and the end of the marine phase of their life cycle in estuaries and near-coastal areas as well as on the high seas.
21. Given the success of this Symposium and the positive feedback the Committee has received from participants, NASCO should consider hosting similar events in the future.