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Report of the Working Group on the Science Requirements to Support Conservation, Restoration and Management of Diadromous Species (WGRECORDS)

16–17 September 2014

A Coruña, Spain



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H. C. Andersens Boulevard 44–46
DK-1553 Copenhagen V
Denmark
Telephone (+45) 33 38 67 00
Telefax (+45) 33 93 42 15
www.ices.dk
info@ices.dk

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Executive summary

WGREGORDS was established to provide a forum for the co-ordination of work on diadromous species following the disbanding of the Diadromous Fish Committee. The role of the Group is to co-ordinate work on diadromous species, organise Expert Groups, Theme Sessions and Symposia, and help to deliver the ICES Science Plan. WGREGORDS held an informal meeting during the NASCO Annual Meeting in St Malo, France, 5 June 2014. The annual meeting of WGREGORDS was held over two days i.e., 16 September 10:30–13:00 and 17 September 10:30–13:00 during the ICES Annual Science Conference in Á Corúna, Spain and chaired by Niall Ó Maoiléidigh (Ireland) and Atso Romakkaniemi (Finland). There were 7 participants in total from 6 countries (Annex 2) including the chairs of WGNAS, WGBAST and WGERAAS.

At the informal meeting in St Malo, initial discussions were held on the requirements for Expert Groups to address new and ongoing issues on Atlantic salmon including issues arising from the NASCO Annual Meeting. The Annual Meeting received reports from the ICES Expert Groups working on diadromous species, and considered their progress and future requirements. Particular interest was noted by groups working in different areas in:

- continuing declines in eel and salmon stocks;
- further research needs on contaminants in and quality of eels;
- ongoing methods to improve assessments and provide scientific advice for eel, salmon and sea trout;
- collecting and synthesizing information about experiences in salmon recovery actions;
- data collection procedures adopted for salmon in the Baltic and North Atlantic under the new EU DC-MAP;
- co-ordination of research on data poor diadromous fish stocks;
- outcomes of a number of recent sea trout projects;
- advances in digital scale reading methodologies.

The Group noted the completion of the work of a number of expert groups established by WGREGORDS late in 2013 or up to September 2014 i.e. the Workshop on Sea trout (WKTRUTTA), and Workshop on Lampreys and Shads (WKLS). The ongoing work of the Working Group on the Effectiveness of Recovery Actions for Atlantic Salmon (WGERAAS) was noted. There was a desire to include more discussions on other Diadromous fish species notably those which are rare or where data are limited. The emphasis on salmon and eel was obvious but WGREGORDS needs champions for other species. Some of these are very sensitive or threatened. Better co-ordination between Diadromous fish scientists was identified and WGREGORDS could provide a source of information on these species for national and international management. In this regard, a Working Group on data Poor Diadromous Species (WGDAM) was included in 2015 ICES resolutions and will be held in 2015.

Two Theme sessions were proposed for ASC 2015, one of which was approved and another was held over for consideration at the 2015 ICES Annual Science Conference in

Denmark. A resolution for a publication in the CRR series was carried forward by WGRECORDS and accepted by SCICOM on Marine Recoveries of Tags from Atlantic Salmon – from 1960s to 2012.

There was strong support for maintaining the work of the WGRECORDS and the ToR was rolled over unchanged for the years 2015 to 2017.

The Working Group will continue to hold its annual meeting during the ASC in September and a sub-meeting in the margins of the NASCO annual meetings in June each year.

1 Meetings held in 2014

The Working Group on the Science Requirements to Support Conservation, Restoration and Management of Diadromous Species (WGRECORDS) was established to provide a scientific forum in ICES for the co-ordination of work on diadromous species. The role of the Group is to co-ordinate work on diadromous species, organise Expert Groups, Theme Sessions and Symposia, and help to deliver the ICES Science Plan.

WGRECORDS held an informal meeting during the NASCO Annual Meeting (5th June 2014) in St Malo, France. The meeting was attended by 9 participants from 7 countries (Annex 2). This meeting provided the opportunity for preliminary discussions about the organisation of the Expert Groups (EGs), proposals for future theme sessions and symposia and potential CRRs relating to Atlantic salmon. Discussions were held on the requirements for Expert Groups to address new and ongoing issues on Atlantic salmon including issues arising from the NASCO Annual Meeting.

The annual meeting of WGRECORDS was held over two days i.e. Tuesday 16 September 1030–1300 (Modular room 9) Wednesday 17 September 1030–1300 (Bitacora room) during the ICES Annual Science Conference in Á Corúna, Spain and chaired by Niall Ó Maoiléidigh (Ireland) and Atso Romakkaniemi (Finland). There were 7 participants in total from 6 countries (Annex 2) including the chairs of WGNAS, WGBAST and WGERAAS.

2 Opening of annual meeting and adoption of the agenda

The agenda (Annex 3) for the annual meeting was adopted.

3 Review of Expert Groups on diadromous species

During 2014, WGRECORDS has co-ordinated the activities of eight ongoing or proposed EGs related to diadromous species. There were also reports from four ACOM EGs. The groups which completed their work late in 2013, were due to complete their work in 2014 or were proposed during 2014 are indicated below while details of their work are summarised separately.

- Joint EIFAC/ICES Working Group on Eel – WGEEL (ACOM) – Report available
- Working Group on Baltic Salmon and Trout – WGBAST (ACOM) – Report available
- Working Group on North Atlantic Salmon – WGNAS (ACOM) – Report available
- Working Group on the Effectiveness of Recovery Actions for Atlantic Salmon – WGERAAS (SCICOM) – Report available
- Workshop on Lampreys and Shads – WKLS (SCICOM) – Due 2015
- Working Group on Data Poor Diadromous Fish – WGDAM (SCICOM) – Due 2015

3.1 WGEEL – Joint EIFAC/ICES Working Group on Eel

The Joint EIFAAC/ICES/GFCM Working Group on Eel [WGEEL] met at FAO HQ, Rome, Italy from 3–7 November 2014. The group was chaired by Alan Walker (UK) and there were 44 participants representing 20 countries, the General Fisheries Commission of the Mediterranean (GFCM) and the EU's DG MARE. Information was also provided by correspondence from Estonia and Finland for use by the Working Group.

The WGEEL glass eel recruitment index has increased in the last three years, to 3.7% of the 1960–1979 reference level in the 'North Sea' series, and to 12.2% in the 'Elsewhere' series. The 'recruiting yellow eel' index has risen to 36% of the same reference period, from a low of 7% in 2013. Statistical analyses of recruitment indices using segmented regression ANOVA and Bayesian approaches detected a significant breakpoint (an upturn) in both North Sea and Elsewhere indices in 2011/2012. It was not possible to determine whether this up-turn can be considered a trend shift, as this short positive trend could be the result of the time-series auto-correlation. However, if these positive trends are confirmed and continue in the future without any changes, the recruitment indices would be expected to exceed the reference level around 2030 in "North Sea" and 2045 in "Elsewhere" indices. Better understanding of the functioning of the population is required to make these analyses more robust. There is no statistical evidence of an upturn in the recruiting yellow eel time-series.

Following the 2012 reporting of the assessed area, the levels of silver eel escapement biomass were as follows: escaping silver eel (B_{current} 12 000 t), present potential escapement in the absence of anthropogenic mortality (B_{best} 49 000 t), and 'pristine' potential escapement with no anthropogenic mortality (B_0 194 000 t). This indicates that current (2012) silver eel escapement biomass from the assessed area was at 6% of the 'pristine' state, or equal to 25% of the present potential if no anthropogenic impacts existed. The total landings from commercial fisheries in 2013, provided in Country Reports, were 2470 t of eel. The current state of knowledge on level of underreporting, misreporting and illegal fisheries is insufficient to include these in the assessment. Catch and landings data for recreational fisheries are not consistently reported in the Country Reports: inconsistencies in environments, fishing gears, life stages sampled. Therefore, it was not possible to assess the most recent total landings and catches of recreational and non-commercial fisheries. About 39 million glass eels and 15 million yellow eels were stocked in 2013. Aquaculture production has slowly decreased to about 5000 t in 2013. No new data on the impacts of non-fishing anthropogenic factors were available to WGEEL 2014: EU Member States will provide updates next year within their 2015 Eel Management Plan Progress Reports to the EU Commission.

The data requirements for international stock assessment, the data available and the gaps in those data were reviewed by the working group. Reported commercial landings from countries that have not implemented Eel Management Plans (because they are not subject to the EC Eel Regulation) accounted for about 27 to 39% of the total reported eel catch in some years. Therefore, the addition of data from countries not covered by the stock assessment so far is urgently required, but so too are improvements in the spatial coverage and quality of data for the EU countries implementing and reporting on EMPs. The GFCM is working with the Mediterranean countries to provide their required data, with the support of the working group. A standardized assessment approach applied across

the entire eel-producing countries would provide a means to address gaps in data reporting, and to examine the comparability of national estimates that are presently based on different data and analyses. The working group reviewed and tabulated the eel and anthropogenic data available from eel-producing countries. The most common data available are yellow eel densities. However, these are not available from lakes, large/deep/wide river sections and transitional waters, and since these habitats can represent the majority of the wetted area in an EMU, this will require new methods to convert catch per unit effort data to density data. The working group proposed a coordinated research program to develop this standardised / cross-calibrating assessment method.

The working group recommended the creation of a digitised data reporting database, to make the preparation of assessments more efficient, to provide a readily accessible historical archive, and to facilitate national reporting to all international fora (e.g. ICES, EU, CITES, DCF). The long-term objective of such standardization is to facilitate the creation of an international database of eel stock parameters updated annually. The working group catalogued the existing eel databases (recruitment, POSE, eel quality) and developed a structured plan for storing data within the ICES Data Portal. The working group catalogued the variety of management measures that are being implemented within the national and local Eel Management Plans. These actions were categorised as those relating to commercial fisheries; recreational fisheries; hydro-power and obstacles; habitat improvement; stocking; and, others. This catalogue is intended as a starting reference for those wishing to implement new programs of management measures.

3.2 WGBAST – Working Group on Baltic Salmon and Trout Working Group

The Baltic Salmon and Trout Assessment Working Group [WGBAST] (Chair: Tapani Pakarinen, Finland) met in Århus, Denmark, 26 March–2 April 2014. 17 persons from all Baltic Sea countries attended the meeting. The group was mandated to assess the status of salmon in Gulf of Bothnia and Main Basin (Subdivision 22–31) and Gulf of Finland (Subdivision 32) and sea trout in Subdivision 22–32, and to propose consequent management advices for fisheries in 2015. Salmon stocks in Subdivision 22–31 were assessed using Bayesian methodology, and a stock projection model was used for evaluation of the impacts of different catch options on the stocks. The fishing effort has decreased in the offshore fishing substantially in 2012–2013 and the estimated offshore exploitation was at an all-time low.

The natural smolt production of salmon populations continued to increase until 2012 but is predicted to decline somewhat from 2013. An increase is then predicted from 2015–2016, mainly as a result of the large spawning runs in 2012–2013. The current production is around 2.85 million wild smolts, which corresponds to about 70% of the overall natural potential smolt production capacity for salmon stocks. About 4.9 million salmon smolts were released to the Baltic Sea in 2013.

Post-smolt survival has declined from the late 1980s until the mid-2000s, but indications of improvement have been noticed since then. Especially the post-smolt survival of the 2010 smolt cohort seems to have been higher than average in the last years, and the current survival is estimated to be about 15% for wild and 5% for reared post-smolts. The decline in survival suppressed recovery of wild salmon stocks but the latest positive turn

in survival will probably lead many salmon stocks to recover closer to their potential smolt production capacity by 2020.

The driftnet ban in 2008 resulted in a reduction in offshore salmon catches to the lowest level recorded, but subsequent increases in the longline fishery resulted in a harvest rate in 2010 that was as high as the combined harvest rate for longlines and driftnets was in the early and mid-2000s. Since then, the harvest rate in the offshore fishery has again declined and is now at an all-time low. The harvest rate in the coastal fishery shows an overall declining trend, reaching the lowest value in 2013.

The Working Group assessed the current status by evaluating the probability that individual salmon rivers have reached 50% and 75% of the potential smolt production. Most of the large, northernmost stocks have likely or very likely reached the 50% objective, but only two rivers have likely reached the 75% objective. As a result of positive development in spawner abundances in the last two years, however, a gradual improvement in the stock status is expected for the most of the northern stocks by 2020. Southern stocks in AU4–5 and a few small northern stocks have varying and on average a poor status.

Wild salmon stocks in Gulf of Finland have shown recovery. The smolt production in the Estonian wild salmon river Keila was at the level of full capacity in 2013. A positive trend can be seen also in river Vasalemma which exceeded 50% of the potential production capacity. In the third Estonian river, the river Kunda, smolt production has varied from 10% to almost 100% of the potential capacity.

Sea trout populations are in a precarious state in the northern Gulf of Bothnia and in Gulf of Finland. Trout populations in the Main Basin area are in general in a good status, but there are indications of declining status in some areas.

3.3 WGNAS – Working Group on North Atlantic Salmon

Working Group on North Atlantic Salmon [WGNAS], ICES HQ, 19–28 March 2014, chaired by Ian Russell (UK). Number of meeting participants: 21 representing twelve countries from North America (NAC) and the Northeast Atlantic (NEAC). Information was also provided by correspondence or by WebEx link from Greenland, Faroes, Denmark, Norway and Spain for use by the Working Group.

WGNAS met to consider questions posed to ICES by the North Atlantic Salmon Conservation Organisation (NASCO) and also generic questions for regional and species Working Groups posed by ICES. The need for catch advice was dependent on the outcome of applying two indicator frameworks prior to the meeting.

- In 2012, the Working Group advised that there were no mixed-stock fishery options at West Greenland in 2012 to 2014 nor in NAC in 2012 to 2105 that would be consistent with a 75% chance or greater of simultaneously meeting the seven (for West Greenland) and six (for NAC) management objectives for 2SW salmon. The West Greenland Framework of indicators was applied in January 2014 and did not indicate the need for an updated assessment of catch options and no new management advice for this fishery was requested by NASCO.
- A Framework of Indicators (FWI) was developed for NEAC stocks in 2012 and was also applied in January 2014 in relation to the multi-annual agreement for

the Faroes fishery. This also did not indicate any need for an updated assessment of catch options and no new management advice for this fishery was requested by NASCO.

- The terms of reference were addressed by reviewing working documents prepared ahead of the meeting as well as the development of documents and text for the report during the meeting. The report is structured by sections specific to the terms of reference of the WGNAS.
- In the North Atlantic, exploitation rates have declined and nominal catch of wild Atlantic salmon in 2013 was 1296 t, the lowest in the time-series beginning in 1960.
- The Working Group reported on a range of new opportunities for salmon assessment and management (e.g. developments in setting conservation limits, recovery potential assessments, fish tracking technologies, genetic investigations) and potential threats (e.g. parasites, fish farm escapees).
- The Working Group reviewed new information on levels of bycatch of salmon in pelagic fisheries and considered possible options for further investigation of this issue. The Working Group also reviewed the stock status categories used by different organizations and jurisdictions with a view to exploring possible common approaches that might be applicable for use by NASCO.
- Three of the four NEAC stock complexes were assessed as having a greater than 95% probability of exceeding their conservation limits (CLs) and were therefore considered to be at full reproductive capacity prior to the commencement of distant water fisheries in the latest available PFA year. However, the Southern NEAC non-maturing 1SW stock was considered to be at risk of suffering reduced reproductive capacity. At a country level, stocks from several jurisdictions were below CLs.
- For the first time in the assessment time-series beginning in 1971 the midpoint of the 2SW spawners in Labrador exceeded the 2SW CL. However, this increased abundance was not realised in others areas of NAC and North American 2SW spawner estimates were below their CLs in the five other regions of NAC. Returns to southern regions (Scotia-Fundy and USA) have remained near historical lows and many populations are currently at risk of extirpation.
- There was a catch of 47 t in the fishery at Greenland in 2013. The overall abundance of salmon within the West Greenland area remains low relative to historical levels and five of the seven stock complexes exploited in the fishery are below CLs.
- Marine survival indices in the North Atlantic have improved in some index stocks in recent years, but the declining trend has persisted and survival indices remain low. Factors other than marine fisheries, acting in freshwater and in the ocean in both NAC and NEAC areas (e.g. marine mortality, fish passage, water quality) are contributing to continued low abundance of wild Atlantic salmon.

3.4 WGERAAS – Working Group on Effectiveness of Recovery Actions for Atlantic Salmon

The Working Group on the Effectiveness of Recovery Actions for Atlantic salmon [WGERAAS] had its second meeting from 12–16 May 2014 at ICES HQ in Copenhagen (Chair Denis Ensing, UK N. Ireland). WGERAAS decided to focus on the evaluation of case studies and use the river-specific database; ‘Database on Effectiveness of Recovery Actions for Atlantic salmon’ (DBERAAS) to support the case studies by providing an overview of the impact of a list of stressors and the effect of recovery actions across the species range.

At the meeting in Copenhagen an interim report was drafted (ICES, 2014b) presenting eight case studies and an analysis of a partially completed database using data from rivers that were the focus of peer-reviewed or grey literature studies of recovery or rebuilding actions. The results from the analysis showed the potential of a complete DBERAAS for analysis of population stressors, and recovery and rebuilding actions, in relation to conservation status, and the effects of recovery and rebuilding actions across varying spatial scales.

For 2015, WGERAAS aims to collect more case studies, specifically on populations impacted by stressors such as invasive species and diseases, as well as populating DBERAAS. Analysis of both DBERAAS and case studies will indicate under what conditions recovery actions are successful and when unsuccessful. Recommendations on future recovery and restoration actions for Atlantic salmon will be based on this analysis.

WGERAAS plans to meet in November 2015 and report to ICES in 2016.

4 Proposals for New SCICOM Expert Groups

WGRCORDS discussed the proposed Terms of References and meeting arrangements for existing and new EGs. The following proposals were sent forward for formal resolution by SSGEPD and SCICOM. Full details of the ToRs are given in Annex 3.

Proposed for late 2014

Under ICES, lampreys and shads are currently treated by WGBYC in the context of protected fish species. Although these species make part of Annex II in the Habitats Directive, they are also targeted by artisanal fisheries of very long tradition in several European countries. **A Workshop on Lampreys and Shads (WKLS)** was considered as an opportunity to obtain an updated view and an informed recommendation on the most adequate course of action to monitor and manage fishing activities that have an impact on these anadromous species (Annex 4). The output of this WK can be integrated in the development of a wider ICES strategy for science and advice. The Workshop met in October 2014 and the report is due shortly.

Proposed for 2015

Following the recommendations of WGEEL, two workshops on eel were proposed for 2015 (Annex 4), one facilitating collaboration between the WGEEL and the Working

Group on Biological Effects of Contaminants (**WKBECEEL**), and another planning monitoring of eel quality (**WKPGMEQ**).

In addition a further expert group has been considered and discussed, i.e. a Working Group on data poor diadromous fish (**WGDAM**). A resolution to create this EG was put forward to SCICOM in 2014 and was accepted (Annex 4). The meeting will be held in October 2015.

5 Theme Sessions 2015 & 2016

Two topics concerning diadromous species were proposed for Theme Sessions in 2015:

Resolution for Theme Session 2015

Planning the future for diadromous and other migratory fish – what can be done to respond to climate change and other processes potentially affecting natural mortality over broad geographic scales? (Details in Annex 5)

Resolution No. 2 for Theme Session 2015

Practical application of Genetic Stock Identification for the conservation, management and restoration of Diadromous fish species (Details in Annex 5)

Of these two resolutions, No. 2 was chosen as a candidate theme session for ICES ASC 2015. Resolution No. 1 will be held over and should be resubmitted for ASC in 2016.

For future (2017 and beyond) theme session topics, WGRECORDS has listed the following potential themes:

- Drug resistance in fish parasites and diseases;
- Life histories and status of rare and data-poor species, e.g. Shads, Sea Trout, Lampreys, Chars, Sturgeons etc;
- Carrying capacity and ecosystem interactions associated with mariculture

6 Proposals for Symposia

Symposia which could be proposed for Atlantic salmon or linked more broadly with Diadromous fish were discussed and it was noted that there were recommendations for an International Year of the Salmon for Pacific salmon. A previous symposium with NASCO and NPAFC in 2002 was noted and there has been good co-operation with NPAFC in joint research and workshops. It was suggested that WGRECORDS could be a good conduit between ICES and NASCO to promote this. It was recommended that more information should be sought on this initiative from SCICOM and NASCO.

7 Proposals for Publications

2012/1/SSGEF06 The report on the “**Marine Recoveries of Tags from Atlantic Salmon – from 1960s to 2012**”, edited by Niall Ó Maoiléidigh (Ireland), Lars Peter Hansen (Norway), Jan Arge Jacobsen (Faroes Islands), Ted Potter (UK) and Dave Reddin (Canada) as reviewed and approved by the Chair of the Steering Group on Ecosystem Functions, will

be published in the ICES Cooperative Research Report (CRR) series. The estimated number of pages is 100. A revised resolution was submitted in 2014 (Annex 6).

8 Future co-ordination of science on diadromous species

The meeting discussed the continuing role of WGRECORDS. It was agreed that the WG provided a very useful forum for the discussing and sharing information on the problems facing different diadromous species (particularly salmon and eel) in different areas (particularly North Atlantic and Baltic). These species face a number of problems in common, but without this co-ordination it would be much more difficult to raise their profile in ICES.

Similarly the WG provides the opportunity to co-ordinate and plan future work, often allowing a more efficient approach to be taken (e.g. the organisation of the workshop on data requirements for both salmon and eel under the DCF). It is also one of the few groups in ICES giving significant attention to issues in freshwater and ecosystem issues from mountains to the sea. It was felt that, without the WG, there would be little opportunity for these interactions within the current structures and processes of ICES. There was therefore strong support for the continuation of the WG. The WG proposed that the ToR of WGRECORDS should be rolled over unchanged and should apply to the years 2015 to 2017 (see Annex 4). The ToRs will be reviewed by ICES when the new chair (or co-chairs) of WGRECORDS are appointed at the 2014 ASC.

Other issues raised and discussed within WGRECORDS included:

- There was a desire to include more discussions on other Diadromous fish species notably those which are rare or where data are limited. The emphasis on salmon and eel was obvious but WGRECORDS needs champions for other species. Some of these are very sensitive or threatened. Better co-ordination between Diadromous scientists was identified and WGRECORDS could provide a source of information on these species for national and international management.
- In particular UK identified specific problems with shad (Alosid) species due to the creation of barrages. US also have issues regarding the migrations of American shads.
- There was a recommendation to identify scientific experts working on other Diadromous fish and see how WGRECORDS can be helpful in highlighting issues or threats. It was suggested that the status of DIADFISH be investigated as a start.
- In this regard, emphasis will be given to establishing the **Working Group on Data Poor Diadromous Fish** (WGDAM) as a priority and to developing a Theme session for 2015 and 2016.

8.1 Participation in WGEPPS session during the ASC

There was no requirement for any members of the WG to make a presentation at the WGEPPS, but the chair of WGEPPS was expected to present highlights from the work of the EGs.

9 Any other business and Close

Ongoing Marine Surveys which could provide information on Salmon

Attention was drawn to marine survey projects which could be used to collect information on salmon by-catch at sea. Leif Nottestad (chair of the survey) will be doing ongoing surveys. In particular ongoing IESSNS surveys will be routinely collecting fish samples and zooplankton data from the Norwegian in areas associated with salmon post-smolts. It might be possible to get a time-series out of this survey but there would need to be someone willing to take salmon samples, feeding info, parasites etc. Some structuring would need to be put in place but it could continue time series of sampling initiated by salse merge. Direct estimates of by-catch could not be made unless the survey methods were calibrated with commercial fishing operations but it would provide ongoing and up to date information on distribution and migration biology of salmon at sea.

The chair of WGNAS (Ian Russell) has initiated some discussions. Arrangements should be made to collect samples and the Chair of WGERAAS (Denis Ensing) agreed to act as a link for genetic material. The possibility of seeking funding through the EU Data Collection Framework was also discussed.

Studies on PIT tagged mackerel in UK and Irish waters were beginning to pick up tagged salmon also and contact had been made here by the chair of WGNAS.

Review the contents of the theme session on telemetry Theme Session R

Telemetry studies are not only expanding our knowledge of the biology of a range of marine species but are of great interest to the fisheries managers. The papers presented to Theme Session R described a number of applications of telemetry to practical management problems and the provision of results that fed directly into management actions. The wider application of these methods has potential to greatly enhance our knowledge and the management of marine resources.

It was noted that all the presentations at the Theme Sessions had been based on work undertaken in Canada or USA, and that several of these had highlighted the benefits of cooperation between research groups in order to share tag detection information obtained from different receiver arrays. Such networks have been established in a top-down fashion by such groups as the Ocean Tracking Network (OTN), but speakers also noted real advantages in establishing them in a bottom-up fashion as had been the case with the Atlantic Cooperative Telemetry network (ACT) and the Florida Atlantic Coast Telemetry network (FACT). It was felt that there were real opportunities for researchers in Europe to start applying these techniques more widely and that major benefits would be obtained from developing cooperative links between groups working on different species, including diadromous fish, sharks and marine mammals. The session was informed that this was the intention with an international salmon telemetry programme which the North Atlantic Salmon Conservation Organisation (NASCO) has recently

agreed to support with the aim of describing the migration pathways of Atlantic salmon in the sea and partitioning the marine mortality of salmon populations from different regions in space and time.

International Telemetry Project

Information was also provided on the NASCO Telemetry Workshop (Conveners – Ted Potter, UK and Tim Sheehan USA) to be held in December 2014.

International invitations had been sent out for this workshop in an attempt to encourage planning of a large scale international telemetry project to investigate bottlenecks in survival of salmon. The Workshop hoped to start the planning process and develop a partnership. It was expected that this would need to be integrated with other species and marine platforms/users and include open ocean, or expansion from mouths of rivers out to sea possibly using index rivers initially. The Workshop would be held in December 2014. .

Partnerships will be established and the plan would be brought forward to NASCO for potential support and fund raising as per SALSEA Merge. The initial meeting with technical experts would identify where to start in Europe, who should be involved. The Ocean Tracking Network (OTN) had indicated that they would offer technical support and there were some new approaches for investigation fish and other species movements further out to sea.

It was also hoped to include tracking adults or pre-adults back to the river, satellite tagging or arrays in specific rivers to investigate the probabilities of getting fish back to rivers.

Notice was given of the International fish telemetry conference in Halifax early to mid-July/ 13 to 17 July with registration in November.

The Co-chairs thanked the WG members for their active participation and support during the meeting and wished the incoming chairs all the very best in their endeavours between 2015 and 2017.

Annex 1: WGRECORDS Intersessional Meeting at NASCO, 5 June 2014, St Malo, France

N. Ó Maoiléidigh (Ireland), Ted Potter(UK, England & Wales), Jaako Erkinaro (Finland), Julian Maclean (UK Scotland), Tim Sheehan (USA), Gerald Chaput (Canada), James Orpewood (UK Scotland), Peder Fiske (Norway), Ian Russell (UK England & Wales)

Proposals for Theme Sessions, Symposia, Expert Groups

Proposal for theme session/Workshop

The meeting considered a suggested theme session proposal for the ICES ASC entitled “Comparison of climate drivers affecting salmon productivity or Diadromous fish populations” or alternatively “Understanding the common drivers and potential mechanisms of Atlantic salmon productivity declines in North America and Europe”. The idea was to bring together scientists from North America and Europe to discuss the common trends and apparent common drivers of salmon abundance/productivity on both sides of the Atlantic with a view towards linking these large scale forcing mechanisms to a common driver. The theme session would include working through ecosystems through to top predators and including climate and ecosystem changes. Temperature changes, effects on salinity, changes in phytoplankton, zoo plank, capelin, salmon would also be considered. It was also suggested to highlight recent publications which are showing new links with productivity and environment and synergies with other species.

The outcome of this theme session would have clear links to EU priorities with regard to the ecosystem approach to management of biological resources and to the International Trans-Atlantic Marine Research initiatives which are currently being developed.

Proposals for Symposia

Symposia which could be proposed for Atlantic salmon or linked more broadly with Diadromous fish were discussed and it was noted that there were recommendations for an International Year of the Salmon for Pacific salmon. A previous symposium with NASCO and NPAFC in 2002 was noted and there has been good co-operation with NPAFC in joint research and workshops. It was suggested that WGRECORDS could be a good conduit between ICES and NASCO to promote this.

Proposal for Expert Group

It was suggested that WGRECORDS could develop and propose an Expert Group on “Stock Classification” for salmon populations linked to the NASCO database of salmon rivers. This should in some way be linked to stock size and stability, rationale, and possibly broaden to refer to other indicators aside from CL. Traffic lights ideas for stocks which are “very good” “good” and “bad”. It would require some estimate of productivity for each river and it was recognised that many salmon rivers did not have such estimates and this might limit the initiative.

Proposal for Expert Group (or Theme Session)

This could either be developed as an Expert Group or a Theme Session on Genetics and Management of Diadromous Stocks for conservation purposes. It was important that recent advances in genetic assignments and mapping of stocks both in freshwater and in the marine be assimilated into a form which could be practically used by homewater resource managers, ICES and NASCO. There is a huge advance in genetic stock identification both in terms of methods and numbers of stocks with genetic baselines – some co-ordination and development of the management implications would be useful. Possibly some new stock indicators could be developed or development of examples of advice incorporating some new indicators. It was noted that there were immediate questions from NASCO to be answered regarding mixed stock fisheries in Labrador, Greenland and Faroes and some co-ordination between the WGNAS and the Working Group on the Application of Genetics in Fisheries and Mariculture (WGAGFM) would be required.

Current Theme Session Proposal from WGRECORDS for 2014 ICES Annual Science Conference

The meeting discussed the upcoming ICES ASC in A Coruna with a WGRECORDS Theme Session R on Use of Telemetry data for migratory fish.

Nomination of new chairs for WGRECORDS 2015–2017

Nomination of new chairs for ICES ASC 2014 for period 2015 to 2017 was outlined and the meeting was advised the currently the nominated chairs for the next three years of WGRECORDS would be Russell Poole (Ireland) and Johan Dannewitz (Sweden).

Annex 2: List of participants

Meetings held on 5th June in St Malo and 26th September in Á Coruna 16th and 17th September 2014

(P) – participated

Name	Address	Email	St Malo, France	Á Coruna, Spain
Gerald Chaput	Canada	gerald.chaput@dfo-mpo.gc.ca	P	
Dennis Ensing	UK(N. Ireland)			P
Jaakko Erkinaro	Finland	jaakko.erkinaro@rktl.fi	P	
Peder Fiske	Norway	peder.fiske@nina.no	P	
James Orpwood	UK(Scotland)	james.orpwood@scotland.gsi.gov.uk	P	
Julian Mac Lean	UK(Scotland)		P	
Niall Ó Maoiléidigh	Ireland	niall.omaoleidigh@marine.ie	P	P
Tapani Pakarinen	Finland	Tapani.Pakarinen@rktl.fi		P
Ted Potter	UK(England and Wales)	ted.potter@cefas.co.uk	P	P
Atso Romakkaniemi	Finland	atso.romakkaniemi@rktl.fi		P
Ian Russell	UK(England&Wales)	ian.russell@cefas.co.uk	P	P
Tim Sheehan	USA	tim.sheehan@noaa.gov	P	
Henrik Sparholt	ICES	Henrik@ices.dk		P

Annex 3: WGRECORDS Agenda September 2014

Chair: Niall Ó Maoiléidigh (Ireland), Atso Romakkaniemi (Finland)

Tuesday 16th September 1030 – 1300 (Modular room 9)

Wednesday 17th September 1030 – 13:00 (Bitacora room)

Welcome and introductions

Adoption of Agenda and Appointment of Rapporteur

Report of informal meeting of WGRECORDS NASCO, St Malo, June 2014

Review of current Expert Groups on diadromous species:

- WGEEL - Joint EIFAC/ICES Working Group on Eel (Chair: Alan Walker, UK)
- WGBAST - Working Group on Baltic Salmon and Trout Working Group (Chair: Tapani Pakarinen, Finland)
- WGNAS - Working Group on North Atlantic Salmon (Chair: Ian Russell, UK)
- WGERAAS – Working Group on Effectiveness of Recovery Actions for Atlantic Salmon (Chair: Denis Ensing, UK)
- WKTRUTTA - Workshop on Sea trout (Chairs: Stig Pedersen, Denmark and Nigel Milner UK)
- New proposed and accepted after ASC in 2013 WKLS - Workshop on Lampreys and Shads

Proposals for New SCICOM Expert Groups

- Working Group on data poor diadromous fish (WGDAM)
- Possible Working Group to explore the underlying reasons for downward trend and variation in post-smolt survival taking into account prey and predator effects and other factors affecting survival during the post-smolt migration. Exchange of information with groups studying salmon survival at sea is needed (WGNAS, WGBAST etc).
- Working Group on Stock Classification for salmon populations linked to the NASCO database of salmon rivers.
- Proposal for Expert Group or Theme Session on Genetics and Management of Diadromous Stocks for conservation purposes

Theme Sessions 2015 & 2016

Suggested Theme Session

"Understanding the common drivers and potential mechanisms of Atlantic salmon productivity declines in North America and Europe".

Carry over Proposals for New Theme Sessions from WGRECORDS meeting in Reykjavik, 2013.

Proposals for Symposia

WGRECORDS role in ICES in the light of the new Science Plan

- Future co-ordination of science on diadromous species in new Science plan.
- Participation in SSGEPD session during the ASC.

Election of the new chairmen for WGRECORDS, years 2015–2017

Any other business

Annex 4: Working group meeting draft resolutions – Expert Groups

2015/SSGEPD The Working Group on the Science Requirements to Support Conservation, Restoration and Management of Diadromous Species (WGRECORDS), co-chaired by Russell Poole (Ireland) and Johannes Dannewitz (Sweden) meet by correspondence and annually at that ICES ASCs in September 2015, 2016 and 2017:

WGRECORDS will report on the activities of 2015 to SSGEPD by December 2015.

ToR descriptors

ToR	DESCRIPTION	BACKGROUND	SCIENCE PLAN	DURATION	EXPECTED DELIVERABLES
			TOPICS ADDRESSED		
a	Stimulate international scientific co-operation in the study of diadromous fish species and provide a mechanism through which issues relating to these species, including in estuarine and fresh waters, can be addressed and coordinated within the ICES science plan;	There were many topics within the previous ICES Science Plan that are very relevant to the research on diadromous fish species currently being undertaken or planned. While not as clearly defined in the new science plan, there is still a need to be able to draw the various elements of ICES work together to support the management advice provided on diadromous fish, particularly in delivering commitments under various regulations, including the EU-Habitats and Water Framework Directives and the EU Eel Regulation	121-123, 131,133, 141-147, 311-314, 335,336	1,2 and 3	Report of WG and establish and maintain a network of diadromous fish experts
b	Propose activities, including experts groups, theme sessions and symposia, to support the Science Plan and the work of ACOM Experts Groups on diadromous species and review their outputs;	ICES is well placed to co-ordinate scientific activities which generate up to date information on the biology of these species, the threats to their status and advice on measure to be taken to restore and rebuild	131,133, 151,152, 154, 232,233	1,2 and 3	Organise theme sessions, symposia or expert groups. Co-ordinate feedback from these sources for use in publications and CRR documents

		depleted populations.			
c	Assist SSGEPD to integrate these activities with those of other Expert Groups reporting to SSGEPD. WGRECORDS will report annually by 31 December (via SSGEPD) for the attention of SSGEPD and SCI-COM.	Issues relating to rare and data poor species are widely dispersed across the ICES Science plan. This group provides a focal point for reporting new developments and concerns regarding diadromous fish in particular back to ICES via the SSGEF.	111 to 114, 211- 214	1,2, and 3	Keep ICES abreast of important issues relating to Diadromous fish species and ensure these issues are communicated to other EGs and SGs.

Summary of the Work Plan

Year 1	Co-ordinate scientific activities (theme sessions, symposia, EGS, CRRs and report to SSGEPD)
Year 2	Co-ordinate scientific activities (theme sessions, symposia, EGS, CRRs and report to SSGEPD)
Year 3	Co-ordinate scientific activities (theme sessions, symposia, EGS, CRRs and report to SSGEPD)

Supporting information

Priority	The Working Group will provide the mechanism to coordinate scientific activities relating to diadromous fish species in support of the ICES Science Plan. It will also permit ICES to respond fully to request from NASCO and the EU/FAO/IUCN/CITES for scientific advice on research needs and data deficiencies in these areas.
Resource requirements	Meeting facilities at the ASC in 2015-2017
Participants	National representatives and other invited experts working on diadromous fisheries
Secretariat facilities	Secretarial support for organisation of the meeting and preparation of the report.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	The proposal originates from SSGEPD but will have direct significance to ACOM for advice from WGNAS, WGBAST, WGEEL in particular
Linkages to other committees or groups	There are linkages with SCICOM and all Expert Groups working on issues relating to diadromous species in relation to improving scientific understanding of salmon and coordinating scientific activities.
Linkages to other organizations	NASCO, FAO

2012/2/SSGEF03 A Working Group on Effectiveness of Recovery Actions for Atlantic Salmon [WGERAAS] (Chair: Dennis Ensing, UK (Northern Ireland)) will be established and meet at ICES Headquarters, Copenhagen, Denmark, 12-16 May 2014, to work on ToRs and generate deliverables as listed in the Table below.

The Working Group on North Atlantic Salmon noted that factors other than fishing are currently constraining and, in some areas, threatening with extirpation, populations of Atlantic salmon throughout the North Atlantic. Factors acting in both the freshwater and marine environment are of concern. A review of successes and failures in wild salmon

restoration could lead to a classification of activities which could be recommended under various conditions or threats to the persistence of populations. Such a classification would be of benefit to management tasked with rebuilding and restoration actions.

WGERAAS will report initially on the activities of 2014 (Year 2) by 30 June 2014 to WGNAS, WGRECORDS, WGBAST and SSGEF.

ToR descriptors

DESCRIPTION	BACKGROUND	SCIENCE PLAN TOPICS ADDRESSED	DURATION	EXPECTED DELIVERABLES
This should capture the objectives of the ToR	Provide very brief justification, e.g. advisory need, links to Science Plan and other WGs	Use codes	1, 2 or 3 years	Specify what is to be provided, when and to whom
a) develop a classification system for recovery / re-building programs for Atlantic salmon, including threats to populations, population status, life history attributes, actions taken to re-build populations, program goals, and metrics for evaluating the success of re-building programs;	Advisory Requirements Rebuilding of salmon stocks is central to international management objectives (NASCO) for increasing salmon stocks to a point where sustainable fisheries can take place. Links to ACOM/WGNAS	344,345,346	Year 1	Review paper and interim report to WGNAS
b) populate the system by collecting data on recovery / re-building programs for Atlantic salmon populations from around the North Atlantic;	No systematic review of recovery programmes for salmon stocks has been carried out to date. This information will inform on best practice for rehabilitation.	232, 233	Year 1 and 2	Report with response to NASCO ToRs for WGNAS
c) summarize the resulting data set to determine the conditions under which various recovery / re-building actions are successful and when they are not;	No systematic review of recovery programmes for salmon stocks has been carried out to date. This information will inform on best practice for rehabilitation.	311,312,	Year 1 and 2	Report with response to NASCO ToRs for WGNAS

d) provide recommendations on appropriate recovery / rebuilding actions for Atlantic salmon given threats to populations, status and life history.	Definitive recommendations can be built in to catch advice and advice on salmon management generally from ICES to NASCO.	313,314	Year 1 and 2	Report with response to NASCO ToRs for WGNAS Suggestions for Theme session arising with links to activities in North America and Pacific for 2015 ASC
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Summary of the Work Plan

Year 1	Provide a report outlining progress towards meeting the ToRs and any significant findings regarding the current strategies for rebuilding salmon stocks – this report to be available to WGNAS in April 2013
Year 2	Complete a comprehensive review of stock rebuilding practices noting success and failures and provide guidance on best practice for salmon stocks at different levels of conservation limit attainment
Year 3	Not required

Supporting information

Priority	NASCO has requested that ICES provide a review of examples of successes and failures in wild salmon restoration and rehabilitation and develop a classification of activities which could be recommended under various conditions or threats to the persistence of populations; and that this classification information on best solutions for fish passage and associated mitigation efforts with examples of practices in member countries.
Resource requirements	None other than the usual ICES secretarial support and co-ordination to produce the report
Participants	Members of the WGNAS, WGBAST, WGAGFM, WGRECORDS, invited experts
Secretariat facilities	None.
Financial	No financial implications.
Linkages to ACOM and groups under ACOM	The Study Group will have direct significance to ACOM in supporting the provision of advice, via WGNAS, to NASCO
Linkages to other committees or groups	WGNAS, WGBAST, WGAGFM, WGRECORDS
Linkages to other organizations	NASCO

The **Workshop on Lampreys and Shads (WKLS)**, co-chaired by Pedro Raposo de Almeida, Portugal, and Eric Rochard, France, will be established and will meet in Lisboa, Portugal, for 3 days in October 2014 to:

- a) Summarize existing knowledge on species distribution, population delimitation and dynamics of lampreys and shads in the north Atlantic and highlight main conservation concerns;
- b) Review current state of habitat recovery and conservation efforts relevant for these species;
- c) Describe causes of lamprey and shad mortality (both target and incidental) across the north Atlantic (including characterization of target fisheries during the spawning migration) and the level of monitoring data available to support management decisions;
- d) Propose future directions for the sustainable exploitation of these resources and the recovery of populations and habitats, as well as the most adequate representation of this theme within the ICES framework.

WKLS will report by December (?) 2014 for the attention of WGRECORDS.

Supporting information

Priority	<p>Under ICES, lampreys and shads are currently treated by WGBYC in the context of protected fish species. Although these species make part of Annex II in the Habitats Directive, they are also targeted by artisanal fisheries of very long tradition in several European countries, while there exists a group of scientists in both sides of the Atlantic with dedicated research and conservation action that is unrelated to the main thematic areas of WGBYC. A workshop on this theme (under WGRECORDS) is a timely opportunity to obtain an updated view and an informed recommendation on the most adequate course of action to monitor and manage fishing activities that have an impact on these anadromous species. The output of this WK can be integrated in the development of a wider ICES strategy for science and advice related to diadromous species that is currently stimulated by WGRECORDS.</p>
Scientific justification	<p>Term of Reference a)</p> <p>Several countries are conducting studies in this area and the subject would benefit from a compilation and critical review of existing knowledge. Although across most North Atlantic lampreys and shads are under some conservation concern, in America the land-locked form of sea lamprey is a pest, with implementation of aggressive management plans for population control.</p> <p>Term of Reference b)</p> <p>Riverine habitat recovery plans have been in place in several European countries and there exist success stories that have permitted recolonization of spawning habitat for migrating lampreys and shads. Information on such plans is scattered and has never been adequately integrated in the monitoring and management advice for these species</p> <p>Term of Reference c)</p> <p>Lampreys and shads form the target of dedicated artisanal fisheries in several European countries, mainly during their riverine migration for spawning. Although adequate monitoring data on these fisheries are only available in few systems and generic DCF data from marine fisheries provide limited information, monitoring of habitat recovery plans can provide a valuable additional insight tha</p>

	can improve management advice. Term of Reference d) There exists a group of scientists with dedicated research and conservation action on lampreys and shads that is unrelated to the main thematic areas of WGBYC. This ToR will provide an informed recommendation to ICES (via WGRECORDS) on the most adequate course of action to balance exploitation and conservation concerns and provide management advice for these anadromous species.
Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	The Group will be attended by 20–25 members and guests of several European countries and (eventually) USA.
Secretariat facilities	None.
Financial	No financial implications.
Linkages to advisory committees	The Workshop will report to WGRECORDS.
Linkages to other committees or groups	None.
Linkages to other organizations	None.

Joint Workshop of the Working Group on Eel and the Working Group on Biological Effects of Contaminants (WKBECEEL) will be established under the subject “Are contaminants in eels contributing to their decline?” WKBECEEL will be chaired by Caroline Durif, Norway, and Bjørn Einar Grøsvik, Norway, and will meet in January/ February 2016 (location and dates to be determined) to:

- a) To describe the spatial and temporal trends in concentrations of “traditional” and/or “emerging” contaminants in eel (but mainly refer to figures available from WGEEL 2008-2013).
- b) To describe the potential impacts of contaminants on reproduction in the European eel, based on science of eel and what can be learned from other species models (including endocrine disruption, effect on sex ratio, maternal transfer of bioaccumulated contaminants toward the eggs and effects on the larvae).
- c) To describe the potential impacts of contaminants on lipid metabolism and migration in the European eel based on eel science and what can be learned from other species
- d) To review the impacts of contaminants on the genetics of the European eel.
- e) To explore whether there is experience with assessing/qualifying the bioaccumulation + fitness status in other species, which can be helpful for the eel’s quality assessment (Eel Quality Index) and to quantify the impact of eel quality.

WKBCEEL will report by DATE for the attention of WGEEL, WGRECORDS and SCICOM.

Supporting information

Priority	<p>During previous meetings WGEEL (2008-2013) made considerable progress in understanding and describing the potential impact of contaminants on the European eel stock.</p> <p>During the last sessions WGEEL 2012 and WGEEL 2013 indicated that the WG would clearly benefit from a joint cooperation with experts from other ICES WGs, and specifically WGBEC. The experience and knowledge concerning the effect of contaminants in other species, as present within WGBEC, is anticipated to be very beneficial to make further progress in understanding the role of contaminants in the eel stock decline.</p>
Scientific justification	<p>The stock of the European eel <i>Anguilla anguilla</i> is in decline and there is an increasing awareness that poor health status due to contaminants might be a key element in this decline and might be a hindrance to recovery. Several studies have recently been initiated to study the degree and the effects of pollution on the eel, resulting in an increasing quantity of information that demonstrates the negative impact of pollution on eel.</p> <p>These advances in the science of the effects of contaminants on the eel have been reviewed recently (e.g. Geeraerts <i>et al.</i>, 2010; by Elie and Gerard, 2009, and WGEEL 2008-2012). However, essential issues to assess the importance of eel quality for reproductive success, such as to evaluate the effect of specific contaminants on the ability for eel to migrate and to reproduce have still to be developed. The joint workshop will review all sources of information (including work on other species) to better understand how contaminants in eels contribute to their decline.</p>
Resource requirements	
Participants	WGEEL and WGBEC Working Group Participants, and other experts. The Workshop is anticipated to be attended by some 15-20 members and guests.
Secretariat facilities	Sharepoint
Financial	
Linkages to advisory committees	WGEEL, WGBEC and ACOM
Linkages to other committees or groups	WGRECORDS, SSGEF, SCICOM
Linkages to other organizations	FAO EIFAAC, GFCM, EU DG MARE, EU DG ENV

Workshop of a Planning Group on the Monitoring of Eel Quality under the subject “Development of standardized and harmonized protocols for the estimation of eel quality.”

(WKPGMEQ) will be established and chaired by Claude Belpaire (Belgium) and Olga Haenen (The Netherlands), on contaminants, and on eel diseases respectively, and will meet in Brussels, Belgium, 20-22 January 2015 to:

- a) design standardized and harmonized protocols for the estimation of eel quality with regard to the bioaccumulation of contaminants (including sampling, analysis and reporting).
- b) design standardized and harmonized protocols for the estimation of eel quality with regard to diseases (including sampling, analysis and reporting).

WKPGMEQ will report by 28 February 2015 for the attention of the WGEEL, WGRECORDS, SSGEF and SCICOM

Supporting information

Priority	<p>WGEEL 2012 stated that to improve the assessment of the impact of contaminants and diseases on effective spawner biomass and reproductive success, national routine monitoring programmes are urgently required. The Eel Regulation does not refer to the health status of the population of European eel or possible impacts on the population due to contamination and diseases. Hence, regular monitoring programmes for eel are neither run nor reported to the EU. WGEEL 2012 recommended that Member States implement routine monitoring of lipid levels, contamination and diseases, but also identified the need to develop standardized and harmonized protocols for the estimation of eel quality, so that national data would be comparable and could be reliably incorporated in international stock assessments.</p> <p>In 2015 WGEEL will organize a Workshop of a Planning Group on the Monitoring of Eel Quality, in order design standardized and harmonized monitoring protocols, to facilitate the integration of eel quality parameters in quantitative assessment of the reproductive potential of the stock.</p>
Scientific justification	<p>Reliable assessment of the eel stock quality and its quantitative effect on the reproductive stock is currently not possible, due to insufficient spatial and temporal coverage. WGEEL(2009) emphasized the need to establish a comprehensive overview with improved spatial coverage of the quality of the eel population across Europe as an essential and urgent requirement. Many countries have started compiling data on the health status of eels in their water bodies. Objectives for these monitoring actions are diverse and there is large amount of information collected by EU member countries. However, procedures with respect to sampling, analysis and reporting are not harmonised, jeopardising stock wide assessments and risking inefficient deployment of resources. Understanding of the reproductive potential of the international spawning stock is a key component to predicting the effects on stock recovery of changes to silver eel escapement arising from management actions implemented within Eel Management Plans.</p>
Resource requirements	None other than financial, see below. The host institution will provide meeting facilities.
Participants	WGEEL Participants, other experts/representatives from member states
Secretariat facilities	Sharepoint
Financial	Support is requested to cover the travel and subsistence costs of those attending the workshop.
Linkages to advisory committees	WGEEL and ACOM
Linkages to other committees or groups	WGRECORDS, SCICOM, Eel diseases group EAFP
Linkages to other organizations	FAO EIFAAC, GFCM, EU DG MARE, EU DG ENV

A **Working Group on Data Poor Diadromous Fish** (WGDAM), chaired by Karen Wilson, United States, and Lari Veneranta, Finland, will meet in Copenhagen, Denmark, 12–16 October 2015 to work on ToRs and generate deliverables as listed in the Table below.

WGDAM will report on the activities of 2015 (the first year) by January 2016 to WGRECORDS.

Subsequent meetings will be held alternately in North America and Europe (venues to be decided).

ToR descriptors

ToR	DESCRIPTION	BACKGROUND	SCIENCE PLAN TOPICS ADDRESSED	DURATION	EXPECTED DELIVERABLES
a	Update the status & distribution of poorly understood diadromous fish species	a) Science Requirements More scientific information required	121-123,	1 years	Review paper/report Map of change since 2005
b	Identify biological knowledge gaps and their importance for key diadromous species.	a) Science Requirements More scientific information required b) Advisory Requirements Better informed advice required	121-123,	1 years	Review paper/report Map of change since 2005 with emphasis on most vulnerable/data poor.
c	Recommend species and approaches for systematic monitoring of key diadromous species	a) Science Requirements More scientific information required b) Advisory Requirements Better informed advice required	121-123,	2 years	Identification of current monitoring activities. Recommendations for monitoring and evaluation, including periodicity and species
d	Identify key stressors on diadromous species & recommend restoration strategies	b) Advisory Requirements Better informed advice required c) Requirements from other EGs Impacts from climate and anthropogenic sources poorly understood	111-114, 121-123, 141-147, 151-154, 223, 231-233, 334, 344-346	2 years	Produce a database of common and significant threats by species (or link to and update existing DIADFISH database), describe current mitigation actions and recommend subsequent actions

e	Develop stock assessment Methodologies for key species of interest for which assessments are currently no available or difficult	b) advisory requirements	121-123,	3 yrs	Provide guidance on appropriate assessments and example of possible assessments for diadromous fish other than salmon and eel
f	Synthesise an Ecosystem Approach for Diadromous fish consistent with ICES Strategy	c) science and advisory requirements relating to environmental drivers	121-123,	3 yrs	Produce a Working paper to bring issues relating to diadromous fish under a common umbrella relating to the EAM and IEAs. Produce an

Summary of the Work Plan

Year 1	Report of status of Diadromous fish (update from 2005) with exchange of knowledge with North American investigators. Template of status of individual species relating to most recent investigations. Update database of information on diadromous fish based on DIADFISH initiative.
Year 2	Provide an overview of monitoring for diadromous fish species and recommendations for monitoring in future years. Produce a template of threats and effective mitigation measures.
Year 3	Progress assessments methods and approaches for diadromous fish other than eel and salmon Progress incorporation of diadromous into the Ecosystem Approach to be consistent with ICES Strategy

Supporting information

Priority	<p>In 2005 the ICES Diadromous Fish Committee (SGSDFS) published a report on diadromous fish species (ICES CM 2005/I:02 Ref. ACFM, ACE, G) to report on the status and distribution of these poorly understood species. Since the 2005 report, there have been increasing legal drivers to protect and restore these species mainly for biodiversity reasons. This has further highlighted knowledge gaps in the biology of these species, but has also been restrained by social barriers in explaining the biological function and importance of these species in the wider ecosystem. Meanwhile, pressure from development in freshwater, transitional and marine zones continues to threaten the life cycle of these species.</p> <p>A Workshop on Shads and Lampreys proposed by WGRECORDS will meet in November 2014 to provide information relating to shads and lampreys. The outputs from this workshop will be used by the WGDAM to progress their ToRs.</p>
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Resource requirements	The research programmes which provide the main input to this group are already underway, and resources are already committed. The additional resource required to undertake additional activities in the framework of this group is negligible.
Participants	Experts on diadromous fish from North America, Europe (including Scandinavia and Russian Federation).
Secretariat facilities	Support for meetings and report writing. WGRECORDS sharepoint can be used for communications
Financial	None
Linkages to ACOM and groups under ACOM	Links to ACOM . Although species in question not subject to fisheries per se, there may be some bycatch issues in existing commercial fisheries
Linkages to other committees or groups	Proposed by WGRECORDS, links to WGAQUA, Workshop on Shads and Lampreys
Linkages to other organizations	IUCN

Annex 5: Proposed Resolutions for Theme Sessions 2015 and 2016

Resolution for Theme Session 2015

Planning the future for diadromous and other migratory fish – what can be done to respond to climate change and other processes potentially affecting natural mortality over broad geographic scales?

Proposer's Name : Niall Ó Maoiléidigh

Proposer's Institute (and contact details) * Marine Institute, Newport, Co Mayo

Proposer's Email * Niall.omaileidigh@marine.ie

Proposer's Telephone * 00353 98 42314

Short Title * Planning the future for diadromous and other migratory fish – what can be done to respond to climate change and other processes potentially affecting natural mortality over broad geographic scales ?

Name and email of theme session convener 1 * Jonathan White, jonathan.white@marine.ie

Name and email of theme session convener 2 * Tim Sheehan, 'Tim.Sheehan@noaa.gov'

Description * Over the last three decades there has been widespread warming of the sea surface temperature of the North-East Atlantic, affecting all widely migrating fish and including areas of importance to migrating fish including diadromous fish. This shift to a warmer regime has been accompanied, for example, by marked changes in the distribution, abundance and quality of the prey of these fish. Furthermore, higher temperatures in freshwater have affected growth rates, age at migration and timing of migration to sea for Atlantic salmon and probably other anadromous fish at a time when ocean conditions may be less favourable for their growth and survival. Thus, it is not just the direct effects of changes at sea, but factors operating in freshwater may also ultimately manifest themselves as increases in marine mortality.

Further changes in the climate of the North Atlantic are anticipated, but predictions of the nature and extent of these changes are uncertain as are their consequences for species which use large areas of the ocean during for migration. These uncertainties pose challenges for scientists and managers in understanding how fish will adapt to the new and uncertain conditions associated with a changing climate.

The theme session will invite contributions covering:

- Prediction of changes in species migrations, distributions which may affect the quality or quantity of these animals.
- Options for management under different predictive scenarios, recognizing that options for diadromous fish in the ocean are limited i.e. management options to maximise the number of

animals leaving freshwaters by focusing management actions on impact factors in fresh, estuarine and coastal waters.

- Common trends and apparent common drivers of stock abundance/productivity on both sides of the Atlantic with a view towards linking these large scale forcing mechanisms to a common driver and improving predictability in forecasting stocks for management and conservation.

Expected participation – Scientists and managers involved in stock conservation of Diadromous fish

Linkages to ICES Strategic Plan: Strongly linked to Goals 1, 2 and 3. In particular (Goal 3 Supporting activities 1) providing recurrent advice on fisheries and environmental issues in various areas of the North Atlantic and adjacent seas, such as the provision of advice on multi-annual fisheries management plans, and spatial management needs. Whenever possible, the biological, environmental, and social and economic consequences of alternative management scenarios will be presented; (Goal 3 Supporting Activities 1) responding to the evolving policy context and to non-recurring special requests on fisheries, aquaculture, and environmental issues, such as the provision of precautionary and MSY-consistent advice, advice on mixed fisheries taking account of biological interactions, advice on aquaculture–environmental interactions, and advice on implementation of environmental directives; (Goal 3 Supporting Activities 3) promoting the use and delivery of integrated advice in an ecosystem-based approach to fisheries and environmental management, such as integrated ecosystem assessments, providing guidance on how to maintain or improve good environmental status, and advice on ecosystem health and productivity that considers drivers such as climate change and various maritime activities;

Linkages to ICES Steering Groups and/or Advisory Committee (if relevant): SSGEPD and SSGEPI and ACOM

Linkages to ICES Strategic Initiatives and/or ICES action areas on Aquaculture and the Arctic: Some linkages to SICCME.

Resolution for Theme Session 2016

Practical application of Genetic Stock Identification for the conservation, management and restoration of Diadromous fish species

Proposer's Name : * Atso Romakkaniemi

Proposer's Institute (and contact details) * Finnish Game and Fisheries Research Institute

Proposer's Email * atso.romakkaniemi@rktl.fi

Proposer's Telephone * +358 400 186 364

Short Title *

Practical application of Genetic Stock Identification for the conservation, management and restoration

of Diadromous fish species

Name and email of theme session convener 1 Dennis Ensing, dennis.ensing@afbini.gov.uk

Name and email of theme session convener 2 Philip McGinnity, University College Cork, Ireland, P.McGinnity@ucc.ie

Description *

Genetic Stock Identification (GSI) is applied widely to salmon and other Diadromous fish populations. Current applications include identification of contributing stocks to mixed stock salmon fisheries particularly in the high seas where stocks from Europe and North America mix and where international management is required and where ICES provides advice to the North Atlantic salmon Conservation Organisation (NASCO). There is a need to assimilate the outputs from GSI studies into a form usable to managers of diadromous fish resources both nationally and also for provision of advice to ICES, NASCO, EIFAAC etc. There has been a significant advance in genetic stock identification both in terms of methods and numbers of stocks with genetic baselines. The distribution and migrations of salmon post smolts has now been described using GSI from the SALSEA Merge and SALSEA North America studies between 2009 and 2011. The Kolarctic Project (a joint GSI study on salmon from Scandinavia and Russia) is complete and the implication for mixed stock fisheries are being explored.

Some co-ordination and synthesis of the management implications is now being sought by managers, scientists and conservation organisations and this will require an overview of GSI studies with implications for management of stocks. It is also important that the limitations of GSI probability assignments are understood in applied assessments.

Finally, both biodiversity and stock productivity are important components for identifying the conservation status of stocks but are not well integrated into practical management assessments or advice particularly for rare, marginal or poorly known diadromous and other migratory fish.

The session would invite contributions which would include examples of GSI studies integrated with:

- Management advice and policy decisions including EU and other Directives
- Management of mixed stock fisheries
- Application to restocking or enhancement/restoration projects
- Biodiversity of marginal, rare and sensitive species conservation (shads, lampreys, charr, coregonids etc).
- Cause of changes in populations and stock composition over longer time periods from archival tissue samples.
- Population bottlenecks and population viability.
- Compensatory programmes and live gene banking for long term management of critically endangered stocks.
- Single Nucleotide Polymorphism genetic markers (SNPs) and improving analytical resolution to finer geographical scales and stock discrimination.

Expected participation – Scientists and managers involved in stock conservation of Diadromous fish

Linkages to ICES Strategic Plan: Strongly linked to Goals 1, 2 and 3.

Particularly (Goal 2 Supporting Activities) providing recurrent advice on fisheries and environmental issues in various areas of the North Atlantic and adjacent seas, such as the provision of advice on multi-annual fisheries management plans, and spatial management needs. Whenever possible, the biological, environmental, and social and economic consequences of alternative management scenarios will be presented; and (Goal 3 Supporting Activities) responding to the evolving policy context and to non-recurring special requests on fisheries, aquaculture, and environmental issues, such as the provision of precautionary and MSY-consistent advice, advice on mixed fisheries taking account of biological interactions, advice on aquaculture–environmental interactions, and advice on implementation of environmental directives;

Linkages to ICES Steerings Groups and/or Advisory Committee (if relevant): SSGEPD and SSGEPI and ACOM.

Linkages to ICES Strategic Initiatives and/or ICES action areas on Aquaculture and the Arctic: Some linkages to SIBAS.

Annex 6: Resolution for publication in ICES CRR series

Resolution for an ICES Internal Publication (Category 1)

The report on the “Marine Recoveries of Tags from Atlantic Salmon – from 1960s to present” edited by Niall Ó Maoiléidigh (Ireland), Lars Peter Hansen (Norway), Jan Arge Jacobsen (Faroes Islands), Ted Potter (UK), Dave Reddin (Canada) and Jonathan White (Ireland) as reviewed and approved by the Chair of the Steering Group on Ecosystem Functions, will be published in the ICES Cooperative Research Report (CRR) series. The estimated number of pages is 100.

This resolution was originally passed in 2012, but the original deadline (November 2014) will not be met. This resubmission is to allow additional analyses to be included and to finalise the report. The Working Group WKSTAR agrees to submit the final draft of the proposed publication by 31st December 2015.

Supporting information

Priority:	There has been a persistent decline in survival of Atlantic salmon at sea over the past three decades. Despite closures of many significant fisheries and other restrictive management actions, this decline has not been halted. Several initiatives have been taken by NASCO and ICES to improve knowledge about the distribution and migration of salmon at sea, which in turn may help to understand mortality of salmon during their marine phase. In home waters, salmon smolt tagging programmes have been conducted over many years, resulting in large numbers of tags being recaptured in the oceanic fisheries. There have also been adult salmon tagging programmes at sea, both at Greenland and in the Norwegian Sea. There is a large scientific resource which needs to be made available for investigations into these declines in salmon populations on both sides of the Atlantic.
Scientific justification:	<p>The Report of the Workshop on the Development and Use Of Historical Salmon Tagging Information From Oceanic Areas (WKDUHSTI) presented the first results from analyses of historical data on salmon at sea, and proposed a number of recommendations for further work (ICES 2007). This was followed up by a Workshop on Salmon Historical Information – New Investigations from old Tagging Data (WKSHINI) which made significant further progress (ICES 2008). A third Workshop on the use of historical information (WKLUSTRE) provided additional information on the distribution of salmon at sea and some exploratory analyses were carried out. In 2011 an EU project (SALSEA MERGE) was completed and the scientific output from this project was published in a special issue of the ICES JMS in 2012 relating to the ecology and migration of salmon at sea including i.e.</p> <p>Jacobsen, J.A., Hansen, L.P., Bakkestuen, V., Halvorsen, R., Reddin, D.G., White, J., O’ Maoileidigh, N., Russell, I., Potter, E.C.E., Fowler, M., Smith, G.W., Mork, K.A., Isaksson, A., Oskarsson, S., Karlsson, L. & Pedersen, S. (2012) Distribution by origin and sea age of Atlantic salmon (<i>Salmo salar</i>) in the sea around the Faroe Islands based on analysis of historical tag recoveries. ICES Journal of Marine Science, 69</p> <p>And</p> <p>Reddin D.G., Hansen, L.P., Bakkestuen, V., Russell, I., White, J., Potter, E. C. E., Dempson, J.B., Sheehan, T.F., O’ Maoileidigh, N., Smith, G.W., Isaksson, A., Jacobsen, J.A., Fowler, M., Mork, K.A. and Amiro, P. (2012) Distribution and biological characteristics of Atlantic salmon (<i>Salmo salar</i>) at Greenland based on the analysis of historical tag recoveries. ICES Journal of Marine</p>

	Science, 69.
	<p>The final ICES Workshop (The Workshop on Salmon Tagging Archive , WKSTAR) worked by correspondence in 2010/2011 and met at ICES Headquarters, Copenhagen, Denmark, 19–21 June 2012 to :</p> <ol style="list-style-type: none"> 1. Complete the compilation and checking of the historical salmon tag recovery information from distant waters collated by WKDUHSTI, WKSHINI and WKLUSTRE for archiving in the ICES Data Centre; 2. Develop an appropriate database structure to facilitate the storage of archival tag recovery data which is consistent with ICES Data Centre requirements; 3. Complete the preparation of a draft report (for submission as a Co-operative Research Report, to document and describe the historic data sets).
Resource requirements:	The material in the report is fairly straightforward, and therefore no specific additional costs are necessary.
Participants:	The editors of the document have agreed to participate in the final write-up.
Secretariat facilities:	About one month of the services of Secretariat Professional and General Staff will be required.
Financial:	Cost of production and publication of a 100-page CRR/TIMES.
Linkages to advisory committees:	This product has been endorsed by SGEF, WGRECORDS, WGNAS and ACOM.
Linkages to other committees or groups:	WGNAS, WGRECORDS, SGEF.
Linkages to other organizations:	Very strong link to NASCO

Annex 7: Report of Theme Session R (ASC 2014): Analytical approaches to using telemetry data to assess marine survival of diadromous and other migratory fish species

Conveners: Niall Ó Maoiléidigh, Ireland (niall.omaileidigh@marine.ie) and Ted Potter, UK (ted.potter@cefas.co.uk)

A wide range of conventional tagging methods has been used to study the behaviour and survival of fish in the sea in the past, but these approaches are constrained by the need to recapture the marked fish, generally in existing fisheries, and each tagged fish provides only a single recapture event (with time, location and biological data) or very little information at all (if it is not recaptured). Telemetry potentially provides far more information on each tagged fish, and radio and acoustic transmitters are now available that are small enough to be attached to fish of less than 10cm (e.g. the size of salmon smolts) and will transmit for several weeks; larger fish can be tagged with transmitters that will operate for well over a year. Coded tags are now widely used so that large numbers of fish can be individually identified and tags can also transmit information on water depth, temperature and other environmental parameters. Furthermore costs, while still relatively high, have reduced to a level that makes it feasible to tag quite large numbers of individuals. This has led to a rapid expansion in the application of telemetry techniques ranging from localised studies of the behaviour of fish in relation to specific problems (e.g. dams) to extensive coastal and ocean investigations of the distribution and behaviour of fish populations. Theme Session R focused particularly on approaches for estimating mortality of fish using electronic tags.

The six papers presented to the session addressed both localised and large scale telemetry studies. In the first category, researchers have used direct observations or changes in behaviour to indicate when individual bluefin tuna (*Thunnus thynnus*) had died following catch and release (paper R:03) and when sockeye salmon smolts (*Onchorhynchus nerka*) had been consumed by a predator (paper R:04). The predation studies were enhanced by simultaneous 2D tracking of both the prey and predators and have shown different behaviour being exhibited by different predator species (e.g. smallmouth bass (*Micropterus dolomieu*) and striped bass (*Morone saxatilis*) and possible avoidance behaviour being exhibited by the salmon smolts (paper R:04). Several presentations indicated that rules could be applied to the tracks of tagged fish to identify when they had been consumed by predators, but more reliable data can now be provided by a 'predation tag', which has a digestible fuse that causes it to transmit a modified signal after it had been ingested by a predator (paper R:04). Tracking of individual fish with depth recording tags can also indicate their potential vulnerability to marine developments such as tidal stream generating turbines, as illustrated by a study of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Midas Passage in the Bay of Fundy (paper R:03).

In the second category of telemetry studies, papers were presented on the behaviour and population structuring of striped bass around New York Harbour and Hudson Bay (paper R:06) and snook (*Centropomus undecimalis*) along the coast of Florida (paper R:07), and the use of telemetry to estimate the mortality of Atlantic salmon smolts (*Salmo salar*) emigrating from four Canadian rivers entering the Gulf of St Lawrence (papers R:01 and R:05). In the later studies, the use of a sequence of receiver arrays across the migration

route of the smolts has allowed the early post-emigration mortality of the smolts to be partitioned in both space and time and variation in the mortality rates between years can be related to environmental changes.

The presentations indicated various potential technical difficulties with deriving information on fish mortality from tag detection rates, for example caused by tag loss, predation, deterioration in tag signals and changes in receiver efficiency. Several papers noted the need to screen data for evidence that receivers were becoming less sensitive and in some cases it was suggested that rules could be applied to the data to do this in a consistent manner. Paper R:05 referred to the use of sentinel tags to monitor the status of receivers over time and identify problems. In discussion it was noted that receivers had also been attached to wave gliders and to predators such as seals, and these had successfully extended the detection of tagged fish.

Most of the papers noted the very large amounts of data that could be generated by telemetry programmes, with some referring to at least 1 million tag detections by up to 50 different receivers. While such studies can now provide detailed descriptions of the behaviour of different populations of a fish species within a given area (e.g. freshwater, estuary and coastal populations of striped bass (paper R:06)), there has been a clear need to develop and apply more sophisticated analytical tools. Paper R:01 described a purpose developed software package, MyTrack, which provides a flexible platform for analysing the detection of 10s or 100s of tags by multiple receivers, while paper R:07 presented the application of Network Theory, using packages such as Unicnet and Netdraw, to analyse the distribution and behaviour of populations of snook on the Florida coast. Papers R:01 and R:05 also described alternative approaches for analysing data on the emigration of tagged salmon smolts, with the latter paper applying a Bayesian Jolly-Seber mark-recapture state-space process model, which provides estimates of the detection efficiencies of the receiver arrays and estimates of losses between the arrays.

It was noted that all the presentations at the Theme Sessions had been based on work undertaken in Canada or USA, and that several of these had highlighted the benefits of cooperation between research groups in order to share tag detection information obtained from different receiver arrays. Such networks have been established in a top-down fashion by such groups as the Ocean Tracking Network (OTN), but speakers also noted real advantages in establishing them in a bottom-up fashion as had been the case with the Atlantic Cooperative Telemetry network (ACT) (paper R:06) and the Florida Atlantic Coast Telemetry network (FACT) (paper R:07). It was felt that there were real opportunities for researchers in Europe to start applying these techniques more widely and that major benefits would be obtained from developing cooperative links between groups working on different species, including diadromous fish, sharks and marine mammals. The session was informed that this was the intention with an international salmon telemetry programme which the North Atlantic Salmon Conservation Organisation (NASCO) has recently agreed to support with the aim of describing the migration pathways of Atlantic salmon in the sea and partitioning the marine mortality of salmon populations from different regions in space and time.

Telemetry studies are not only expanding our knowledge of the biology of a range of marine species but are of great interest to the fisheries managers. The papers presented to Theme Session R described a number of applications of telemetry to practical management problems and the provision of results that fed directly into management actions.

The wider application of these methods has potential to greatly enhance our knowledge and the management of marine resources.