

## CNL(17)9

### *Report of the Sixteenth Meeting of the International Atlantic Salmon Research Board*

*Varbergs Kusthotell, Varberg, Sweden*

*5 June 2017*

#### **1. Opening of the Meeting**

- 1.1 The Chairman, Mr Rory Saunders (USA), opened the meeting and welcomed members of the Board, their scientific advisers and observers to Varberg.
- 1.2 A list of participants is contained in Annex 1.

#### **2. Adoption of the Agenda**

- 2.1 The Board adopted its Agenda, ICR(17)5 (Annex 2).

#### **3. Election of Officers**

- 3.1 The Board unanimously re-elected Mr Rory Saunders as its Chairman for a further period of two years to commence from the close of the Thirty-Fourth Annual Meeting of NASCO.

#### **4. Report of the Scientific Advisory Group**

- 4.1 The Chairman of the Board's Scientific Advisory Group (SAG), Dr Niall Ó Maoiléidigh, presented a report on the Group's meeting, SAG(17)7 (Annex 3). During its meeting the SAG had:
  - discussed the Updated Inventory of Marine Research. Twelve new projects have been included since last year, some of which have been ongoing for some time and one of which is completed. Seven of these new projects involve telemetry. The value of the inventory was recognised;
  - considered the timing of the next review of the inventory and, given that the Board has identified its research priority as SALSEA – Track, and that the focal year of IYS is 2019, recommended that the next review should be deferred to 2019 or 2020;
  - reviewed the metadatabase of salmon survey data and sample collections. In 2016, the Board agreed that information on scale collections should be included in the metadatabase and information has been received from the Russian Federation and the United States. Information has also been included in the metadatabase on the West Greenland Sampling Programme Biological Characteristics database. The Chairman encouraged Parties/jurisdictions to contribute further information on scale collections for inclusion in the metadatabase;
  - received updates on the International Year of the Salmon from Mr Mark Saunders (on activities in the North Pacific) and Mr Dan Morris (on activities in the North Atlantic. Mr Morris urged the SAG to dream big to make the IYS a success.

- discussed developments in relation to SALSEA - Track (see item 5 below);
- received progress reports on two projects for which funding had been provided to the Board through EU ‘grants for actions’. These projects are ‘Understanding and comparing early migration of European salmon populations at sea’ and ‘Sea lice model for the sustainable development of Atlantic salmon and fisheries’.
- received a report on the SAMARCH project, a collaborative project with partners in England and France to track salmon and sea trout in support of stock assessments and measures to protect them.
- received a report on a new approach to tracking ‘ROAM’ based on a technique for sub-surface oceanographic monitoring. A study plan to track sub-adult salmon at Greenland using this technique was described. While this technique is not suitable for nearshore waters it offers potential in tracking salmon through the North Atlantic area at reasonable cost;
- received an update on the telemetry programme being conducted by the Atlantic Salmon Federation;
- received an update on the project entitled ‘Enhancement of a North American Atlantic salmon genetic baseline for individual and stock identification and application of the baseline to historical scales collected at West Greenland’ which is being funded through the Board. Sample collection and processing has been completed and final results are expected by October 2017;
- considered an application to the Board for endorsement and funding by the Atlantic Salmon Trust (UK). A sum of £5,000 is being sought (see SAG(17)4 and ICR(17)4) which would, if approved, be used to help organise and run a scientific workshop related to the development of a ‘suspects model’;

4.2 In the light of the recommendations from the SAG, the Board decided:

- to ask the Parties to provide to the Secretariat, by 1 July, any changes or updates for the inventory, prior to it being uploaded to the IASRB website;
- to postpone the next review of the Updated Inventory of Marine Research until 2019 or 2020;
- to endorse the AST project to develop a ‘suspects model’ and to explore options to provide financial support;
- to encourage Parties/jurisdictions to provide details of archive scale collections for inclusion in the metadatabase and ask the Secretary to contact Parties/jurisdictions in order to seek relevant additional information.

## 5. Developments in relation to SALSEA - Track

- 5.1 In 2014, the Board had endorsed the need for an international acoustic tracking programme and adopted a Resolution (ICR(14)10) encouraging Parties to continue the development of local collaborative telemetry projects, encouraging the development of large international collaborative projects building on local efforts and encouraging Parties to make efforts to identify funding sources. The Board had noted that the telemetry programme should build on the success and identity of the SALSEA Programme.
- 5.2 In 2015, the Board received a report from its Telemetry Workshop that had, *inter alia*, developed 12 outline project proposals. The Board had recognised that it would be important to liaise with the outline project leaders with a view to following progress and, where appropriate, to provide support to assist with their implementation. The Board also recognised the high value of the SALSEA brand and the strong impact of NASCO as the international forum for consultation and cooperation on wild Atlantic salmon. The Board reaffirmed its commitment to an international telemetry project under the SALSEA brand, named ‘SALSEA - Track’. Specifically, the Board will support SALSEA - Track as a continuing commitment to understanding the factors affecting mortality of salmon at sea, to make funds available to prepare a vision statement for SALSEA - Track and to advance existing initiatives towards an integrated collaborative telemetry programme.
- 5.3 The Chairman introduced document ICR(17)3 (Annex 4) providing an update on developments in relation to SALSEA - Track. Following the Board’s 2016 Annual Meeting, applications for funding from the European Union were successfully completed and funding has been granted for two following projects and the progress on each is shown in italics:
- Understanding and comparing early mortality of European salmon populations at sea  
*The SMOLTRACK project has just started, but already good progress has been made. Central purchase of telemetry equipment has enabled partners to get a large discount to the benefit of the whole project. As a consequence, several partners have now committed to do a two season study instead of the originally planned 1 season study. The first workshop with partners was held in Galway from 28 February - 1 March 2017. The general criteria for the study were discussed and co-ordinated, an overview of the study sites was presented and a Standard Operating Procedure (SOP) was developed. The workshop also included a practical hands-on tagging course for all partners. These steps will ensure a good possibility for comparison between the sites. The acoustic systems are in place at all partners and tagging began in the last week of March, with the majority of smolts expected to be tagged in April and early May.*
  - Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture  
*The EU funded NASCO project Licetrack, Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture, began in early March 2017 when a workshop of all project partners took place at IFI headquarters in Dublin. The workshop covered items such as fieldwork planning for the sentinel cage experiment in Killary harbour, development of hydrodynamic modelling in*

*Norway, Scotland and Ireland, development of a standard model and project budget. Sentinel cages were manufactured and delivered during the first week in May and the first batch of salmon smolts was put to sea in six cages in Killary Harbour on 8 May. These salmon smolts were removed on 16 May and lice counts undertaken. A second batch of salmon smolts was put into the sentinel cages on 16 May and sampled on 23 May. Three cages are fitted with salinity and temperature probes and velocity meters. Some mortality of salmon smolts was encountered due to high water temperatures. A bag net has also been operating in Killary since early May. Farmed salmon in the vicinity of Killary Harbour are due to be harvested in late May and the site left fallow for a period. Salmon smolts will continue to be monitored in sentinel cages during this fallow period to provide baseline data. It is expected that larger salmon will be moved to sites in Killary harbour in autumn and salmon smolts will be placed in sentinel cages to monitor lice levels during this period. The field work element of the project has progressed as set out in the project plan and work is ongoing in developing a hydrodynamic model for Killary harbour. The development of a standard model using hydrodynamic models of local currents to generate sea lice dispersal patterns in any site specific location is also being progressed.*

- 5.4 Progress reports were received for 6 of the 12 outline projects developed at the Telemetry Workshop. Lack of funding or resources was identified as a factor hindering implementation of some of these projects. Identifying potential funders and attracting their interest in SALSEA - Track is a considerable undertaking that requires specialist skills. In the first phase of the SALSEA Programme, the Board had sought support from professional fund-raisers, Brakeley Consultants. The Secretary has contacted one of those involved in the earlier work and they have advised that their minimum contract would be for around £12,000. This would enable advice to be provided on an approach to fundraising but a fundraising programme would involve considerable cost. The IASRB agreed that the first step would be to develop Terms of Reference for the work to be undertaken in developing the fundraising approach including such considerations as questions to addressing ethical issues in the choice of potential funders and whether or not to seek funding for one or two well developed projects or the entire 12 project programme.
- 5.5 The Chair referred to the hemispheric collaboration envisaged under the IYS and asked Mr Mark Saunders (NPAFC) to provide an update. Mr Saunders referred to areas of overlap in interests in the North Atlantic and North Pacific identifying tracking studies and wild/farmed fish interactions. NPAFC sees collaboration as an essential component of the IYS and there have been similar long-term declines in abundance in the Pacific in more than 100 populations in the North Pacific and salmon face similar uncertainties in future. He indicated that those in the North Pacific want synergies in bringing resources to the IYS. Over the last year the governance model has been defined, a logo developed and work has commenced on the IYS website. NPAFC would like to work together inter-sessionally over the next months to manage joint interests.

## **6. Finance and Administrative Issues**

- 6.1 The Secretary introduced document ICR(17)2 presenting the Board's accounts for 2016. The decision had been taken not to have the 2016 accounts audited, but rather income and expenditure statements has been prepared. At the end of 2016, the balance of the International Atlantic Salmon Research Fund was £354,491.17. On 22 December

2016 the Board had received payment from the European Union of 70% (totaling €377,838.88) of the approved grants for two projects ‘Understanding and comparing early migration of European salmon populations at sea’ and ‘Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture’. At current exchange rates this is equivalent to approximately £321,300 and is ring-fenced for these EU supported projects. The funding has levered substantial funding by the partners in the projects. For the Board’s general account, the year-end balance was £32,791 but a sum of £16,900 has subsequently been paid to the to support the project entitled ‘Enhancement of a North American Atlantic salmon genetic baseline for individual and stock identification and application of the baseline to historical scales collected at West Greenland’. The Board had received a donation amounting to £215 from a research project seeking to estimate willingness to pay. The current funds available amount to approximately £15,000. The Board had previously agreed that it was desirable to retain a reserve of £4,000 - £5,000.

- 6.2 The Chairman thanked the representative of the European Union for this generous contribution.
- 6.3 The Board agreed that given the increases in its resources it should have its 2017 accounts audited and the Secretary indicated that he thought this would involve costs of around £1,500 - £2,000. The Board decided that it would have its 2017 accounts audited by NASCO’s auditors, Saffery Champness (Edinburgh).
- 6.4 The Chair noted that this would mean that if the cost of the audit and the agreed reserve were taken into account, the Board had a total of £13,000 in its general fund and the cost of the pilot fundraising exercise and the support for the AST proposal amounted to £17,000. Given the relatively small amount of funding needed to support the request from AST, it was suggested that the Chair might seek approval from the Council to use a sum of £5,000 from the IYS Fund to support the AST proposal, ICR(17)4 (Annex 5). The Chair also asked if there was agreement on the fund-raising payment to Brakeley Consultants if financial support from the Council (from the IYS Fund) were received. Consensus on this point was not reached given the agreement to develop terms of reference in section 5.4 of this report.

## **7. Other Business**

- 7.1 There was no other business.

## **8. Report of the Meeting**

- 8.1 The Board agreed a report of its meeting.

## **9. Date and Place of the Next Meeting**

- 9.1 The Board agreed to hold its next meeting in conjunction with the Thirty-Fifth Annual Meeting of NASCO during 12 - 18 June 2018.

## **10. Close of the Meeting**

- 10.1 The Chairman thanked participants for their contributions and closed the meeting.



***List of Participants***

**Canada**

Mr Bud Bird  
Mr Doug Bliss  
Mr Gérald Chaput  
Ms Shelley Denny  
Ms Patricia Edwards  
Dr James Irvine  
Dr Martha Robertson

**European Union**

Dr Dennis Ensing  
Dr Jaakko Erkinaro  
Dr Cathal Gallagher  
Mr John McCartney  
Dr Michael Millane  
Dr Niall Ó Maoiléidigh  
Mr Ian Russell  
Mr Lawrence Talks

**Norway**

Mr Raoul Bierach  
Mr Arne Eggereide  
Dr Peder Fiske

**Russian Federation**

Dr Konstantin Drevetnyak  
Ms Alina Nikolaeva  
Dr Sergey Prusov

**USA**

Mr Rory Saunders  
Mr Tim Sheehan

**NGOs**

Mr David Meerburg  
Dr Walter Crozier  
Professor Ken Whelan  
Dr Nigel Milner

**Secretariat**

Dr Peter Hutchinson





**ICR(17)5**

***Agenda***

1. Opening of the Meeting
2. Adoption of the Agenda
3. Election of Officers
4. Report of the Scientific Advisory Group
5. Developments in relation to SALSEA - Track
6. Finance and Administrative Issues
7. Other Business
8. Report of the Meeting
9. Date and Place of the Next Meeting
10. Close of the Meeting



**SAG(17)7**

***Report of the Meeting of the Scientific Advisory Group of the  
International Atlantic Salmon Research Board***

***Varbergs Kusthotell, Varberg, Sweden***

***5 June 2017***

**1. Opening of the Meeting**

1.1 The Chairman of the Scientific Advisory Group (SAG), Dr Niall Ó Maoiléidigh (European Union), opened the meeting and welcomed participants to Varberg.

1.2 A list of participants is contained in Annex 1.

**2. Adoption of the Agenda**

2.1 The SAG adopted its Agenda, SAG(17)5 (Annex 2).

**3. Review of the Updated Inventory of Research and the Metadatabase of Salmon Survey Data and Sample Collections**

*Research Inventory*

3.1 The Chairman presented an overview of the Inventory of Research Relating to Salmon Mortality in the Sea, SAG(17)2. For 2017, the total annual expenditure on the 53 ongoing projects (3 of which are uncosted) is approximately £6.9 million. Approximately 40% of the expenditure is associated with long-term monitoring programmes. He indicated that there are twelve new projects, some of which have been ongoing for some time and one of which is completed. Seven of these new projects involve acoustic telemetry. The new projects are as follows:

**Canada**

- Tracking the migration behavior of Atlantic salmon kelts (Middle and Baddeck rivers), through a unique inland brackish sea of Cape Breton, Canada;
- Evaluating the role of bottom-up effects of prey availability on the survival or local abundance of repeat spawning Atlantic salmon between two ecosystems;
- Movements and survival rates of acoustic tagged smolts from Campbellton River, Newfoundland;
- Research into factors of early marine phase postsmolt mortality using acoustic predator-detection tags (*Northwest Miramichi River, New Brunswick, Canada*);
- Research into factors of early marine phase postsmolt mortality using acoustic predator-detection tags (*Stewiacke River, Inner Bay of Fundy, Nova Scotia, Canada*);

- Migration, distribution, survival of smolts from Nashwaak River;
- Early marine phase migration, and survival of Atlantic post-smolts from multi-sea-winter salmon populations of Quebec;
- West River Acid Rain Mitigation Project.

### **European Union - Ireland**

- Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture;
- Unlocking the archive: using scale and otolith chronologies to resolve climate impacts.

### **European Union - UK (Northern Ireland)**

- COMPASS (Collaborative Oceanography & Monitoring for Protected Areas and Species).

### **United States**

- Effects of climate-driven ecosystem change on Atlantic salmon growth and survival at sea; analyses of West Greenland salmon.

- 3.2 The SAG has previously recognised that as there is insufficient time available to thoroughly review the inventory at its meetings or at the meetings of the ICES Working Group on North Atlantic Salmon and the Board had, therefore, agreed that review of the inventory should be conducted by a SAG Sub-Group every 3 or 4 years. The inventory was last reviewed in 2012 by the Sub-Group on the Future Direction of Research on Marine Survival of Salmon and, if the agreed schedule is followed, the next review of the inventory would be due in 2017. However, the SAG noted that one of the purposes of the review is to identify research needs and it recognised that the Board has agreed that its current priority is to partition mortality of salmon along their migration routes through telemetry studies (SALSEA - Track). The SAG also considered that it might be appropriate to wait until after the IYS to conduct the next review of the inventory. The SAG, therefore, recommends to the Board that the need for a further review of the inventory should be reconsidered in 2019 or 2020.
- 3.3 The SAG noted that Table 3 in the inventory allocates projects to their relevant SALSEA work package and that this presentation continued to be informative and should be retained.
- 3.4 The SAG recommended to the Board that the Parties be asked to provide any comments on the inventory to the Secretariat by 1 July and, thereafter, that the revised inventory should be uploaded to the IASRB website.
- 3.5 Professor Ken Whelan of the Atlantic Salmon Trust (AST) informed the SAG that the AST had recently appointed Matt Newton as a coordinator for telemetry projects in the UK and that some new projects would be commencing soon and would then be available for inclusion in the inventory.

- 3.6 Mr Mark Saunders (North Pacific Anadromous Fish Commission) indicated that the inventory was a valuable source of information and that there was interest in developing an inventory for research on salmon for the hemisphere.

#### *Metadatabase*

- 3.7 The Secretary reported that the Board had previously decided that it could play an important role with regard to marine salmon survey data and sample co-ordination by establishing a metadatabase of existing datasets and sample collections of relevance to mortality of salmon at sea. This metadatabase was established in 2014 and is made available on the IASRB's website. Prior to the 2016 Annual Meeting, the metadatabase contained the following eleven entries:

- Greenland tag recaptures (data);
- SALSEA-Merge biological samples (biological samples);
- External tag recoveries from tagging programmes in Canada, USA, EU, Norway and Russia and international adult salmon tagging at Faroes and Greenland (data);
- Faroes CWT recoveries (data);
- Greenland catch data (data);
- North-East Atlantic run reconstruction data (data);
- SALSEA Greenland (biological samples);
- SALSEA North America biological samples (biological samples);
- North American Run Reconstruction Data (data);
- SALSEA-Merge marine feeding (data);
- SALSEA-Merge Genetics Database: Genetically-based Regional Assignment of Atlantic Salmon Protocol (GRAASP) (data).

- 3.8 In 2015, the SAG had discussed the high value of archival scale collections that, as a result of advances in analytical methods, can now be used for genetic, stable isotope and growth studies. Additional information may be obtained in the future in response to further advances in analytical methods. The SAG had noted that these collections may be lost when individual scientists retire unless appropriate arrangements are in place to archive them and ensure their safe storage so that they may be available for analysis. The SAG recognised that, even if the scales themselves are not lost, the information accompanying them could be or they could be damaged while in storage. In 2016, it was recognised that the Board could play a role in identifying such scale collections, raising their profile with a view to safeguarding them for future use. The IASRB agreed that information on these scale collections should, as a first step, be included in the IASRB metadatabase. Accordingly, Parties/jurisdictions were requested to provide details to the Secretariat of any archival scale collections and information has been received from the Russian Federation and the United States. The Board had also agreed that information on the West Greenland Sampling Programme Biological Characteristics database should be included in the metadatabase. The following new datasets have been included in the metadatabase since 2016:

- Kolarctic Coastal samples;
- PINRO Atlantic salmon scales collection;

- USA origin juvenile and adult scale samples; and
- West Greenland Sampling Database.

3.9 The Chair encouraged other Parties/jurisdictions to contribute details of scale collections for inclusion in the metadatabase. He referred to the existence of scale collections in Ireland dating back to the 1920s which are stored in a secure facility and a metadatabase entry will be developed during the course of a new project and the information provided to NASCO.

#### **4. Update on the International Year of the Salmon**

4.1 At its 2016 Annual Meeting, the Council had recognised that an International Year of the Salmon (IYS) could provide a very good opportunity to raise awareness of the factors driving salmon abundance, the environmental and anthropogenic challenges they face and the measures being taken to address these. An Outline Proposal for an IYS, entitled '*Salmon and People in a Changing World*', which included a proposed rationale, vision, themes and timings for the IYS, together with details of its scope, a governance model and initial budgetary considerations, was broadly accepted by the Council in 2016 subject to some provisional points of clarification. The focal year of the IYS is 2019. There are five research themes for the IYS and the Board has previously recognised that there might be some synergies between the IYS and SALSEA - Track. The IYS research themes are as follows:

- Status of Salmon: to understand the present status of salmon and their environment;
- Salmon in a changing salmosphere: to understand and quantify the effects of natural environmental variability and anthropogenic factors affecting salmon distribution and abundance and to make projections of their future changes;
- New Frontiers: to develop new technologies and analytical methods to advance salmon science and to explore the uncharted regions of the salmosphere;
- Human Dimension: to investigate the cultural, social and economic elements that depend upon sustainable salmon populations;
- Information Systems: to develop an integrated archive of accessible electronic data collected during the IYS and tools to support future research.

4.2 In 2016, the SAG noted that the SALSEA - Track programme fitted well into the first three of these themes. There was support for the proposed international symposium as a means to improve exchanges between scientists working in the Pacific and Atlantic.

4.3 The Chairman referred to Council document CNL(17)12 which provides an update on IYS activities since last year. He referred to ICES being a core partner of NASCO in the IYS and its interest in facilitating improved dialogue between scientists working in the Pacific and Atlantic. He referred to consideration of climate change issues at the last meeting of the Working Group on the North Atlantic Salmon at which there had been valuable input from scientists in the North Pacific.

4.4 The Chair welcomed Mr Mark Saunders, Dr George Iwama and Dr Jim Irvine from the North Pacific Anadromous Fish Commission (NPAFC). Mr Saunders provided an update on IYS activities in the North Pacific. He indicated that NPAFC had conducted its Annual Meeting about two weeks ago and that there is considerable interest in this hemispheric approach to salmon research and outreach. He indicated that 2015 witnessed

the largest EL Ninô event in the Pacific, both in magnitude and duration, and impacts on salmon stocks are evident. He indicated that the Committees envisaged under the IYS Outline Proposal had been established in a flat rather than hierarchical structure. An IYS Secretariat had been established for the North Pacific to support planning and fund raising. The North Pacific Steering Committee had considered the timing and scope of the IYS symposium proposed for autumn 2018. The NPAFC IYS Working Group had considered potential research activities aligned with NPAFC's Science Plan and a large winter survey involving five vessels is proposed. A primer for planning IYS activities has been developed which identifies impact measures for each IYS outcome and the intention would be to discuss this within the Coordinating Committee. He indicated a number of overlapping priorities in the North Pacific and North Atlantic including understanding survival across life history stages, aquaculture/wild salmon interactions, expansion of the research inventory to cover the hemisphere, and the use of telemetry as some examples. He looks forward to planning joint activities with NASCO that will be transformational.

- 4.5 Mr Dan Morris indicated that he was looking forward to the IYS Special Session to be held during the Annual Meeting and he hoped that the SAG would find the programme that had been developed to be relevant and of interest. He noted that NPAFC has a large emphasis on research and impressive levels of investment. NPAFC and NASCO are approaching the IYS differently and the situation in the two oceans is very different with greater abundance and utilisation in the Pacific but scarcity in the North Atlantic. He noted that the NPAFC Steering Committee has an expansive view of the IYS over a five year period. There is a need to develop an approach for collaboration since in NASCO the IYS is having to fit in with other activities. There is a need to identify what we have in common, including interest in a better understanding of how habitats are changing, sharing data, a joint symposium and possibly research at the salmosphere level. He advocated dreaming big to make the IYS a success.

## **5. Developments in relation to SALSEA - Track**

- 5.1 In 2014, the IASRB had endorsed the need for an international telemetry programme and adopted a Resolution (ICR(14)10) encouraging Parties to continue the development of local collaborative telemetry projects, encouraging the development of large international collaborative projects building on local efforts and encouraging Parties to make efforts to identify funding sources. The Board had noted that the telemetry programme should build on the success and identity of the SALSEA Programme and had recognised that there may be a role for the Board in co-ordinating efforts and supporting fund raising initiatives. In 2014, a Telemetry Workshop organised by the Board had developed 12 outline project proposals utilising telemetry. The Board had recognised that if the international telemetry programme is to proceed, it would be important to liaise with the project leaders with a view to following progress and, where appropriate, to provide support to assist with their implementation.
- 5.2 In 2015, the Board had recognised the high value of the SALSEA brand and the strong impact of NASCO as the international forum for consultation and co-operation on wild Atlantic salmon. The Board reaffirmed its commitment to an international telemetry project under the SALSEA brand, namely SALSEA - Track. Specifically, the Board agreed to support SALSEA - Track as a continuing commitment to understanding the factors affecting the mortality of salmon at sea, to make funds available to prepare a vision statement for SALSEA - Track and to advance existing initiatives towards an integrated collaborative telemetry programme.

- 5.3 In 2016, the Board had confirmed that it endorsed the twelve projects but noted that, if they changed substantially, they should be referred to the SAG. It was recognised that there might be scope to combine some of these projects into larger projects within the North American and North-East Atlantic Commission areas.
- 5.4 The Chairman of the Board, Mr Rory Saunders (USA) introduced paper ICR(17)3. He provided an update on progress with the twelve projects, noted additional new projects relating to telemetry that had been included in the inventory and referred to funding provided to the IASRB to support two projects (see 5.5).
- 5.5 Dr Cathal Gallagher presented updates on two projects for which funding had been provided to the IASRB through an EU ‘grant for action’ award. The Lice Track project aims to develop a sea lice integrative model, and involves parties in Norway, Scotland and Ireland. A planning workshop had been held in early 2017. The main test site is in an Irish National Salmonid Index Catchment where there is some salmon farming located in close proximity but with high densities in some years and low densities in others. The field work is underway and sentinel cages have been deployed. A second project, Smolt Track, has also commenced with an expert workshop at which there was a review of tagging techniques and sharing best practice and development of SOPs. The project involves partners in Denmark, England, Northern Ireland, Spain and Ireland where there are different mortality factors operating e.g. sea lice in Ireland and cormorants in Denmark. New partners are seeking to join the project.
- 5.6 Mr Lawrence Talks made a presentation on the SAMARCH project which involves ten partners in England and France. Funding has just been approved for the project to establish a genetic dataset. The project will be conducted from 2017 - 2022 with funding of €7.8million. It will aim to track salmon and sea trout smolts and sea trout kelts in estuary and inshore waters. It should provide information to establish a genetic dataset, improve stock assessment for salmon and sea trout and support the protection of salmon and sea trout stocks.
- 5.7 Mr Tim Sheehan provided an overview of a new approach for tracking marine species in the open ocean, through a collaborative effort between NOAA Fisheries, Woods Hole Oceanographic Institute, (WHOI), and the Atlantic Salmon Federation. The approach is designed to overcome many of the significant challenges associated with tracking Atlantic salmon throughout their marine migration.
- 5.8 The new approach, ROAM (RAFOS Ocean Acoustic Monitoring), is a modification of RAFOS, a commonly used technique for sub-surface oceanographic monitoring. Hydrophones are used to detect and record ‘pong’ detections while also collecting a suite of environmental data. Once the sound source detections are downloaded from the hydrophone, the estimated distance of the hydrophone from the sound source can be calculated for each ‘pong’ recorded. Daily position estimates can then be calculated to approximately one square kilometre based on triangulation from the daily distance estimates.
- 5.9 He described a study plan to track sub-adult Atlantic salmon captured at Greenland throughout the Labrador Sea during their return migration using the ROAM approach. A total of 8 sound sources would adequately cover the study area which ranges from Nova Scotia (Canada) north to Disko Bay (Greenland). The sound source would need to be custom built and would cost approximately US\$50K each, US\$400K in total. The



sound source would remain active for a period up to 10 years and efforts are being pursued to have them deployed in-kind by a potential collaborator. The ROAM archive and PSAT tag costs have yet to be determined but are expected to be approximately equal to current acoustic and PSAT costs if not cheaper. The tentative plan is for sound source deployment to occur in 2018/19 with tagging to occur in 2018/19-2020/21. NOAA Fisheries, WHOI, and ASF are currently working to organize this project.

- 5.10 Mr Sheehan noted that as with any new effort, there would be initial start-up costs, although these costs may be considered reasonable given the scope of the project. This is a new approach for old technology and although expectations are high for success, field and laboratory testing is needed and ongoing. Many challenges remain to be identified and further planning and coordination are needed to move this technology and effort forward. It was also noted that the technique is not appropriate for nearshore positioning given issues with sound propagation in shallow environments nearshore. It was also noted that any large scale tagging is inevitably difficult to coordinate. However, the ROAM approach may provide an ability to accurately track Atlantic salmon further out to sea than previously possible. The miniaturization of the RAFOS approach will overcome many of the cons from contemporary tracking technologies and the archive and PSAT version will provide different approaches for tracking different life stages. In addition to precise location estimates, concurrent environmental data will also be collected. Sound source coverage from Nova Scotia (Canada) north to Disko Bay (Greenland and eastward from France north to the Kola Peninsula (Russia) may be theoretically achievable with 20 sound sources at an approximate cost of US\$1 million. This could provide a monitoring network covering the range of Atlantic salmon across the North Atlantic.
- 5.11 In response to a question from the Chair, Mr Sheehan indicated that while the ROAM project was not a specific project within the 12 endorsed by the Board, it was technically part of the satellite tagging project at West Greenland, which has been endorsed, and could be extended to other endorsed projects. He indicated that the technology exists but it needs to be included in existing pop-off satellite tag housing and it may reduce the size of these tags up to 50%. The technology is already being used by oceanographers and should not have impacts on marine mammals. For the smolt tags there would be a need for tag recovery programs but at the moment the focus was on satellite tags. It was noted that interference from other sound sources was not a problem in the open ocean but it could be in coastal areas. The Ocean Tracking Network (OTN) was aware of this development and had expressed interest. Further communication has not occurred yet.
- 5.12 The SAG noted the enormous potential of this development in terms of being able to monitor tagged fish across the entire North Atlantic at a relatively modest cost. The SAG recommended that this research should continue to be reported at the SAG and brought to the attention of the IASRB.
- 5.13 Mr Dave Meerburg (ASF Canada) updated the SAG on its smolt and kelt tracking studies in the Gulf of St Lawrence. A more detailed report is available in the report of the 2017 meeting of the ICES Working Group on North Atlantic Salmon.

## **6. Progress Reports on Projects Funded by the IASRB**

- 6.1 Mr Tim Sheehan indicated that the United States had previously made a contribution of £16,900 (US\$26,000) to the IASRB to support an extension of a study undertaken in 2014/15 (SAG(15)4). The extension study is being led by Dr. Ian Bradbury, Fisheries and Oceans Canada, and is entitled ‘Enhancement of a North American Atlantic Salmon genetic baseline for individual and stock identification’. The details of the project were to be finalised following last year’s Annual Meeting and the research was to be initiated thereafter. He provided an update on the project to the SAG on behalf of Dr. Bradbury. The funds are to support the genetic processing and analysis of approximately 670 individual scale samples collected from the West Greenland fishery to obtain region of origin assignments for North American origin fish. The target years are 1970, 1971, 1972, 1976, 1980, 1981 and 1982. These years were selected to increase the sample size of North American region of origin assignments prior to 1990. Previous work supported by the Board (SAG(15)4) presented a time-series of North American region of origin contributions to the West Greenland fishery (1968-2014); however, sample size prior to 1990 was low. Mr Sheehan confirmed that the funds had been transferred to DFO and that sample collection had been completed. The initial processing has been completed and the laboratory is currently re-running samples whose preliminary genetic results were found to be deficient. Final results are expected by October 2017 and a final report will be provided to the SAG at their 2018 Meeting.

## **7. Review of Project Applications for Potential Funding by the IASRB**

- 7.1 Under the Board’s Guidelines for Submitting Proposals for Research, Workshops, Symposia and Other Activities for Support by the IASRB, ICR(09)10, applications seeking either only endorsement by the Board or funding support from the Board may be considered. Applications are reviewed by the SAG which makes its recommendations to the Board.
- 7.2 The Chairman referred to an application by the Atlantic Salmon Trust for endorsement by the Board of a ‘suspects model’ and a request for £5,000 funding to help organise and run a scientific workshop of 6 to 8 specialists in Autumn 2017. Professor Walter Crozier (Atlantic Salmon Trust) presented documents SAG(17)4 and ICR(17)4 and referred to a request for endorsement for the project and support for the workshop which would examine in detail the feasibility of the framework proposed in SAG(17)4 and support the development of a consortium bid for funding in the form of a Concerted Action or other appropriate science support mechanism. The Atlantic Salmon Trust has funded the work to date and will continue to support its further development on a partnership basis into the future.
- 7.4 The SAG considered that the development of the ‘suspects model’ was a valuable initiative that could support new modelling approaches being developed by the ICES Working Group on North Atlantic Salmon. It recommended that the Board endorse the development of the model and approve the request for funding. Mr Mark Saunders indicated that there is considerable interest in a similar approach in the Pacific and that IYS funds may be available to allow participation of scientists from the Pacific in the AST Workshop.
- 7.5 The Board had previously agreed that it would be important to have reserves available to it so that it could continue to support initiatives such as the Greenland and Faroes GSI

projects; the Board's support had assisted in securing additional funding from other sources. These projects had resulted in new information of value to management with limited financial support from the Board. The Sub-Group on the Future Direction of Research on Marine Survival of Salmon had noted in 2012 that the Board had very limited resources and recognized that if it is to continue to play a role in supporting research on salmon at sea it should consider how it can address this situation.

## **8. Other Business**

8.1 There was no other business.

## **9. Report of the Meeting**

9.1 The SAG agreed a report of its meeting.

## **10. Date and Place of the Next Meeting**

10.1 The SAG agreed to hold its next meeting in conjunction with the Thirty-Fifth Annual Meeting of NASCO during 12 - 18 June 2018.

## **11. Close of the Meeting**

11.1 The Chairman of the SAG thanked the participants for their contributions and closed the meeting.

*List of Participants*

**Canada**

Mr Bud Bird  
Mr Gérald Chaput  
Ms Shelley Denny  
Ms Patricia Edwards  
Dr James Irvine  
Dr Martha Robertson  
Ms Annette Rumbolt

**European Union**

Dr Stamatis Varsamos  
Dr Dennis Ensing  
Dr Jaakko Erkinaro  
Dr Cathal Gallagher  
Mr John McCartney  
Dr Michael Millane  
Dr Niall Ó Maoiléidigh  
Dr Arnaud Peyronnet  
Mr Ian Russell  
Mr Lawrence Talks

**Norway**

Dr Peder Fiske

**Russian Federation**

Ms Alina Nikolaeva  
Dr Sergey Prusov

**USA**

Mr Daniel Morris  
Mr Rory Saunders  
Mr Tim Sheehan

**IGOs**

Dr George Iwama  
Mr Mark Saunders

**NGOs**

Dr Walter Crozier  
Professor Ken Whelan  
Dr Nigel Milner

**Secretariat**

Dr Peter Hutchinson

**SAG(17)5**

***Agenda***

1. Opening of the Meeting
2. Adoption of the Agenda
3. Review of the Updated Inventory of Research and the Metadatabase of Salmon Survey Data and Sample Collections
4. Update on the International Year of the Salmon
5. Developments in relation to SALSEA - Track
6. Progress Reports on Projects Funded by the IASRB
7. Review of Project Applications for Potential Funding by the IASRB
8. Other Business
9. Report of the Meeting
10. Date and Place of the Next Meeting
11. Close of the Meeting



## ICR(17)3

### *Progress Report on SALSEA - Track*

1. At its 2013 meeting, the Board had agreed that a particular focus of its work should be studies to partition mortality of salmon among the phases of its marine migration. In 2014, the Board adopted a Resolution on Research on Salmon at Sea, ICR(14)6, which *inter alia*:
  - encourages NASCO Parties to continue the development of local collaborative telemetry projects;
  - encourages the development of large international collaborative telemetry projects that together build upon and expand local efforts; and
  - requests NASCO Parties to make efforts to identify funding sources to support telemetry projects.
2. To support an integrated collaborative telemetry programme, the Board organised a Telemetry Workshop in December 2014. At this Workshop, twelve outline project proposals for telemetry-based research were developed. In 2015, the Board recognised the high value of the SALSEA brand and the strong impact of NASCO as the international forum for consultation and co-operation on wild Atlantic salmon. The Board had re-affirmed its commitment to an international telemetry project under the SALSEA brand, named SALSEA - Track. Specifically, in 2015 the Board agreed that it would support SALSEA - Track as a continuing commitment to understanding the factors affecting mortality of salmon at sea, to make funds available to prepare a vision statement for SALSEA - Track and to advance existing initiatives towards an integrated collaborative telemetry programme.
3. The Board recognised that if the international telemetry programme is to proceed, it would be important to follow progress in taking forward the twelve outline projects and, where appropriate, provide support to assist with their implementation. Last year, the Board had confirmed that it endorsed these twelve projects but noted that, if they changed substantially, they should be referred to the Board's Scientific Advisory Group (SAG). It was recognised that there might be scope to combine some of these projects into larger projects within the NAC and NEAC areas. The SALSEA - Track brochure had been developed, in consultation with members of the Board/SAG and a professional fund-raiser, prior to the Board's 2016 meeting and has been widely distributed and well received. At the 2016 meeting, the representative of the European Union had indicated that the intention was to make a voluntary contribution to NASCO to support two projects relating to marine mortality with funding of €300,000 per project representing 80% of the costs with the balance of funding requiring to be found from third parties (Member States).
4. This paper provides an update on progress with the twelve outline projects and on the funding from the EU and details new telemetry projects reported through the inventory of research relating to salmon mortality at sea.

#### **Progress on the twelve outline projects**

5. In accordance with the Board's request that progress in taking forward the twelve outline projects be followed, the contact for each project was requested to provide an update on

progress to date, identifying any challenges in progressing the projects and advising of any assistance the Board may be able to offer to support implementation of the projects and in disseminating information relating to them. The responses received are summarised below:

<p>Drifters and BioProbes: Options for detecting acoustically tagged fish in large geographic areas (NAC and/or NEAC)</p>	<p><b>Progress report (John Kocik and Fred Whoriskey):</b> Within the Canada Atlantic Salmon Research Joint Venture, preliminary conversations have occurred between DFO, NOAA, OTN and the Atlantic Salmon Federation (ASF) as to funding some preliminary research and development to evaluate a cost-effective real time recording drifter. This tool would be able to transmit acoustic tag detections on a satellite platform eliminating the need for drifter recovery. The Ocean Tracking Network (OTN) has submitted funding requests to do the required engineering and integration work to add acoustic receivers to the MetOcean drifter and to build and test a prototype with the intent of having an operational unit ready for 2018.</p>
<p>New Receiver Lines/Arrays/Grids (NAC)</p>	<p><b>Progress report (Tim Sheehan, John Kocik, Jon Carr and Fred Whoriskey):</b> Some progress has been made on this project in 2016. With regards to adding acoustic receiver capacity of/to marine autonomous vehicles, OTN has requested funding to add two new Slocum Gliders and two SV3 Wave Gliders to its fleet to increase North Atlantic Ocean coverage and is working within the nascent Ocean Gliders Canada to arrange to place acoustic receivers on gliders operating within marine areas used by salmon during their marine migration, including the Labrador Sea. OTN has also been working through the Horizon 2020 AtlantOS program to partner with a variety of agencies and programs (DFO, OSNAP, OceanSITES, University of Washington and others) that have established fixed moorings in the North Atlantic Ocean and Labrador Sea to add acoustic receivers to the moorings. This is significantly expanding the acoustic receiver network that could be used to track the marine movements of salmon.</p> <div data-bbox="794 1227 1177 1496" data-label="Figure"> </div> <p><i>Map of fixed deployments (red dots) of acoustic receivers operating or to be installed by 2018 in the Western Atlantic Ocean and linked to the OTN data system. Does not include receivers mounted on gliders and which are currently operating in the Labrador Sea.</i></p> <p>Starting in 2015, ASF deployed a second line of receivers (N=28) in the Strait of Belle Isle to measure the efficiency of the existing line and calibrate stage-specific survival estimates for post-smolts travelling through the Gulf of St Lawrence. ASF has had discussions with DFO (St. Johns, Newfoundland) and plans to deploy a few receivers in the Labrador Sea in 2017 (up to 20 VR2AR units are planned for deployment off the coast of Spear Harbour).</p> <p>With this developing capacity, what is now needed is a solid plan/idea for the science that needs to be done, identification of critical new infrastructure that might need to be added, and identification of how the science and infrastructure will be sustained for the necessary time period.</p>



Platforms of Opportunity in the NAC area: Stationary Platforms of Opportunity Receiver Exchange (SPORE)	<b>Progress report (John Kocik):</b> The NOAA team maintained extant opportunistic arrays in 2016 and continued working with the whale passive acoustic group. Due to expanded work in the Narraguagus Bay area and overall telemetry workload and funding issues, the telemetry monitoring on lobster traps (t-MOLT) and coastal rivers projects were suspended for 2017. These platforms were often deployed after post-smolts left US waters or in river systems without tagged smolts so impacts to salmon monitoring are minimal. Expansion of opportunities in the northwest GoM and associated waters of the Bay of Fundy remains a mutual NOAA and DFO goal.
NAC kelt satellite tagging	<b>Progress report (Tim Sheehan and Jon Carr):</b> No significant progress has been made to date due to resource needs, and current commitments. Tentative conversations within the US and with ASF as to possibly pursuing this type of effort have been conducted, but if this project were to be conducted it would not be until 2018/2019. However, the ASF has continued their kelt tagging efforts in the Gulf of St. Lawrence (Miramichi and Restigouche rivers, and Cascapedia planned for 2017), but no new efforts outside of the Gulf have been initiated. A peer reviewed manuscript on PSAT kelt tracking has recently been published (2017, doi:10.1093/icesjms/fsw220).
Generic Index River Sites in the NEAC area	No progress report received.
Malin Head to Islay Receiver Array (NEAC)	<b>Progress report (Paddy Boylan):</b> Following the Telemetry Workshop in London, the SeaMonitor project was developed and funding was sought under INTERREG V. A description of the project was provided to the IASRB/SAG last year (see SAG(16)4). Unfortunately, this application was unsuccessful. The project included the Loughs Agency as the lead with partners from: the Marine Institute; University of Glasgow; Queens University Belfast; Ocean Tracking Network; Marine Scotland Science; National University of Ireland, Cork; Mayo Institute of Technology, Galway; Agriculture, Food and Biosciences Institute for Northern Ireland; and the University of California, Davis, USA. The consortium is still keen to look for a mechanism to fund the project and as a result a ready-made project is available if another funding opportunity arises. The total project cost was €8.23 million but elements could be tailored into smaller projects depending on available funding.
North Sea Loose Array (NEAC)	No progress report received.
West-coast Scottish arrays (NEAC)	No progress report received.
Studies of migration along the European shelf edge and into the Norwegian Sea using drifters/AUVs etc (NEAC)	No progress report received.
NEAC kelt satellite tagging	No progress report received.
Sub-adult satellite tagging at Faroes	No progress report received.
Adult satellite/acoustic tagging at Greenland	<b>Progress report (Tim Sheehan and Jon Carr):</b> Planning (ASF, NOAA, Greenland Institute for Natural Resources) has been ongoing for a multi-year satellite/acoustic tagging effort at West Greenland starting in 2017. Preliminary plans are for 2017 activities to focus on developing and refining capture methods for supplying high quality fish for tagging. Tagging would be initiated in 2018 and continue through 2020.

6. The response to our request for progress reports and identification of factors hindering implementation for the twelve outline projects has not resulted in information for all projects. However, for those that have responded, some have indicated that lack of resources is an issue. In the first phase of the SALSEA Programme, the Board had sought support from professional fund-raisers, Brakeley Consultants and we have maintained contact with one of those involved in the earlier work (Anne Conner) who remains very keen on the work of the Board. She volunteered to review the SALSEA - Track brochure and believes that together with the companion 'Salmon at Sea' brochure, which was developed following the Salmon Summit in 2011, the information available is informative and should be attractive to potential funders including corporates, foundations and high-worth individuals.
7. Identifying potential funders and attracting their interest in SALSEA - Track is a considerable undertaking that requires specialist skills. It would also require a clear description of the planned research and the funding required before funders could be identified and approached. The process would require professional support and Anne Conner's minimum contract would be for around £12,000 (for around 20 days of her time). However, this would only be feasible if we had planned and costed projects that could be presented to potential funders. One approach might be for the IASRB to identify one or two of the twelve projects, perhaps one North American and one European, as model projects that could be promoted in the first instance and seek advice on a fund-raising strategy in support of those projects.
8. The Resolution on Research on Salmon at Sea, ICR(14)10, which encourages NASCO Parties to continue the development of local collaborative telemetry projects, should also be supportive of applications for funding and the Board can also support telemetry projects through endorsements as it has for the twelve outline projects.

### **EU funding to the IASRB**

9. Following the Board's 2016 meeting, applications for funding through EU 'Grants for an action' were completed for two projects and these were approved for funding (up to 80% of eligible costs). A summary of the projects and a brief report on their progress is provided below.

### ***Understanding and comparing early mortality of European salmon populations at sea***

10. *Summary:* Over recent decades, the abundance of wild Atlantic salmon stocks has been in decline throughout their migratory range despite the significant management measures put in place both domestically and at an international level. There is evidence that the initial mortality, immediately after smolts enter salt water, is very high and that this 'point mortality' may explain most of the variation seen in return rates of salmon. Estuarine and near shore mortalities may also be occurring in the part of the marine life cycle where management intervention is feasible. This project will determine the mortality of salmon smolts and post-smolts during their migration through the lower parts of rivers, estuaries/fjords and near-shore areas through case studies using telemetry in rivers in five areas: Denmark, England, Ireland, Northern Ireland and Spain. Mortality of kelts migrating on the same route will also be investigated in Denmark. In combination with other published results, the research will provide crucial input on marine mortality to existing models used for assessment purposes and test if the measured initial mortality can explain observed variation in return rates. If causality between post-smolt mortality and run size

can be established, the findings may inform future management and conservation of (some) Atlantic salmon stocks.

**Total project cost (including in-kind contributions):** €18,300

**EU contribution to the IASRB:** €299,800

**Partners:** DTU Aqua (National Institute of Aquatic Resources), Denmark; Centre for Environment, Fisheries & Aquaculture Science (Cefas), UK; Xunta de Galicia, Spain; Agri-Food and Biosciences Institute (AFBI), UK. In-kind contribution from Inland Fisheries Ireland.

11. *Progress to date:* The SMOLTRACK project has just started, but already good progress has been made. Central purchase of telemetry equipment has enabled partners to get a large discount to the benefit of the whole project. As a consequence, several partners have now committed to do a two season study instead of the originally planned 1 season study. The first workshop with partners was held in Galway from 28 February - 1 March 2017. The general criteria for the study were discussed and co-ordinated, an overview of the study sites was presented and a Standard Operating Procedure (SOP) was developed. The workshop also included a practical hands-on tagging course for all partners. These steps will ensure a good possibility for comparison between the sites. The acoustic systems are in place at all partners and tagging began in the last week of March, with the majority of smolts expected to be tagged in April and early May.

#### ***Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture***

12. *Summary:* This project proposes to develop a sea lice integrative model developing and refining hydrodynamic modelling, environmental variables, sea lice production on salmon farms and other data requirements to support sustainable development of aquaculture and wild salmon stocks. Existing modelling tools have been developed in Norway and Scotland. These models simulate dispersal of larval sea lice based on farm production, hydrodynamics, water temperature and salinity, and have been used to identify the role of specific salmon farming sites as recipients or sources of sea lice. In order to make directly comparable estimations of lice dispersal, and hence larval concentrations and infection pressure, the models need to be standardised. The work carried out in each country can also benefit from the exchange of ideas to ensure optimal solutions are arrived at. For this reason, we will seek to form a network that will meet with the objective of developing a standard model that can be plugged into any hydrodynamic model of local currents to generate sea lice dispersal patterns. This project will contribute to developing best management practice for sea lice control and define a range of production strategies aiming at reducing the presence of sea lice and their negative impacts, both on farmed and wild Atlantic salmon.

**Total project cost (including in-kind contributions):** €18,604

**EU contribution to the IASRB:** €239,994

**Partners:** Inland Fisheries Ireland. In-kind contributions from Norwegian Institute for Nature Research; Institute of Marine Research, Norway; Marine Science Scotland; National University of Ireland, Galway

13. *Progress to date:* The EU funded NASCO project Licetrack, Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture, began in early March 2017 when a workshop of all project partners took place at IFI headquarters in

Dublin. The workshop covered items such as fieldwork planning for the sentinel cage experiment in Killary harbour, development of hydrodynamic modelling in Norway, Scotland and Ireland, development of a standard model and project budget. Sentinel cages were manufactured and delivered during the first week in May and the first batch of salmon smolts was put to sea in six cages in Killary Harbour on 8 May. These salmon smolts were removed on 16 May and lice counts undertaken. A second batch of salmon smolts was put into the sentinel cages on 16 May and sampled on 23 May. Three cages are fitted with salinity and temperature probes and velocity meters. Some mortality of salmon smolts was encountered due to high water temperatures. A bag net has also been operating in Killary since early May. Farmed salmon in the vicinity of Killary Harbour are due to be harvested in late May and the site left fallow for a period. Salmon smolts will continue to be monitored in sentinel cages during this fallow period to provide baseline data. It is expected that larger salmon will be moved to sites in Killary harbour in autumn and salmon smolts will be placed in sentinel cages to monitor lice levels during this period. The field work element of the project has progressed as set out in the project plan and work is ongoing in developing a hydrodynamic model for Killary harbour. The development of a standard model using hydrodynamic models of local currents to generate sea lice dispersal patterns in any site specific location is also being progressed.



*Scottish type sentinel cage used in Killary harbor*



*Deploying sentinel cages in Killary harbour*

14. The funding provided by the European Commission of approximately €600,000 is very much appreciated and has contributed to projects costing approximately €1.5million in total being implemented. We have been advised that additional funding is available through the EU ‘Grants for an action’ in 2017 with €300,000 available towards eligible costs for each approved project.

### **Inventory of research**

15. The inventory of research relating to salmon mortality at sea, SAG(17)2, includes 21 ongoing projects related to the migratory behaviour of individual fish (C16, C18, C25, C27, C29, C30, C31, C32, C33, De4, De5, Ir12, Ir13, Ir14, Ni4, N18, U4, U5, U10, U13, U16). Seven new projects involving tracking individual fish have been included since last year and these are as follows:

**C27:** Tracking the migration behaviour of Atlantic salmon kelts (Middle and Baddeck rivers), through a unique inland brackish sea of Cape Breton, Canada;

- C29:** Movements and survival rates of acoustic tagged smolts from Campbellton River, Newfoundland;
- C30:** Research into factors of early marine phase post-smolt mortality using acoustic predator-detection tags;
- C31:** Research into factors of early marine phase post-smolt mortality using acoustic predator-detection tags;
- C32:** Migration, distribution, survival of smolts from Nashwaak River;
- C33:** Early marine phase migration, and survival of Atlantic post-smolts from multi-sea-winter salmon populations of Quebec; and
- Ni4:** COMPASS (Collaborative Oceanography & Monitoring for Protected Areas and Species)

### **In summary**

16. SALSEA - Track is a novel and exciting project proposal that has the potential to answer key questions relating to the conservation and management of Atlantic salmon. The success of the project is entirely dependent upon extensive international co-operation and partnerships between scientists, public sector funders, private sector foundations, NGO groups and industry. If the necessary co-ordination and funding come together, it will undoubtedly have a high profile. Given that the Board has committed to support SALSEA - Track as a continuing effort to understanding mortality of salmon at sea, there are a number of measures it may wish to consider in order to further its goal of advancing an integrated, collaborative telemetry programme. The Board has previously recognised that it could play an important role by: supporting fund-raising initiatives; providing funds as resources permit; endorsing projects; serving as a forum for information exchange and collaboration among research groups; and facilitating co-ordination of the research programme.
17. The Board has, of course, already played a significant role in support of this initiative by funding the Telemetry Workshop that brought together the key scientists who may collaborate in future telemetry studies on salmon and at which the outline project proposals, subsequently endorsed by the Board, were developed. It has adopted a Resolution and it has prepared a brochure which should be supportive of telemetry studies. The Board's inventory indicates that seven new telemetry studies have been initiated since last year. The NASCO/IASRB have successfully applied for EU funding to support two projects related to mortality of salmon at sea and additional funding could be made available in 2017 if acceptable projects are forthcoming. The International Year of the Salmon, although focused on outreach activities in the North Atlantic, may be supportive of research relevant to SALSEA - Track. If the Board is to engage in fund-raising to support the twelve outline projects, it will need professional advice and that will need clarification of the research to be conducted and its cost and this might best be achieved by focusing on one or two model projects. The Board will need to consider its further role in taking forward SALSEA - Track and we look forward to discussing this further at the Annual Meeting.

Chairman and Secretary of the IASRB  
Edinburgh  
23 May 2017



## ICR(17)4

### *Application for funding to the International Atlantic Salmon Research Board Salmon at Sea: a 'likely suspects' approach to guiding research*

#### **The Proposal - summary**

SALSEA identified potential sources of mortality during the initial smolt migration to feeding grounds but it did not aim to quantify or fully understand these. It is evident however, that since these factors can vary in time and space, such variation may be expected to account for some if not most of the variability in return rates observed among salmon stocks and between years. As plans for new research develop, it is necessary to consider how that research can be targeted and prioritised. The overview accompanying this application suggests that it is possible to identify an overall strategic framework that would provide coherent guidance in this regard.

A strategic approach is proposed that would place candidate mortality factors within an overall spatio/temporal framework of salmon throughout the marine phase, with a view to quantifying the potential of each factor to influence survival (the “likely suspects”) and to link these dynamically in such a way that the cumulative effects of these factors is made to account for the observed survival variations in cohorts of salmon.

Given the number of, and variation in, likely factors influencing mortality at sea, the approach is not designed to be modelling in the meaning of inputting variables to test or predict outcomes, but is more akin to an “accounting exercise” and can be used to identify the likely impact both individually and cumulatively of the “suspects”. A key objective is to prompt specific testable hypotheses about the operation of the factors involved and hence aid targeting of research to further refine the estimates of the potential scale of mortality at each part of the marine phase. A particular focus would be on identifying where and how mortality factors had changed between earlier periods of higher marine survival and the more recent/current low survival phase.

#### **Funding Requested**

At this early stage of development of the likely suspects concept, the AST is in discussion with a number of scientists in relevant fields in Europe and North America and also with our partner organisation the Atlantic Salmon Federation (ASF). As part of the concept development, the AST is seeking a contribution of £5,000 from NASCO IASRB to help organise and run a scientific workshop of 6 to 8 specialists in Autumn 2017. If this is not possible the endorsement of the Board for the project concept and approach would be very welcome. The planned workshop would examine in detail the feasibility of the proposed framework and support the development of a consortium bid for funding in the form of a Concerted Action of other appropriate science support mechanism. AST has funded the work to date and will continue to support its further development on a partnership basis into the future.

## **Workshop Budget**

It is difficult at this time to give a precise budget for the organisation and running of the workshop but the following are the approximate costs – on the basis of a six person meeting, two from North America and 4 from Europe:

Further Development of Concept and preparation for workshop:

	£3,000 (consultant)
Travel and accommodation costs	£6,800
AST – staff time	£2,500
	<hr/>
Total:	£12,300

## **Time Frame**

It is envisaged that the workshop would be organised in Edinburgh in late September / October 2017 and that a report on the meeting and a detailed, costed research proposal would be completed by January 2018.

## **The Workshop Team**

The workshop will be organised by the Atlantic Trust Executive Team in conjunction with Professor Walter Crozier, who is currently on contract to AST to develop the Suspects Framework.

Professor Ken Whelan,  
Research Director,  
Atlantic Salmon Trust,  
11 Rutland Square,  
Edinburgh, [EH1 2AS](#)  
Scotland, UK

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