International Atlantic Salmon Research Board

ICR(19)04rev

Progress Report on SALSEA – Track

(***Revised 2 June 2019***)

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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, among other things:

   - 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. In 2017 and early 2018, funding was made available through a European Union funding mechanism to support three projects relating to marine mortality.

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:

Drifters and BioProbes: Options for detecting acoustically tagged fish in large geographic areas (NAC and/or NEAC)	**Progress report (John Kocik and Fred Whoriskey):** Funded by the Canadian Atlantic Salmon Research Joint Venture, three prototype MetOcean SVP Lagrangian current-following drifter buoys have been developed. Communications integration work is nearing completion, and suitable ships will be identified to launch the buoys into areas where we believe it is likely that tagged animals of any species have a possibility of being encountered. This tool would be able to transmit acoustic tag detections on a satellite platform eliminating the need for drifter recovery. Results from the deployment will be used to provide feedback that can be used to improve the first generation of the technology, and to provide support for future funding proposals to distribute the technology more broadly.
New Receiver Lines/Arrays/Grids (NAC)	**Progress report (Tim Sheehan, John Kocik, and Jon Carr):** With regards to adding acoustic receiver capacity of/to marine autonomous vehicles, OTN has added two new Slocum Gliders and one SV3 Wave Glider to its fleet, and is planning on adding an additional 1-2 Wave Gliders to increase North Atlantic Ocean receiver coverage especially in areas where moorings are logistically difficult or costly to maintain. OTN continues working within the nascent Ocean Gliders Canada and international partners 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, others) that have established fixed moorings in the North Atlantic Ocean and Labrador Sea to add acoustic receivers to the moorings. Through the Canada Atlantic Salmon Research Joint Venture, the Nova Scotia Salmon Association, DFO, NOAA, OTN and the Atlantic Salmon Federation (ASF) funding was secured to model the efficacy of candidate line arrays and grid structure. A movement ecology modeller was hired and a manuscript describing designs on the Labrador Shelf is expected this summer. Next steps will be addition of refined current and temperature metrics and glider flight path utility in late 2019 and 2020. New receiver lines were added in the Northwest Atlantic in 2018. ASF and DFO initiated a receiver array along the coast of Labrador (i.e. Port Hope Simpson Line) in 2017. The array was doubled in 2018, covering a distance of 32 km from shore.
Platforms of Opportunity in the NAC area: Stationary Platforms of Opportunity Receiver Exchange (SPORE)	**Progress report (John Kocik):** The NOAA team maintained extant opportunistic arrays in 2018 and continued working with the whale passive acoustic group with a focus on the Gulf of Maine. All ocean observing buoys in the University of Maine program are fitted with acoustic receivers. In addition to Atlantic salmon, more than 20 other species are detected. These data are retrievable through the Ocean

	Tracking Network Data portal: Gulf of Maine NEFSC NERACOOS-GoMOOS Buoys (https://members.oceantrack.org/OTN/project?ccode=GMG). Additional partnerships with lobster fishers and eNGOS will expand coverage seasonally in 2019. 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	**Progress report (Tim Sheehan and Jon Carr):** 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 2020/2021. However, the ASF has continued their kelt tagging efforts in the Gulf of St. Lawrence (Miramichi and Restigouche rivers, and Cascapedia), but no new efforts outside of the Gulf have been initiated.
Generic Index River Sites in the NEAC area	No progress report received.
Malin Head to Islay Receiver Array (NEAC)	**Progress report (Niall Ó Maoiléidigh):** Funding for this project has been provided by the EU's INTERREG VA Programme (Environment Theme) – SeaMonitor project, which is managed by the Special EU Programmes Body (SEUPB), to a value of €4.6m. Match-funding for this project has been provided by the Department for Agriculture, Environment and Rural Affairs in Northern Ireland and the Department of Housing, Planning and Local Government in Ireland. This substantial investment will extend the existing network of 'smart' buoys and oceanographic models – delivered by sister projects COMPASS and MarPAMM – so that a line of acoustic receivers runs between the island of Ireland and Scotland. The SeaMonitor project is led by the Loughs Agency and supported by another eight leading marine research institutions using innovative marine species tracking technology to better understand and protect vulnerable marine life in our oceans. The SeaMonitor project will deliver Europe's largest telemetric marine array and spatial models supporting the conservation of basking shark, cetaceans, salmon, seals and skate. It will also provide three Management Plans; one for skate in the area from Loch Sunart to the Sound of Jura and two for salmon in both the River Foyle and Clyde estuaries.
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	**Progress report (Niall Ó Maoiléidigh):** Funding for this project has been provided by the EU's INTERREG VA Programme (Environment Theme) – SeaMonitor project,

Norwegian Sea using drifters/AUVs etc (NEAC)	which is managed by the Special EU Programmes Body (SEUPB), to a value of €4.6m. Match-funding for this project has been provided by the Department for Agriculture, Environment and Rural Affairs in Northern Ireland and the Department of Housing, Planning and Local Government in Ireland. This substantial investment will allow extensive tracking of salmon and profiling of the shelf-edge dynamics which profoundly influence the migrations of key species of fish including salmon, cetaceans and pinnipeds. The use of AUVs will allow development of marine spatial models supporting the conservation of salmon, basking shark, skates, cetaceans and seals.
NEAC kelt satellite tagging	No progress report received.
Sub-adult satellite tagging at Faroes	No progress report received.
Adult satellite/acoustic tagging at Greenland	**Progress report (Tim Sheehan and Jon Carr):** A new five-year collaborative study was initiated in 2018 by the Atlantic Salmon Federation (Canada), NOAA Fisheries Service (USA), Fisheries and Oceans Canada, and Association of Fishers and Hunters (Greenland) to track salmon fitted with pop off satellite tags (PSATs) from Greenland to coastal regions of origin. Funding for the project is provided by project partners, Equinor (an international private company invested in oil and gas exploration) and Canada's Atlantic Salmon Research Joint Venture. Atlantic salmon were captured, primarily via trolling, and tagged with PSATs (Microwave Telemetry Inc. (Colombia, Maryland) X-tags) near Qaqortoq, Greenland in October 2018. Genetic assignments were conducted for all tagged fish to determine region of origin. A total of 17 Atlantic salmon were captured in early October; 12 were tagged and released with PSATs, 2 with acoustic tags and 3 were not tagged but only sampled. Of the 12 PSAT tagged salmon six individuals were identified as North American origin and 6 were identified as European origin. For the North American origin salmon, one was identified as originating from the USA reporting group, 4 from the Gaspe Peninsula reporting group, and 1 from the Ungava Bay reporting group. All 6 European origin salmon were identified as originating from the United Kingdom/Ireland reporting group. As of mid-March 2019, 8 tags had popped off and transmitted. Fishing in the Qaqortoq region appeared to be poor in 2018 based on anecdotal information received from local fishers and low trolling catch rates. Exploratory trolling in 2017 resulted in ~1.43 fish caught per trolling hour compared to the ~0.15 salmon caught per hour in 2018.

	In 2019, modifications will be implemented with the objective of tagging 50 salmon with PSATs. The primary effort will remain trolling as this method is cost-effective and results in the least harm/injury to salmon compared to other capture methods. The sampling period will be extended from early September to late October and taggers will be scheduled to minimize overlap and maximize days fished.

6. The response to our request for progress reports and identification of factors hindering implementation for the twelve outline projects has resulted in information being provided for seven of the twelve projects. However, for those that have responded, some have indicated that lack of resources remains 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.

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 further application, under the same funding mechanism, for a third project was made and approved in late 2017. 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. SMOLTrack I.

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): €918,300

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 was initiated on January 1 2017, involving partners from Northern Ireland, England, Ireland, Spain and Denmark. The purpose of the project is to determine the mortality of salmon smolts / post-smolts during their migration through the lower parts of rivers, estuaries / fjords, and nearshore areas through case studies using telemetry in rivers of five areas: Denmark, England, Ireland, Northern Ireland and Spain. Additionally, mortality of kelts migrating on the same route will also be investigated in Denmark. Salmon will be tagged with acoustic transmitters and their subsequent migration will be followed via acoustic listening stations. This will provide novel data on lower-river and estuarine/coastal behaviour and mortality, as well as to evaluate the method's applicability in a broader context. Beside the scientific aims, the project is intended to bring together a group of experts to provide advice on best practices and SOP for this type of studies.

Table. Fate of the released smolts for each study area. The percentage of smolts successfully crossing the study area is shown in brackets in the last column.

Country	River	Smolts released	Smolts lost	Successful smolts
Denmark	Skjern	86	55	31 (36%)
England	Tamar	100	36	64 (64%)
Ireland	Erriff	40	28	12 (30%)
Northern Ireland	Bush	99	61	38 (38%)
Spain	Minho	50	23	27 (54%)
Spain	Ulla	100	95	5 (5%)
		∑ = 475	∑ = 298	∑ = 177 (37%)

The project is now complete. It has revealed variable, but generally low survival rates in the lower freshwater and transition environments through study areas across the European area of distribution of the Atlantic salmon. The methodology applied worked well and it was possible to acquire highly valuable data sets about loss of salmon smolts in lower rivers / estuaries, comparable over several countries. The results directed attention towards the conditions under which the smolts must move from river to sea as well as the presence of multiple predators. The results provide a solid, comparable one-year estimate on the survival of salmon smolts through the lower river and estuary / fjord from six river systems in five countries. The results show that potential bottlenecks for Atlantic salmon exist

already in the initial migratory phase, which may have a large impact on the overall return rate of adult salmon.

One paper has been published and two further papers are in preparation, as follows:

Flávio, H., Aarestrup, K., Jepsen, N., Koed, A. 2019. Naturalised Atlantic salmon smolts are more likely to reach the sea than wild smolts in a lowland fjord. River Research and Applications, 35(3) 216-223.

Flávio, H., Kennedy, R., Ensing, D., Jepsen, N., Aarestrup, K. In prep. Marine mortality in the river? Atlantic salmon smolts under high predation pressure in the last kilometres of an ICES index river.

Luke, A., Basic, T., Hillman, R., Ives, M. & Moore, A. In prep. Freshwater survival of Atlantic salmon smolts in relation to river flow and temperature

Comparing mortality of European salmon populations at sea using multiple -method telemetry studies. SMOLTrack II.

12. *Summary.* The Smoltrack II project was initiated on January 1 2018, involving partners from Northern Ireland, England, Ireland, Spain, Sweden and Denmark. The project aims to expand the platform and collaboration of Smoltrack I by including more partners (Sweden is included now, taking the total number of study sites to eight). The geographical span of the project now ranges over all of the salmon distribution area in the EU from north to south and east to west. The project specifically aims to identify specific predators causing the documented loss of smolts from the Smoltrack I project and make comparisons between survival of wild and hatchery-reared salmon smolts. Blood sampling will be used to evaluate smolt quality and sex as they exit rivers to test if gender and physiological background affects the chance of survival. Lastly, the project will do a pilot study to test the feasibility to tag genetically assigned large salmon at the Faroe Islands or Greenland and track the return migration.

Total project cost (including in-kind contributions): €539,000

EU contribution to the IASRB: €260,000

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

13. *Progress to date.* The first project tagging (smolts) in 2018 has been completed and overall results shown below in Table 2. The samples collected in 2018 for sexing the salmon are presently under analysis in AFBI. After these analyses the samples will be reallocated to CEFAS and / or DTU Aqua for physiological analyses. The radio tagging in 2019 has been undertaken, but data are not yet finally compiled (Automatic listening station and manual tracking has to be completed first). A workshop was held in Pontevedra, Spain in March 2018 (in prolongation of the Smoltrack I workshop), where studies and analysis were discussed and agreed and the Standard Operating Procedures for SMOLTrack I were updated and adapted for the present project, including procedures for blood sampling and genetic analyses. The experimental fieldwork went quite well and the results are much in line with the ones from 2017. In general, the wild smolts have a slightly better survival than hatchery (except for Erriff), but the difference is less pronounced than may have been expected. The radio-telemetry provided information about the exact cause of smolt-loss and both avian and mammalian predators were found to prey on smolts. The pilot study on salmon at sea has run into challenges of accessing suitable salmon for tagging. Currently,

work is done to prepare for a potential tagging of adult salmon of East Greenland and if this proves unfeasible, to discuss potential other solution with North American colleagues before their tagging operation in late Autumn 2019.

Table. Fate of the released smolts for each study area divided into wild and hatchery reared.

SMOLTRACK II (2018)

	Fish group	Tagged	Lost FW (%)	Lost Estuary (%)	Survived (%)
Minho, Spain	Wild	22	24	56	33
	Hatchery	48	15	63	23
Bush, Northern Ireland	Wild	50	68	6	26
	Hatchery	50	70	6	24
Erriff, Ireland	Wild	35	40	14	46
	Hatchery	35	6	20	74
Taff, England	Hatchery	94	30	12	62
Storaa, Denmark	Wild	50	8	14	78
	Hatchery	50	14	26	60
Gota alv, Sweden	Wild	24	*	*	*
	Hatchery	50	*	*	*
Hogvadsan, Sweden	Wild	37	*	*	*

* Data still being processed

Sea lice model for the sustainable development of Atlantic salmon fisheries and aquaculture. LiceTrack.

14. *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): €618,604

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.

15. *Progress to date.* A second project workshop took place at IFI offices in Citywest on 28/2/2018. An update was given on progress with model development in Killary Harbour. The proposed model builds on a previous hydrodynamic model produced for the Killary

area. The proposed model uses a horizontal spacing with 64 m (DTM: 320 x 100 grid cells) and 15 layers in the vertical direction (500,000 grid points). Grid spacing in the upper part of the water column was discussed and further consultation with the relevant project partners on this and other model-related sensitivities will be required. The best approach to integrate the lice data with the hydrodynamic data (e.g. 3D flow field, salinity, turbulence coefficients, wind forcing, particle time-steps, light attenuation) as well as overall model transferability was discussed and IMR agreed to facilitate and advise Irish partners. The resolution and availability of metrological data for the model was also discussed and it was noted that lice dispersal under a range of meteorological scenarios in Killary is important to elucidate. Stimulus thresholds of lice to light, temperature and salinity and their inclusion in the model were further discussed. It was noted that consideration should be given to localised variations in salinity in Killary which may influence lice survival and dispersal in different areas of the fjord and the potential exposure levels as a result to out-migrating fish.

Progress on sea lice model standardisation and application was discussed under the following areas; the definition of a particle in the model, behaviour of particles at boundaries, lice survival, effects of rate sensitivities, probability of infection, swimming behaviour, and application of standardisation. Vertical currents are not considered in the Norwegian model and the use of surface currents should be sufficient. Furthermore infection rates are temperature and time dependant and that < 50% of lice are considered infective (e.g. <5oC there is virtually no infection potential). NUIG will require the actual source data from the Killary area (e.g. stock abundance in the fish farm). Project partners will continue discussions on model standardization.

A brief overview on sea lice research and model development in home countries related to the implementation of the model in Killary Harbour was presented. A presentation was given on Sea lice and model development at the Institute of Marine Research including an overview of the “Traffic Light system”. A presentation was given on Sea lice work in Marine Scotland Science. The use of eDNA to calculate the abundance of copepodid lice was discussed. It was recommended by NINA to collect samples using a filter pump is preferable to using plankton tows. Pumps can be attached to the sentinel cages in four or five locations at 4-5 metres depth. There is an 80-90% detection rate using eDNA. The standardization in the collection and counting of lice data on fish to populate models was discussed as was the value of non-destructive sampling of sea lice on fish (field counts vs lab counts). IMR commented that field counts are best, otherwise lice can be lost, particularly the young stages of lice and freezing of samples can miss 20% of lice present.

Considerable progress was made in 2018 on development of a standard model through the LiceTrack project. A scientific paper entitled ‘A standard sea lice particle model for application in coupled hydrodynamic-particle models’ was prepared for publication in December 2018. It is expected that the manuscript will be published as a major scientific paper in 2019, a significant output of one of the core objectives of the LiceTrack project. The publication is:

Murray, A.G. et al. Submitted. A standardised generic framework of sea lice model components for application in coupled hydrodynamic-particle models. Environmental Modelling and Software.

Scottish type sentinel cage used in Killary harbor

Deploying sentinel cages in Killary harbour

16. The funding provided by the European Commission of approximately €800,000 is very much appreciated and has contributed to projects costing approximately €2 million in total being implemented.

Inventory of Research Relating to Salmon Mortality at Sea

17. The Inventory of Research Relating to Salmon Mortality at Sea, SAG(19)02, includes 20 ongoing projects related to the migratory behaviour of individual fish (C16, C18, C25, C27, C30, C31, C32, C33, C41, De5, De6, Ir12, Ir13, Ir14, Ni4, N18, U4, U10, U13, U16). One new project involving tracking individual fish has been included since last year as follows:

C41: Mapping Spatial and Temporal Distribution of Atlantic Salmon Mixed Stocks in the North Atlantic

In summary

18. 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.

19. 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 one new telemetry study has been initiated since last year. NASCO / the IASRB have now successfully applied for EU funding to support three projects related to mortality of salmon at sea. 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. 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.

Chair and Secretary of the IASRB
Edinburgh
2 June 2019