ICR(12)5

Research proposals submitted to the International Atlantic Salmon Research Board, 2012

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Research proposals submitted to the International Atlantic Salmon Research Board 2012

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 seeking funding support from the Board may be considered. For projects seeking only endorsement, a detailed proposal is not required only information providing a project summary, relevance to the SALSEA Programme, the name of the leading scientist and details of any cooperating organizations. For proposals seeking funding, more detailed information is required and should be received no later than 31 December each year.

2. Since the last Annual Meeting, we have received three applications seeking funding from the Board. None were received before the deadline of 31 December 2011. These applications are contained in Annex 1 and are as follows:

   ICR(12)6: Proposal to film at Greenland as part of the Castletown Productions Film Entitled 'Atlantic Salmon Lost at Sea'

   ICR(12)8: A Proposal for Pilot project to undertake genetic stokc of origin identification of European salmon captured at West Greenland

   ICR(12)9: Research Proposal for Consideration by IASRB – 2012 Genetic Stock identification of salmon caught in the Faroes fishery

3. The two projects contained in ICR(12)6 and ICR(12)8, were highlighted to the President, Heads of Delegation and Members of the IASRB by the Secretary on 4 April 2012, ICR(12)7 (Annex 2), seeking feedback on the funding options. It was stressed, however, that the Board had limited funds available and may choose to retain those funds as reserves. In the light of the feedback received, the Secretary again wrote to the President, Heads of Delegations and Members of the IASRB on 20 April 2012, suggesting that any decision be postponed until the Meeting of the IASRB in June.

4. The SAG will be asked to evaluate these three projects and develop its recommendations on the priorities for support by the Board.

Secretary
Edinburgh
24 May 2012

Annex 1

ICR(12)6

Proposal to film at Greenland as part of the Castletown Productions Film Entitled 'Atlantic Salmon Lost at Sea'

CASTLETOWN PRODUCTIONS

20-3-2012

Dear Malcom,

Thank you for taking the time to speak with me last week. I have prepared the answers to your questions below. I will call you to follow up and see if there is any additional information you need before presenting this to your board.

Filming to date:

10 days aboard the Celtic Explorer with the Salsea scientific research team in June/July 2009. We filmed scientists collecting smolts and other marine life from the daily trawls, weighing, measuring, and taking scale samples for DNA testing. We filmed the plankton trawls to measure how much food was available and we filmed the CTD sampling to determine conditions in the ocean at each location (temperature, salinity, etc). We interviewed 4 scientists on board covering different areas of expertise from genetics to biology and oceanography.

28 days filming on salmon rivers in Canada, the US (Maine), and Iceland in 2010 and 2011. This was to show the effects of the declining population of returning salmon to rivers, different programs to help salmon (habitat restoration, catch and release, dam removal) and to illustrate the close relationship between man and salmon, building a case for "why it matters" that this extraordinary fish is saved.

Greenland film shoot:

We plan to bring our film crew to Greenland in September of 2012. We will work closely with Tim Sheehan of NOAA and head of Salsea Greenland as well as local scientists from the Greenland Nature Institute

We will film the satelitte tagging of adult salmon (in order to track them on their homeward migration)

Recreate the sampling from adult salmon caught be local fishermen (for Salsea)

Underwater shots of sea life around the coast, showing the rich feeding ground for salmon

Scenic shots of the surrounding landscape

Native subsistence fishery for salmon – fishing sequences and interviews

Aerial shots of the coastline, icebergs, and spectacular scenery

Alternative fisheries to replace salmon fishing (or minimize it) like the lumpfish roe fishery.

Input regarding Salsea:

We would be very interested in NASCO's input regarding Salsea and welcome additional input outlining the goals and what the final results were.

Some questions are: Was Salsea able to determine what is the major cause of the mortality at sea?

Which stocks were most affected and which are doing well?

How was the genetic tracking useful and did the genetic mapping of rivers help in the overall prognosis of the problem? We plan to film the genetic mapping of rivers and refugia story, showing how salmon repopulated rivers after the ice age 10,000 years ago.

Is there hope and what can be done, if anything, to stem the mortality at sea?

Rights to use the film by NASCO once complete:

We expect and will request in our agreements with broadcasters that NASCO maintain rights for non-commercial use of relevant footage. Education is a key part of why we are making this film.

Assuming broadcaster consent, Castletown can also provide some NASCO relevant sequences of the footage for NASCO to use for non-commercial purposes.

Rights in the event of statements made by others that are incorrect:

As the producer of a documentary film that will include a significant amount of scientific data and interviews with field scientists my primary goal is that all such reporting will be factual to the best of my knowledge. Additionally, our anticipated broadcasters generally require verification of the factual basis for the content of the film.

Best regards,

Deirdre

Deirdre Brennan
Producer
Castletown Productions
340 East 57th St. Suite 12D
New York, NY 10022

ICR(12)8

A Proposal for Pilot project to undertake genetic stock of origin identification of European salmon captured at West Greenland.

Dr. Philip McGinnity & Professor Tom Cross (University College Cork), Dr. John Gilbey (Marine Scotland Science), Professor Paulo Prodöhl (Queen's University Belfast) and Professor Eric Verspoor (Aberdeen University)

Background

Fish from North America and Europe, both from the Northern and Southern European population complexes; contribute to the salmon stocks found off West Greenland. European salmon caught at West Greenland appear to be predominantly, if not exclusively, non-maturing one-sea-winter fish. These are fish that mature after two or more winters at sea, and are commonly known as multi-sea-winter (MSW) maturing fish. Marine survival indices for MSW fish in the North Atlantic have declined and remain low.

Both Northern NEAC MSW and Southern NEAC MSW stocks are currently considered to be at just about full reproductive capacity. However, at a country level, stocks from several jurisdictions are deemed to be below conservation limit (CL) thresholds. Furthermore, within the countries there are many individual river stocks, which are now below their CL (WGNAS, 2011).

For 2013 and 2014, the forecasts for salmon of pre fishery abundance (PFA) are less optimistic and suggest that the Southern MSW complex, in particular, is at risk of suffering reduced reproductive capacity in the future (WGNAS, 2011). The difference in terms of survival performance at sea, between the two European stock complexes, and the survival of fish from specific regions within the complexes, including differences among individual populations within regions, may reflect differential exposure to particular critical factors related to marine survival. Establishing what these factors might be will help in predicting pre-fisheries abundance and management of both high seas and home water fisheries.

Advances in microsatellite DNA profiling methodologies and statistical genetics approaches now make it possible to identify, with remarkable accuracy, salmon caught at sea to their natal region and, in some cases, to their river of origin. With regards to European fish, the SALSEA-Merge project has facilitated the development of a unique molecular assignment protocol – GRAASP: Genetically-based Regional Assignment of Atlantic Salmon Protocol – based on a suite of 14 microsatellites. The GRAASP database comprises 26,813 Atlantic salmon individuals from 467 locations, in 284 rivers, encompassing 370,000 pieces of genetic information representing ~ 85% of the non-Baltic European salmon production. The GRAASP tool is capable of delivering both broad and medium scale regional assignment. At the broad geographical scale, it currently recognises three regional assignment units (RAUs), namely, Iceland, Northern Europe and Southern Europe. Furthermore, at the finest supportable scale, it can distinguish 17 geographically cohesive regional subdivisions or RAUs (see Figure 1). Several high resolution microsatellite databases for genetic stock identification are now available in Ireland (the Beaufort NGSI panel), UK (Scotland-

FASMOP), UK (N. Ireland), UK (England & Wales, ASAP), Norway and France that allow, in many instances, river specific assignments.

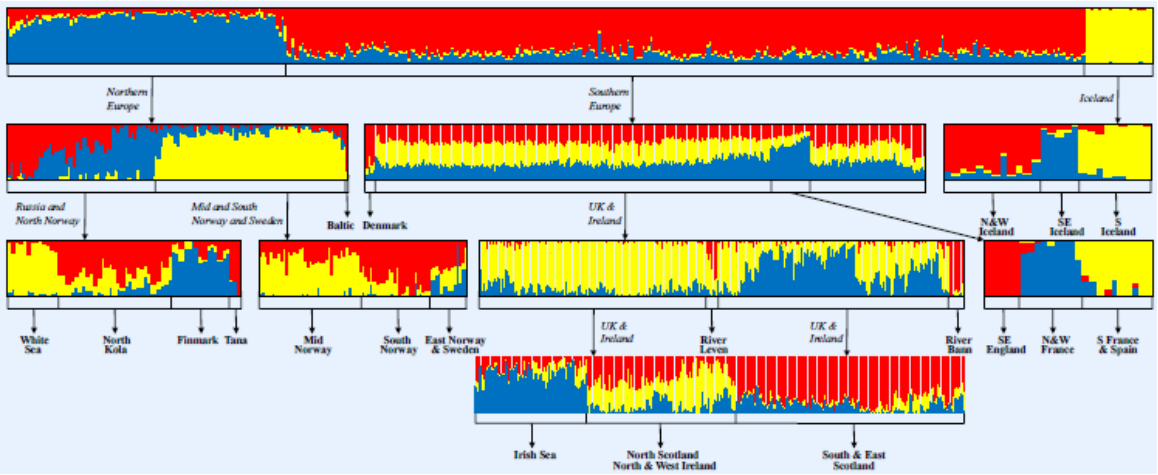

Figure 1. Hierarchical organisation of 17 GRAASP Regional Assignment Units (RAUs).

Objective

Marine sampling has been ongoing at West Greenland for best part of five decades as part of the International Baseline Sampling Programme. Recently, this programme has been enhanced by the SALSEA West Greenland sampling programme in an endeavour to provide data for investigating hypotheses on the causal mechanisms driving stock-specific performance in the ocean (i.e. marine survival).

Building on this work, it is proposed here to deploy the GRAASP and other National Atlantic salmon genetic databases to carry out a pilot study. The objective of this study will be to determine the region and/or river of origin of a strategic subset of historical and contemporary samples comprising fish scale and tissue collections from Atlantic salmon captured in both commercial and experimental fisheries at West Greenland.

Work Plan

The project will be co-ordinated and carried out by the proponents.

Genetic typing of the samples will be undertaken by the Beaufort Fish Populations Genetics Group (Ireland), led by Professor Prodöhl, using an ABI3730XL 96 capillary system. Fish would be screened for the Beaufort microsatellite salmon marker panel, which is a combination of the GRAASP and the Irish NGSI panels. Genotyping will be carried out on a subset of samples collected between 2002 and 2010, which have been made available for the analysis (Table 1). It is anticipated that in the order of 1,500 samples will be analysed as part of the pilot project the number of samples processed depending on available funding. Should the project proposal outlined here be funded, genotyping can commence March 1, 2012 with scored genotypes available for assignment analysis April 30, 2012.

Table 1. Samples available from west Greenland for genetic assignment as part of proposed pilot project

Year	N. America	Europe
2002	341	160
2003	1210	569
2004	1232	456
2005	583	184
2006	859	334
2007	921	202
2008	1594	259
2009	1521	142
2010	991	249
Total	9252	2555

The GRAASP genotypes will be used by the Marine Scotland Genetics Unit at the Freshwater Fisheries Laboratory, led by Dr Gilbey, to provide regional assignments to SALSEA Level 1- Level 4 groupings. A workshop will be held at the end of May at Queen's University in Belfast to consider the results and finalise a combined report detailing the assignments, and the relevant levels of confidence at the various geographical levels of resolution, and the implications of the results for future research directions. On the basis of these GRAASP assignments, tissue samples and genotype data will then be made available to the relevant individual National laboratories for assignment to higher resolution regional groups and to individual rivers within those specific jurisdictions. National laboratories will undertake this work on their own cognisance. This hierarchical approach to the assignment at different regional levels is illustrated in Figure 2.

The analysis of the marine distribution and the implications of the results will be led by Dr McGinnity and Professor Verspoor but will involve input from all parties. The results of the assignments emanating from each of the individual institutions will be combined to produce a final report, which will be submitted to the funding agency for June 2012.

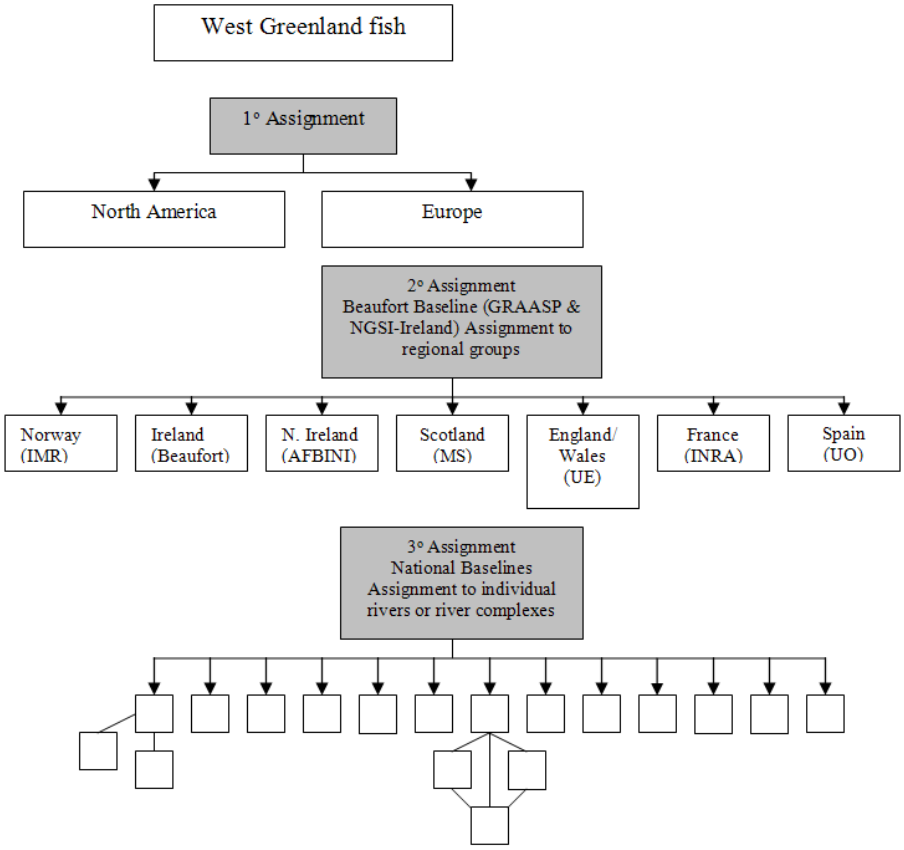

Figure 2 Flow diagram showing hierarchical organisation of process to assign fish captured at west Greenland 2002-2011 to region and river of origin.

Projected Costs

Genotyping (Beaufort Fish Populations Genetics Group)
Genotyping costs per fish: £12
Total fish genotyped: 1,500

Total genotyping cost: £18.000

Assignments (Marine Scotland)
Assignment of genotype data, statistical and GIS analysis of assignments data: £3,500
Report writing: £1,000

Statistical Analysis and Report completion (Aberdeen)
Statistical analysis of assignment data: £2,000
Report writing: £1,000

Statistical Analysis and Report completion (University College Cork)
Statistical analysis of assignment data: £1,500
Report writing: £1,000

The cost of holding a two day workshop and the associated travel expenses for participants would be in the order of £2,000.

The total envisaged cost would be approximately £30,000.

ICR(12)9

RESEARCH PROPOSAL FOR CONSIDERATION BY IASRB - 2012
Genetic stock identification of salmon caught in the Faroes fishery.

Ted Potter (Cefas), John Gilbey (Marine Scotland Science), Jan Arge Jacobsen (Faroe Marine Research Institute), Lars Petter Hansen (NINA), Vidar Wennevik (IMR)

Background

Fish from both Northern and Southern European stock complexes migrate through the southern Norwegian Sea as post-smolts and as 1SW and MSW adults, and were exploited in the long-line fishery that operated within the Faroes EEZ in the 1980s and 1990s. No fishery has operated at Faroes for at least 10 years, but ICES is asked to provide annual catch advice to NASCO for the fishery, and a management decision has been agreed each year. In recent years ICES has developed a risk-framework for the provision of this advice (ICES, 2011 & 2012), but this development is constrained, in part, by lack of data on the composition of the stocks exploited by the fishery. The only suitable data currently available come from a limited number of tag returns in homewaters (~100) from adult salmon tagged in the fishery area in the 1990s (Hansen and Jacobsen 2003). This restricts the ability of ICES to provide advice based on smaller management units as they have recommended.

Both Northern NEAC MSW and Southern NEAC MSW stocks are currently considered to be close to or above full reproductive capacity and so there is potential for there to be an exploitable surplus in the area in the near future. The NASCO agreement on the adoption of a precautionary approach (NASCO 1998), requires the development of a pre-agreed management framework or decision structure for each fishery. There is therefore an urgent need to provide the data to support such a management framework.

Advances in microsatellite DNA profiling methodologies and statistical genetics approaches now make it possible to identify, with good degree of accuracy, salmon caught at sea to their natal region and, in some cases, to their river of origin. The SALSEA-Merge project has facilitated the development of a molecular stock assignment protocol, GRAASP - Genetically-based Regional Assignment of Atlantic Salmon Protocol, based on a suite of 14 microsatellites. The GRAASP database comprises 26,813 Atlantic salmon individuals from 467 locations, in 284 rivers, encompassing 370,000 pieces of genetic information representing ~ 85% of the non-Baltic European salmon production. The GRAASP tool is capable of delivering both broad and medium scale regional assignment. At the broad geographical scale, it currently recognises three regional assignment units (RAUs), namely, Iceland, Northern Europe and Southern Europe. Furthermore, at the finest supportable scale, it can distinguish 17 geographically cohesive regional subdivisions or RAUs (see Figure 1). Several high resolution microsatellite databases for genetic stock identification are now available in Ireland (the Beaufort NGSI panel), UK (Scotland-FASMOP), UK (N. Ireland), UK (England & Wales, ASAP), Norway and France that may allow, in many instances, river specific assignments.

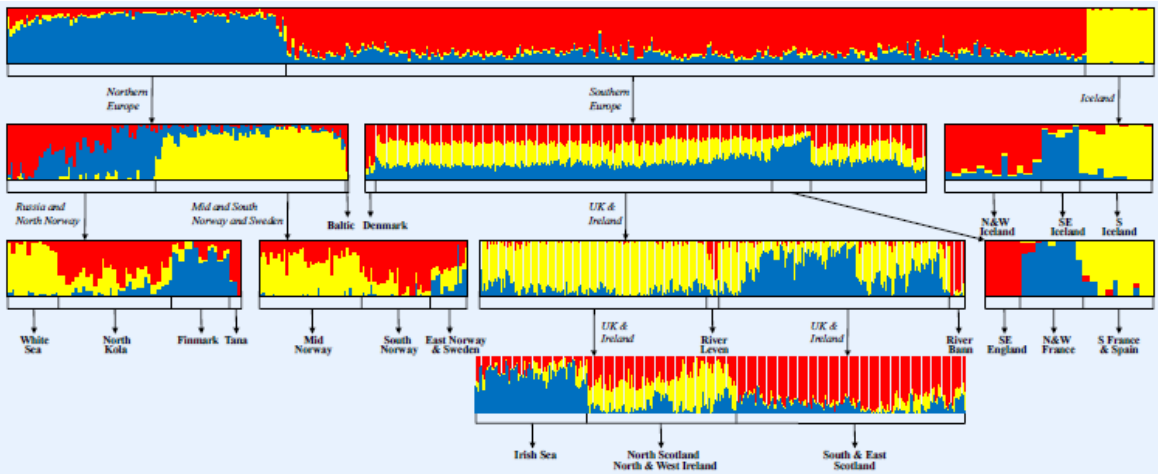

Figure 1. Hierarchical organisation of 17 GRAASP Regional Assignment Units (RAUs).

Sampling of both commercial and research catches in the Faroes EEZ was undertaken in a number of years between 1985 and 2000, and assignment of these samples should therefore provide a basis for establishing a baseline stock composition for the fishery. ICES (2012) has proposed that changes from this baseline over time might be estimated by weighting the regional contributions by their changes in pre-fishery abundance.

Objective

The overall aim of the project will be to provide the basis for assigning potential catches in a fishery at Faroes to their regions of origin in the NEAC area. The specific objectives are:

- To catalogue the scale samples collected from salmon caught in the Faroes fishery between 1984 to 2000;
- To identify a selection of scales that will best represent the likely stock composition during a baseline period or periods;
- To use GRAASP to provide country/region of origin assignments for the selected scales;
- To report to NASCO and ICES on the results of the study, the estimated changes in stock composition in the Faroes area within the fishing season and over time and how the finding can be used in the provision of catch advice for the NEAC area.

Work Plan

The project will be co-ordinated and carried out by the proposers.

Genetic typing of the samples will be undertaken at the Institute of Marine Research, Bergen, Norway, led by Vidar Wennevik, using an ABI3730XL 48 capillary system. Fish would be screened for the IMR microsatellite salmon marker panel, which is a combination of the GRAASP and the Norwegian panels. It is anticipated that in the order of 1,500 samples will be analysed with the final number of samples processed depending on available funding and on the method of DNA extraction utilised (with high quality scales in sufficient quantities to allow for multiple extractions, a cheaper extraction method can be employed than if there has been some DNA degradation during storage or if the quantity of scales is limited).

The GRAASP genotypes will be used by the Marine Scotland Genetics Unit at the Freshwater Fisheries Laboratory, led by Dr Gilbey, to provide regional assignments to SALSEA Level 1- Level 4 groupings. Attempts will also be made to assign fish to the sub-SASLEA levels utilising both the GRAASP and other available datasets.

A workshop will be held to consider the results and finalise a combined report detailing the assignments, and the relevant levels of confidence at the various geographical levels of resolution, and the implications for fishery management.

Should the project proposal outlined here be funded, selecting the scales samples will begin immediately, genotyping can commence in October 2012 with scored genotypes available for assignment analysis by January 2013. The assignment analysis will be completed by March 2013.

The results of the assignment will be used in developing catch advice for the NEAC area by the ICES Working Group on North Atlantic Salmon in April 2013.

The analysis of the marine distribution and the implications of the results will be led by Ted Potter, Jan Arge Jacobsen and Lars Petter Hansen. The results of the assignments will be presented in a final report, which will be submitted to the funding agency by June 2013.

Projected Costs

Genotyping (IMR, Norway: ~1500 scale sets at £13 per fish	£20,000
Assignments (Marine Scotland): Assignment of genotype data, statistical and GIS analysis of assignments data and report writing:	£9,500
Workshop (Location TBA): Two day workshop and the associated travel expenses for participants:	£4,000.
Total cost:	**£33,500**

References

ICES. 2011. Report of the Working Group on North Atlantic Salmon (WGNAS), 22–31 March 2011 Copenhagen, Denmark. ICES CM 2011/ACOM: 09. 286pp.

ICES. 2012. Report of the Working Group on North Atlantic Salmon (WGNAS), 26 March – 4April 2012 Copenhagen, Denmark. ICES CM 2011/ACOM: 09. 320pp.

Hansen, L.P. and Jacobsen, J.A. 2003. Origin, migration and growth of wild and escaped farmed Atlantic salmon, *Salmo salar* L., in oceanic areas north of the Faroe Islands. *ICES Journal of Marine Science* 60: 110–119

Annex 2

ICR(12)7

Correspondence Sent to Heads of Delegations and Board Members re Proposals to the Board

I have been contacted recently concerning two possible initiatives that might be supported financially by the Board. As you will be aware from the accounts of the International Salmon Research Fund that I sent you on 6 February, the Board has limited available funds at its disposal, currently around £20,000 and it may be prudent to maintain a small reserve.

Atlantic Salmon Lost At Sea

The first initiative relates to the production of a film *Atlantic Salmon Lost at Sea*. Following filming some of the SALSEA marine surveys and in rivers the producer, Deirdre Brennan of Castletown Productions (see www.atlanticsalmonlostatsea.net/index.htm), is keen to film in Greenland; the fishery, the people, the environment and the research. We understand that Tim Sheehan has been liaising with the producer on arrangements. Due to a funding shortfall the plans to film in 2011 have been postponed until 2012. I have had some discussions with the producer about the plans and the funding sought. I believe that this could be an opportunity for some good publicity for the Board (and for NASCO's wider work). Both Ken Whelan and Jens Christian Holst have been advising the producer about the SALSEA research. The film is being sponsored by the Atlantic Salmon Federation, the Marine Institute (Ireland), the Icelandic Angling Club, the Institute of Marine Research (Norway), the Mirimichi Salmon Association, the Ocean Foundation and the Cascapedia Society (Canada). The funding sought from IASRB to film in Greenland is £10,000. (We understand that Orri Vigfusson of NASF may also be involved and, if so, it will be important for NASCO/IASRB to have some editorial control). Even if no funds can be made available I would imagine that those involved in the NASCO Sampling might be interviewed. I will offer to meet with the Producer if the Board is interested in this project.

Genetic Analysis of West Greenland Samples

The second initiative is to conduct a pilot project to determine the region and/or river of origin of salmon using both historical and contemporary samples of scale and tissue collected in the fishery at West Greenland. I attach a brief outline of the proposal. This is clearly important work of relevance to the Board and to NASCO in view of their roles in relation to supporting the enhanced sampling programme, coordinating the baseline sampling and management of the fishery. Ken Whelan brought this initiative to my attention (the proposal was actually initially discussed during the margins of the Salmon Summit) and advises that a sum of £7,000 - £10,000 is being sought from the IASRB. The Atlantic Salmon Trust is involved in raising funds and a total of around £30,000 is required for the project.

Both initiatives are clearly of relevance to NASCO/IASRB but the Board has very limited resources. I would be grateful therefore if you could advise which of the following options you prefer:

a) retain existing resources (~£20,000) as a reserve;
b) support the filming at West Greenland up to a maximum of £10,000;
c) support the genetic pilot project up to a maximum of £10,000;
d) support both projects up to a maximum of £5,000 each.

I do think we should leave £5,000 to £10,000 as a reserve but await your views. I would appreciate your feedback on this no later than 20 April.