

SAG(08)7

Proposal submitted to the International Atlantic Salmon Research Board on the food availability of Atlantic salmon post-smolts during their marine phase.

August 2008

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SALSEA-Merge

**FOOD AVAILABILITY OF ATLANTIC SALMON POST-SMOLT
DURING THEIR MARINE PHASE**

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The following proposal for funding for 2009 to 2011 will be an integral part of SALSEA-Merge to analyse zooplankton, chlorophyll and nutrient samples collected during 6 international SALSEA-Merge cruises to the salmon post-smolt habitats of the Northeast Atlantic.

Costs associated with sample collection are covered by SALSEA-Merge, but the analyses and reporting of plankton and other key environmental samples lack funding.

Background

Below is the ABSTRAC of the SALSEA-Merge proposal to the EU quoted:

“Over the past two decades, an increasing proportion of North Atlantic salmon are dying at sea during their oceanic feeding migration. The specific reasons for the decline in this important species are as yet unknown, however, climate change is likely to be an important factor. In some rivers in the southern part of the species range, wild salmon now face extinction. This is in spite of unprecedented management measures to halt this decline. Arguably the greatest challenge in salmon conservation is to gain insight into the spatial and ecological use of the marine environment by different regional and river stocks, which are known to show variation in marine growth, condition, and survival. Salmon populations may migrate to different marine zones, whose environmental conditions may vary. To date it has been impossible to sample and identify the origin of sufficient numbers of wild salmon at sea to enable this vital question to be addressed. SALSEA-Merge will provide the basis for advancing our understanding of oceanic-scale, ecological and ecosystem processes. Such knowledge is fundamental to the future sustainable management of this key marine species. Through a partnership of 9 European nations the programme will deliver innovation in the areas of: genetic stock identification techniques, new genetic marker development, fine scale estimates of growth on a weekly and monthly basis, the use of novel high seas pelagic trawling technology and individual stock linked estimates of food and feeding patterns. In addition, the use of the three-dimensional Regional Ocean Modelling System, merging hydrography, oceanographic, genetic and ecological data, will deliver novel stock specific migration and distribution models. This widely supported project, provides the basis for a comprehensive investigation into the problems facing salmon at sea. It will also act as an important model for understanding the factors affecting survival of many other important marine species.”

In the SALSEA-Merge proposal it was stated that studying the food availability is an integral and important part of the research undertaken by SALSEA-Merge. Food availability, modulated by competition with other pelagic fish species, is important to post-smolt survival, through growth and predation processes. Further, food availability may influence distribution by active swimming of the post-smolts during the search for higher prey densities. Prey species abundances will also serve as major descriptors of post-smolt habitats throughout the SALSEA-Merge sampling areas.

During the process of adjusting the SALSEA-Merge application budget to the available funding it was decided to include sampling of potential food organisms during the cruises, while the analyses of these samples were excluded from the budgets because of the time and personnel consuming nature of such analyses.

Sampling design (by SALSEA-Merge)

The main prey of post-smolts at sea are macrozooplankton organisms and juvenile fish. Prey abundance and distribution during SALSEA-Merge cruises are observed by macroplankton trawls, traditional plankton nets and multi-frequency acoustics. The macroplankton trawl is equipped with a multiple opening and closing codend to facilitate vertically resolved sampling. The traditional plankton net used during the first three cruises was a WP-2 net. This will probably be adjusted during the next year's cruises to facilitate

better near surface sampling and also vertically resolved sampling. Probably, a MOCNESS sampler will be used. Table 1 summarises the anticipated number of samples from the six planned SALSEA-Merge surveys of the Northeast Atlantic and the costs involved in sample analyses.

Table 1. Available zooplankton samples from six SALSEA-Merge cruises (Fig. 1) during 2008 (cruises 1, 2 and 3) and 2009 (cruises 4, 5, 6) and costs of analyses. Norwegian trawl samples are worked up at sea and need no extra funding. Hours of analysis per sample are 4.

Cruises	Gear	Nation	Costs of sample analyses						
			Number of samples		Hours		Costs Euros		Total costs Euros
			2008	2009	2009	2010	2009	2010	
1 and 4	Macroplankton trawl	Ireland	0	0	0	0	0	0	
	Plankton net		10	30	40	120	3520	11040	
2 and 5	Macroplankton trawl	Faroe Islands	2	10	8	40	366.4	1832	
	Plankton net		13	30	52	120	2381.6	5496	
3 and 6	Macroplankton trawl	Norway	22	60	0	0	0	0	
	Plankton net		31	160	124	640	10912	58880	
Total			78	290	224	920	17180	77248	94428

Analyses and scientific interpretation

Norwegian samples of the macroplankton trawl are sorted, organisms identified, body length measured and weighed at sea. Plankton net samples are stored on formalin and analysed subsequently in the lab. In the present proposal we apply for funding of the analyses of macroplankton trawl samples not analysed at sea and net samples. Further we apply for funding of a Post Doc position over 18 months for analysis of multi-frequency acoustic data, the scientific interpretation of plankton data and for the participation in analyses and publication of results under SALSEA-Merge. See Work packages 4 and 5 of SALSEA-Merge proposal below. The Post Doc period will start 1. July 2010 to facilitate sufficient overlap with the work in SALSEA-Merge WPs 4 and 5:

Work package 4 S&T Objective: Biological Analysis of Samples

- analyse and rank available food items
- analysis of archival scale material
- analysis of scale samples collected in Work package 2
- establish digital scale library
- determine fine scale growth rates
- undertake dietary analysis and assessment of condition

Work package 5 S&T Objective: Merge and analyse genetic, biological and oceanographic data

- map spatial distribution of specific regional stocks or populations
- integrate distribution and migration of salmon with biological and oceanographic data
- develop models to integrate stock specific distribution and migration patterns, with patterns of growth, dietary differences and oceanographic conditions

The total costs of analyses of plankton samples and scientific interpretation, including Post Doc salary over 18 months, are given in Table 2.

Table 2. Total costs of plankton samples analyses and Post Doc salary.

Cost categories	2009	2010	2011	All years
Sample analyses	17180	77248	0	94428
Post Doc salary	0	52500	105000	157500
Consumables and travels for Post Doc		3750	3750	7500
Total	17180	133498	108750	259428

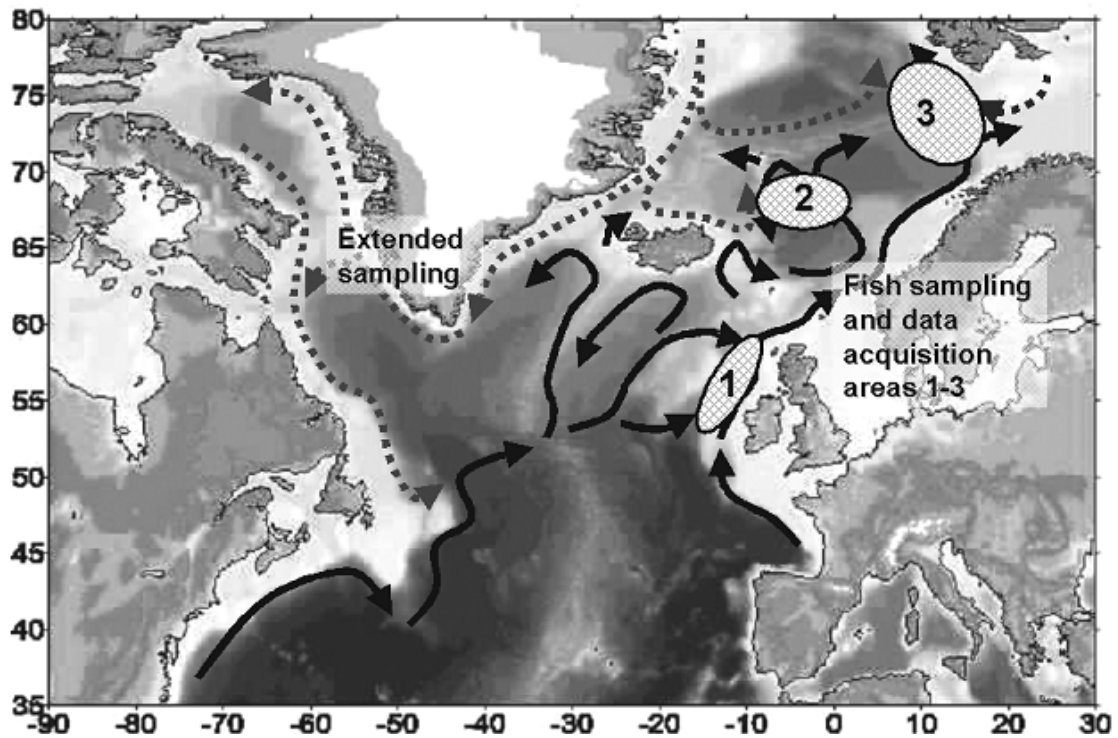


Figure 1. Proposed sampling areas during SALSEA-Merge

Timelines for the samples analysis

Samples will be collected at sea during 6 international cruises during the summers 2008 and 2009 (see above). Samples will be available for analyses after the cruise in the autumn 2008 and 2009. Sample analyses can be completed early 2009 and 2010 for samples collected in 2008 and 2009, respectively. Results of speciation and enumeration of potential food organisms will be disseminated to SALSEA-Merge (WPs 4 and 5) and for inclusion in SALSEA-Merge database immediately after completion of analyses.

Coordination, data analysis and interpretation

The sample transfer between laboratories, analyses and dissemination of results will be coordinated by Dr. Webjørn Melle (IMR, Norway). Scientific interpretation will be an integral part of SALSEA-Merge with additional help by the Post Doc.

List of Partners

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