

SEVENTH FRAMEWORK PROGRAMME THEME 7 Environment

Collaborative project (Large-scale Integrating Project)

Project no: 246 933

Project Acronym: EURO-BASIN

Project title: European Basin-scale Analysis, Synthesis and Integration

**Deliverable 5.1 Preliminary progress report based on existing and knowledge assembled in EURO-BASIN**

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Organisation name of the lead contractor of this deliverable: Ifremer

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Project Coordinator: Michael St John, DTU Aqua

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Theme 6 Environment

Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission)	X
RE	Restricted to a group specified by the consortium (including the Commission)	
CO	Confidential, only for members of the consortium (including the Commission)	

## **Deliverable 5.1 Preliminary progress report based on existing and knowledge assembled in EURO-BASIN**

is a contribution to

Task 5.1 To identify and determine the factors governing the spatial structure of key species populations

Related Milestones: MS23 Simulation of change in distribution of key fish populations; MS57 Draft of a first Special Issue publication in the journal of 'Progress in Oceanography

Responsible: Verena Trenkel  
Start month 1, end month 36

### **Executive Summary:**

Brief summary of deliverable, input from which WP, output to which WP, Relevance to other parts of the project

This report presents a review of the knowledge prior to the start of the Euro-Basin project on the ecology of widely distributed pelagic fish stocks in the North Atlantic basin with emphasis on their role in the food web and the factors determining their relationship with the environment. The species covered are herring (*Clupea harengus*), mackerel (*Scomber scombrus*), capelin (*Mallotus villosus*), blue whiting (*Micromesistius poutassou*), and horse mackerel (*Trachurus trachurus*), which have distributions extending beyond the continental shelf and predominantly occur on both sides of the North Atlantic. Also included are albacore (*Thunnus alalunga*), bluefin tuna (*Thunnus thynnus*), swordfish (*Xiphias gladius*), and blue marlin (*Makaira nigricans*), which, by contrast, show large-scale migrations at the basin scale. North American scientists helped to cover the Northwestern side of the North Atlantic. The focus of the review was on the links between life history processes and the environment, horizontal and vertical distribution, spatial structure and trophic role. It was found that many of the studied species carry out extensive migrations from spawning grounds to nursery and feeding areas. Large oceanographic features such as the North Atlantic subpolar gyre play an important role in determining spatial distributions and driving variations in stock size. Given the large biomasses of especially the smaller species, these stocks can exert significant top-down pressures on the food web and are important in supporting higher trophic levels. The review revealed commonalities and differences between the ecology of widely distributed pelagic fish in the NE and NW Atlantic basins, identified knowledge gaps and modelling needs that the EURO-BASIN project sets out to address within work package 5.

As the project has progressed, effort has been used in the sub-task to develop new models of spatial distribution and migration behaviour because this knowledge is a key input for estimating trophic impact of consumers. New work on stock structure and spatial distributions and their driving factor for mackerel and blue whiting is reported. The sub-task has also developed new migration models for bluefin tuna using individual-based and adaptive network modelling approaches. These include concepts related to energetic costs of swimming and tradeoffs to reach different foraging grounds, optimal foraging theory and game theory.

### **Relevance to the project & potential policy impact:**

The collated information and the new results are feeding into model creation and fitting carried out within WP5 for several species. Policy will be informed through the contribution to task T8.4. Advancing ecosystem based fisheries management in North Atlantic open waters under climate change.

### Access to Data and/or model code:

A data publication entitled **Catch data and spatially explicit estimates of stocks sizes, structure and biomass of Herring, blue Whiting and Mackerel** by Huse et al. is linked to this report and WP1 Deliverable D1.10 ESSD Journal Special Issue.

Complimentary data is available without restrictions via [www.pangaea.de](http://www.pangaea.de) data archive (WP1 Deliverable 1.8):

 Pinnegar, John Keith; Trenkel, Verena; Melle, Webjørn; Óskarsson, Guomundur J (2013): Stomach content records for pelagic fish (herring, mackerel, blue whiting, albacore and bluefin tuna) in the northeast Atlantic. *The Centre for Environment Fisheries and Aquaculture Science, Lowestoft*, Unpublished dataset #820041 <http://doi.pangaea.de/10.1594/PANGAEA.820041>

 Melle, Webjørn; Runge, Jeffrey A; Head, Erica; Plourde, Stéphane; Castellani, Claudia; Licandro, Priscilla; Jónasdóttir, Sigrún Huld; Johnson, Catherine; Chust, Guillem; Broms, Cecilie; Debes, Høgne; Falkenhaus, Tone; Gaard, Eilif; Gislason, Astthor; Heath, Michael R; Niehoff, Barbara; Nielsen, Torkel Gissel; Pepin, Pierre; Stenevik, Erling Kaare (2013): The North Atlantic Ocean as habitat for zooplankton: distribution of key taxa in relation to environmental factors and ecological traits, with a focus on the copepod, *Calanus finmarchicus*. Unpublished dataset #820732 <http://doi.pangaea.de/10.1594/PANGAEA.820732>