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# Trophic food web and ecosystem attributes of the Eastern English Channel



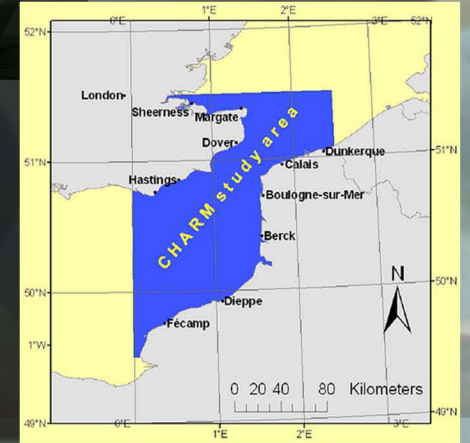
A work package in the Eastern Channel Habitat Atlas for Marine Resource Management (CHARM II) Interreg IIIA project

Villanueva M. C., B. Ernande, S. Vaz, JP. Delpech & A. Carpentier. (1) IFREMER Boulogne/mer and Port-en-Bessin [FR]

(CM 2006/I: 41)

## Objectives

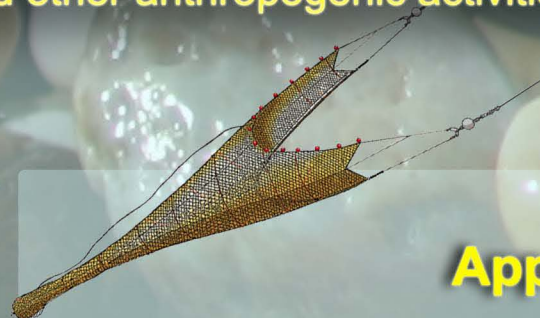
To address and elucidate several ecological questions about  
 (i) the food web structure and functioning  
 (ii) its implications for the spatial distribution of fish species  
 in order to provide a scientific base for the assessment and management of the impacts of fishing and other anthropogenic activities.



## Background

First phase of the CHARM project (2003-2005): to create an Atlas for the Marine Resources of the Eastern English Channel (ICES zone VIId), especially by determining the spatial distribution of 16 commercially important fish species as well as their physical habitat as conditioned by abiotic factors.

Second phase (2006-2008): mostly to develop processes in order to provide both scientific knowledge and operational tools for developing an ecosystem approach to fisheries (EAF)



## Approach

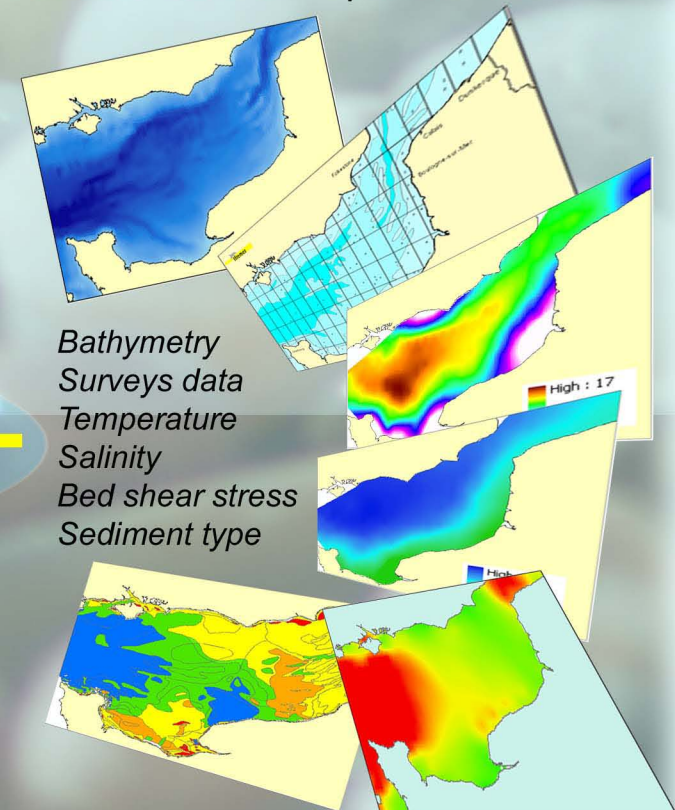
The Ecopath with Ecosim and Ecospace (EwE, Fig. 2)<sup>3</sup> approach has already been used as systematic framework in numerous aquatic system towards an EAF since these models are adaptive, incremental and geographically specific.

The EwE software was primarily developed with the objective to coherently quantify matter and energy flows between system components. Structure of flows and their distribution within and between trophic levels are analysed by aggregating single flows into combined flows for discrete trophic levels.

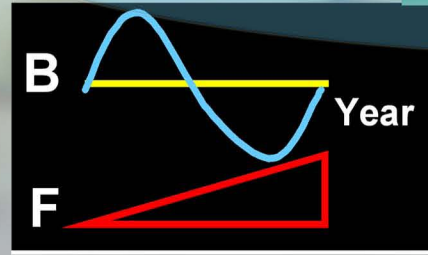
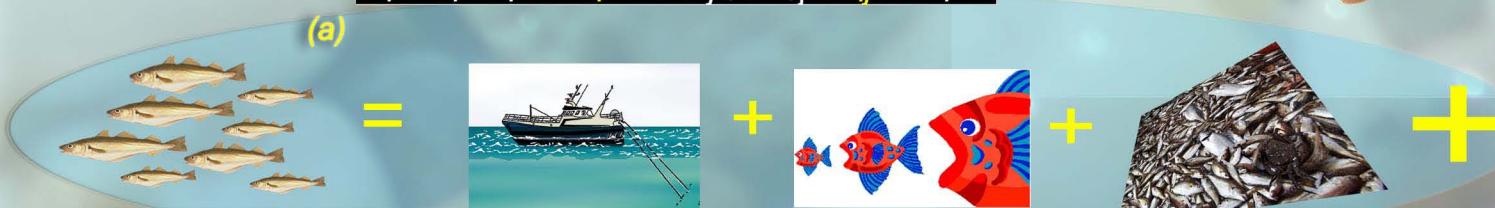
### References

- 1 Carpentier, A. et al. (2005) Eastern Channel Habitat Atlas for Marine Resource Management (CHARM), INTERREG IIIA.
- 2 Pikitch, E.K. et al. (2004) Science 305: 346-347.
- 3 Christensen V. et al. (2004) Fisheries Centre Research Reports 12 (4) 154 p.

For more information and free download of the CHARM Atlas: <http://charm.canterbury.ac.uk>



$$B_i \cdot P/B_i \cdot EE_i = Y_i + \sum B_j \cdot (Q/B)_j \cdot DC_{ij} + EX_i$$



$$dB/dt = f(B_i) - M_o \cdot B_i - F_i \cdot B_i - \sum c_{ij} (B_i \cdot B_j)$$

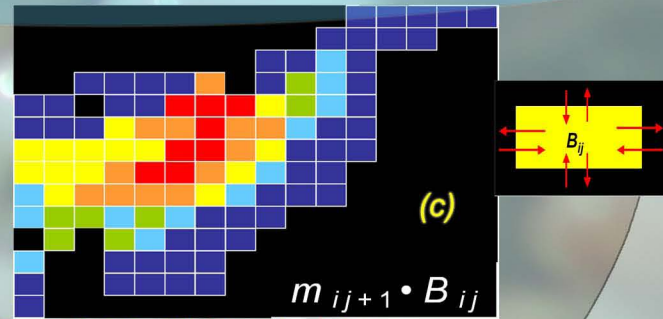


Figure 2. Schematic representation of the Ecopath (a) with Ecosim (b) and Ecospace (c) basic equations (Christensen et al., 2004)

## Ecological questions

- + Food web structure and functioning:
  - . top-down or bottom-up control
  - . biomass and energy flow distribution among trophic levels
  - . others: food web productivity, keystone species, effects of fishing
- + Spatial ecology:
  - . hypothesis: fish spatial distribution in relation with food resource availability
  - . interactions with spatial distribution of fishing effort
  - . interaction with spatial distribution of other anthropogenic activities (wind farms, dredging, ...)

## Outlook

The determination of energy distribution and the network structure of energetic flows will reflect prominent features of the ecosystem in terms of the current status of resources. This intends to identify system level indicators identified for EAF approaches which include a spatial component. Spatial zoning of this environment can become a prime management tool for developing evaluation criteria for adopted management plans.