

# What impact will changes in marine plankton have on the variability of their fish predators?

Marine Theme Objective: State of the Marine Environment; Science for Integrated Marine Management

## What's the problem?

Climate change and human pressures (e.g. fishing activity, loss of biodiversity) have altered the distribution and productivity of several marine organisms in the North Atlantic, particularly around the British Isles, in an area that sits at the boundary between a northern European cold-water system and a warm temperate-water system typical of lower latitudes.

The decline of a few economically relevant fisheries and the recent poor recruitment in planktivorous fish in the sea around the UK have highlighted the importance of taking into consideration in fisheries management the complex interactions between marine species and the marine ecosystem dynamics, often overlooked in the past.

## What are the aims of the project?

Defra funded project MF1105 'The Continuous Plankton Recorder Survey : Fisheries Investigations (CPR VI)' to help monitor how changes in marine biodiversity may affect the fluctuations of North Atlantic fish stocks.

Main aims of this project are :

- to maintain the plankton monitoring performed by the Continuous Plankton Recorder (CPR) Survey in the North Atlantic, increasing the existing CPR time-series, which is the longest and most-spatially extensive plankton survey in the world;
- to improve our understanding of how changes affecting plankton organisms, which are at the bottom of the marine food web, may influence the variability of their marine predators (i.e. fish);
- to provide plankton indicators that can be used to implement an ecosystem based approach for a sustainable management of fish stocks;

This project, that has run since 2007 and finishes in early 2012, also aims to develop an international network of experts that collaborate to monitor and improve our understanding of ongoing changes in the marine system. The research carried out in this project has contributed to a number of reports for ICES, the UK MCCIP report cards and others publications.

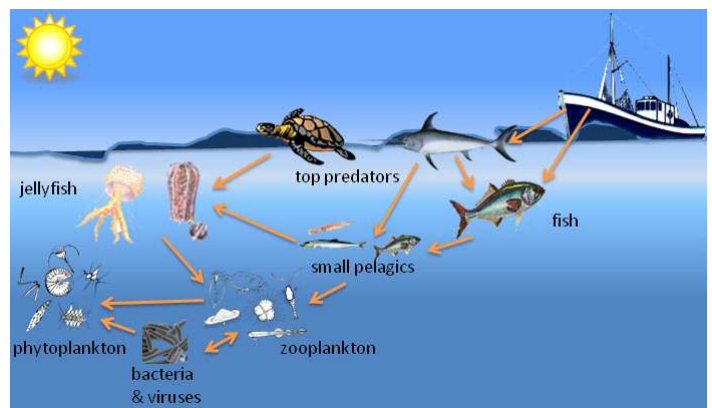


Figure 1: Example of a marine food web showing the interactions between different marine organisms (source: Sir Alister Hardy Foundation for Ocean Science).

## Which policy areas will the research inform?

Climate and human-induced changes affect the state of the marine ecosystem as well as its sustainability and productivity. The results from this project will inform fisheries management, conservation of biodiversity and indicators of good environmental status under the EU Water Framework Directive and the EU Marine Strategy Framework Directive (specifically the Qualitative Descriptors n. 1, 2, 4 and 6). Responses to OSPAR and to ICES on observed impact of hydroclimatic variability were based on expertise from this project. Plankton indicators produced within this project will be used for an integrated assessment of the North Sea marine ecosystem.



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## What are the results from the project and how will they be used?

Improved indicators of plankton stock have been produced within this project. Implementation of those indicators in the integrated assessment of different UK marine regions will contribute to develop sustainable management of the fishery.

Defra provided a contribution to an ICES Working Group investigating the recruitment variability in North Sea herring, sandeel and blue whiting (ICES SGRECVAP). Scientific evidence emerged to support a link between the recent poor recruitment of North Sea herring and the significant changes that occurred in the plankton, the food of herring larvae.

Main results that affect policy management and priorities include:

- The complex interactions between fish and their marine plankton prey need to be considered to understand the decline of planktivorous fish stocks. Failure to do so will result in an unsustainable management of fish stocks.
- Marine plankton predators (e.g. jellyfish) competing with fish for prey, have increased in recent years in some shelf and offshore regions (e.g. Celtic Sea). This additional pressure needs to be accounted for when managing marine ecosystem in those regions.
- Some areas around the British Isles are particularly sensitive to climate and to other environmental changes (e.g. river run-off). In those regions, where marine habitats are potentially at risk, fish stocks should be exploited more lightly than elsewhere.
- Care should be taken when evaluating the criteria for good environmental status in the regions more exposed to natural variability. Target restrictions should be implemented for the conservation of those marine habitats.

Dr. Priscilla Licandro, leading investigator, has presented the main highlights of this project at the Marine Fisheries Science Advisory Group held in London in May 2010.

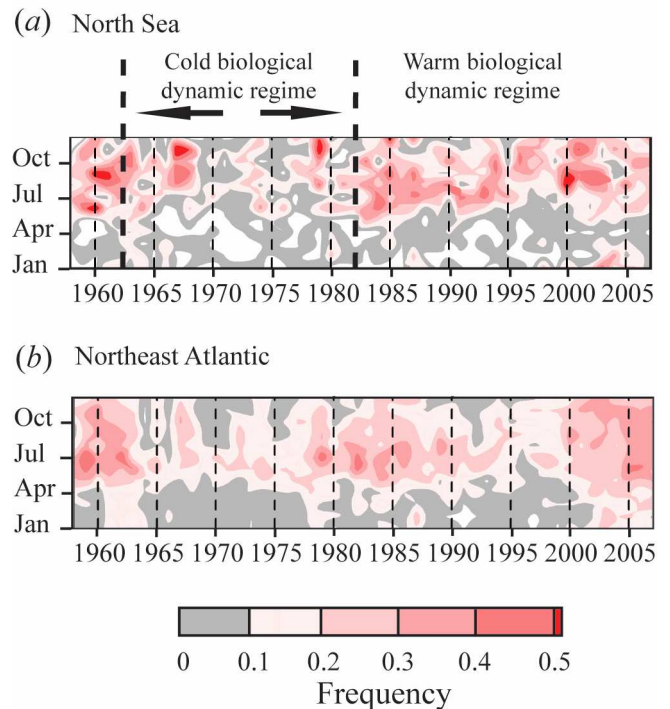


Figure 2: Average monthly frequency of cnidarian jellyfish in (a) North Sea and (b) Northeast Atlantic CPR samples in 1958-2007 (source: Licandro et al., *Biology Letters*, 6: 688-691).

## Where can I find further information about this and related research?

Please contact Priscilla Licandro at the Sir Alister Hardy Foundation for Ocean Science (SAHFOS) ([prli@sahfos.ac.uk](mailto:prli@sahfos.ac.uk)) for more information about this project.

Alternatively, please contact Defra's Marine and Fisheries Science Unit:  
[marinescience@defra.gsi.gov.uk](mailto:marinescience@defra.gsi.gov.uk)

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