

### “IN EX FISH”

## The effects of non-fishery influences on fish stocks

*Recent years have seen fish stocks reach unprecedented low levels. Although the responsibility of the fishing industry in respect of this should not be underestimated, many other factors that act on fish populations and its surrounding ecosystems must also be considered. For instance, atmospheric-ocean interactions which influence climate variability, along with processes such as predation, have been shown to influence the dynamics of fish populations. In addition, agricultural nutrient input, pollution and habitat loss are also drivers of changes to marine life.*

*To achieve sustainable exploitation of fish stocks the influence of these processes must be factored into the setting of the levels of human activities.*

The **IN EX FISH** project was launched in January 2006 with the aim to **increase the responsiveness of fishery management to a range of anthropogenic (human) and non-anthropogenic (natural) factors affecting exploited fish populations**. Its objectives were to:

- Review the effects of anthropogenic and natural factors on the dynamics of fish stocks
- Develop a framework for evaluating anthropogenic and natural factors on the dynamics of exploited fish species
- Identify the most appropriate ways of monitoring important factors and develop methods for assessing the effect of these factors in four ecologically contrasting case study areas
- Demonstrate the effect of integrating the IN EX FISH knowledge into fishery management

To allow comparisons to be made between a range of different human and non-human forcing factors affecting the environment, four ecologically contrasting case study areas have been selected, all of which are of interest to stakeholders:

- the North East Atlantic (including the North Sea RAC area, ICES area VIa and Icelandic Seas);
- the Baltic Sea RAC area;
- the Iberian Sea (within the south-western waters RAC area); and
- the Mediterranean Sea RAC area.



PROJECT MEMBER PROFESSOR CHRIS BRIDGES ON A BLUE FIN TUNA SURVEY IN THE MEDITERRANEAN SEA. ©C. BRIDGES.

During the first six months of IN EX FISH, the project partners reviewed and assessed the effects of different factors on fish ecology. Consequently, a workshop was hosted that brought together project members and specialists from both out- and inside the European Community (Japan, France, Sweden and Spain), so as to identify the important natural and anthropogenic factors that affect commercially exploited fish stocks.



**Project acronym:**

IN EX FISH

**Full title of Project:**

Incorporating extrinsic drivers into fisheries management

**EU contract number:**

022710

**Web-site:**[www.inexfish.org](http://www.inexfish.org)**Coordinator****Prof. Chris Frid****University of Liverpool  
School of Biological Sciences**Crown Street  
Liverpool, L69 7ZB  
UK

Phone : +44 (0)151 795 4382

Fax : +44 (0)151 795 4408

Email : [c.l.j.frid@liv.ac.uk](mailto:c.l.j.frid@liv.ac.uk)

Although the effect of fishing on commercial fish stocks was identified as the most important driver of changes in fish ecology, **temperature, salinity, prey abundance and predation** were also found to be of importance. For some fishes, ice coverage, habitat modification, pollutants (including hormone mimics and complex manmade chemicals such as PCBs) and nutrient enrichment were identified as factors impacting on survival. Finally, indices of changes in the atmosphere-ocean system, the North-Atlantic Oscillation index and upwelling indices, should prove valuable to map changes in the environment.

IN EX FISH will make fisheries management more sensitive to the changes in a stock's productivity/biomass (condition) by improving the understanding of changes in biological parameters, e.g. growth rate and size-structure of the stock, which are due to the identified important factors.

The next step is thus focused on establishing the metrics (also known as indicators) of the important factors and determining the effect of these factors on selected exploited species. Tools, such as the "Fisheries Library in R", are being developed that allow the effects of changes in the important factors on fish dynamics to be assessed in the four case study areas.

By developing contrasts and comparisons as a result of looking at the study areas, the project will be able to assess the relative importance of the different factors. In the final phase all this work will be pulled together to draw out the emergent lessons and to develop management tools that allow incorporation of forcing factors which affect fisheries dynamics.

IN EX FISH will contribute to a better understanding of uncertainty in the estimation of a stock's productivity/biomass (condition), and therefore of changes in fishing mortality due to changes in stock condition. This will allow management to respond more quickly to changes in the ecosystem.



IN EX FISH WORKSHOP ATTENDEES, PROJECT MEMBERS AND INVITED EXPERTS. BACK ROW (L-R): MICHELE DEFLORIO; STURE HANSSON; GREGORIO DE METRIO; LOUIZE HILL; CATHERINE SCOTT; PER DOLMER; ANDERS BIGNERT AND GUEST FRONT ROW (L-R): VICTORIA DE ZARATE; MARIA DE FATIMA BORGES; GREGORY BEAUGRAND; OLLE HJERNE AND ZIRO SUZUKI. © CLSCOTT.

**"NEXT TO FISHING,  
TEMPERATURE, SALINITY, PREY  
ABUNDANCE AND PREDATION  
WERE FOUND TO BE  
IMPORTANT DRIVERS OF  
CHANGES IN FISH ECOLOGY"**