PROFET Policy

TECHNICAL LEAFLET

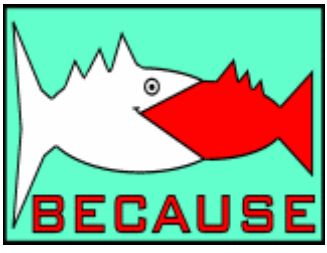
Policy-relevant issues in Aquaculture & Fisheries

Reference No. FF-ALL-ENVEFF-07

"BECAUSE"

Modelling the critical interactions between exploited prey fish, exploited fish predators and other wild life

In most European shelf ecosystems, populations of predatory fish are now severely depleted. This has released predation pressure on prey fish populations substantially. In part, man has taken over the predation role and harvests this part of the prey fish production either for human consumption or for reduction to fish meal, due to which prey species populations have remained fairly stable. Currently, there is no accurate scientific picture of the interactions between predator and prey species and their effects on non-commercial top predators. However, once recovery plans for the over fished predator stocks become operational and effective, an exact quantitative understanding of these interactions will be vital to maintain biodiversity.



For this reason, the EU-funded BECAUSE project has **investigated the interaction between predator and prey, and the shifts in their relative populations**. The project also looked into how fishing affects the balance of the marine food chain. The focus was on simple but critical interactions in the upper trophic levels of marine food webs, referring specifically to the interactions between exploited prey fish populations, exploited fish predators and wild life such as sea birds and marine mammals dependent on the same prey fish populations.

The interactions targeted for investigation included **sandeel/ predator fish, nephrops/cod, capelin/cod herring/cod, sprat/ cod, hake/prey fish, and finally also hake and cod cannibalism**. These interactions were studied in 5 different case studies:

- **the Nordic Seas (i.e. the Barents Sea and waters off Iceland),**
- **North Sea,**
- **Baltic Sea,**
- **Iberian Shelf/Bay of Biscay and**
- **Mediterranean Sea**.

In each case study the analysis started with the development and/or revision of conceptual food web models. This included a detailed analysis of processes driving critical interactions, mainly prey selection, predator/ prey overlap and its dependence on biological and hydrographical factors, consumption, growth and maturity. Special emphasis was given on updates of the population numbers of dependent wild life and revisions of their feeding behaviour and food requirements.

Due to the increased expertise on the historic effects of environmental and/or anthropogenic impacts on critical biological interactions, the process analysis resulted in improved process models which were in turn used to improve existing multi-species models. These models were then further developed and investigated with regard to inherent structural and stochastic uncertainty.

These optimised multi-species models were finally used to produce **forecast predictions for different management scenarios, taking into account environmental regimes and the food requirements of seabirds and marine mammals**. This way, precautionary reference points (i.e. reference points used in precautionary management to define acceptable levels of mortality and recruitment criteria) could be identified as criteria to be used in

Project acronym:
BECAUSE

Full title of Project:
Critical Interactions BEtween Species and their Implications for a PreCAUtionary FiSheries Management in a variable Environment - a Modelling Approach.

EU contract number:
502482

Web-site:
http://www1.uni-hamburg.de/BECAUSE/

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"BECAUSE OPTIMISED MULTI-SPECIES MODELS THAT WERE USED TO PRODUCE FORECAST PREDICTIONS FOR DIFFERENT MANAGEMENT SCENARIOS, "

management measures in order to prevent risk situations.

In its Reform of the Common Fisheries Policy in 2002, the Commission proposed to refocus management on a more long-term approach to securing sustainable fisheries with high yields. Since then, various multi-annual management plans for the recovery of commercial stocks or groups of stocks have been adopted by the Council of Europe (e.g. Council Regulation (EC) No 676/2007 of 11 June 2007 establishing a multiannual plan for fisheries exploiting stocks of plaice and sole in the North Sea). These plans are however based on single species assessments methods and do not take into account trends in predation mortality due to increased or decreased predator stocks. Therefore, recovery plans should include strategies for all species of economic and ecological interest, not for one species alone.

The precautionary reference points derived from the BECAUSE project are necessary for the development of such strategies in different climatic/hydrographic periods. This way, BECAUSE will aid to improve multi-species fisheries assessment and propose optimal policy and management measures to replenish fish stocks and ensure high yields.