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Projects:

**Eel hatchery technology for a sustainable aquaculture (EEL-HATCH) (39181)**

Hatchery and rearing technology for commercial production of glass eels is fundamental to sustainable and profitable eel aquaculture. The vision is to enhance existing technology to rear European eel larvae to the glass eel stage, thereby closing the lifecycle in captivity. Pioneering research of the consortium has raised eel breeding from a state of reproductive failure to stable production of viable larvae.

Objectives include: Design “state of the art” hatchery facilities, optimize broodstock feeds, enhance assisted reproductive technology, and develop larval culture systems and diets. The main success criterion is achievement of large scale culture of larvae throughout the larval stage, leading to glass eel production. The establishment of sustainable aquaculture of this endangered species, presently relying on captive glass eel will rebuild the highly profitable market for eel aquaculture and suppliers as well as assist in conservation and stock management plans.

Results obtained during the half of the project period include the design and establishment of a dedicated research facility in relation to DTU Aqua in Hirtshals, involving several partners. The facility applies recirculation aquaculture systems with emphasis on matured water technology and microbial control. Scientific highlights include successful production of recombinant European eel gonadotropic hormones; enhanced reproduction, fertilization and incubation procedures; and optimized larval culture conditions, including e.g. temperature, salinity, and light regime. Larval diets have been developed and tested in first feeding and behavioral experiments, leading to the first published work on larval feeding for this species. Experiments on improved diets and optimized rearing tanks for larval growth are ongoing.

This project is coordinated by DTU Aqua.

The project is funded by Innovation Fund Denmark.
Study on stomach content of fish to support the assessment of good environmental status of marine food webs and the prediction of MSY after stock restoration (Open call for tenders No MARE/2012/02) (39036)

In support of policies for sustainable management strategies of living marine resources, demands for integrated ecosystem advice are growing and more extensive use of long-term management plans, which are consistent with the ecosystem approach to fisheries management, is anticipated. However, long-term management plan evaluations of fish are particularly sensitive to changes in the proportion of fish removed by natural predators (natural mortality). A prerequisite for estimating this correctly is accurate knowledge of species interactions: Who is eating whom when, where and in which quantity?

Existing stomach content data are currently used in multispecies models using historic stomach content data from before 1995. Since this period, there have been considerable changes in the predator and prey stocks of both the Baltic and the North Sea. Thus, updated information on stomach contents of the essential predators in these two areas is urgently needed.

In order to update and improve the quality and quantity of the available back ground data for the above mentioned multispecies models and management plans, the aim of this project is to
- conduct new stomach content analyses of Baltic cod to support our knowledge of the spatial and temporal stability of cod preferences
- conduct new stomach content analyses of Baltic whiting as well as grey gurnard, mackerel and hake collected in the North Sea to support our knowledge of potentially important predators for which the diet is presently poorly known or is expected to have changed significantly since the last sampling efforts
- compile historical data, which are existing in several institutes around the Baltic and North Sea, and convert them from paper or outdated electronic format into the necessary standard format
- incorporate the new as well as all appropriate historical stomach content information into the Baltic and North Sea stomach content databases

The end product will be updated stomach content databases for the Baltic and North Sea, which include all available information up to 2013. In the Baltic, the project will increase the number of stomachs available for modeling by more than 170%. In the North Sea, the project will increase the number of years where data are available for grey gurnard from 2 to 8, for mackerel from 2 to 6 and for hake from 0 to 1, hence substantially increasing the confidence in the temporal stability of the modeling results.

The databases will be made freely available to the scientific community and will form the basis for new estimates of natural
Forage fish interactions (FACTS) (38781)
Removal of a forage fish has consequences for both predators and prey of forage fish. As everything is connected, every management action has a price which goes beyond the apparent, direct effect on the target species. The fishery on forage fish can therefore not be seen in isolation, as the immediate gain in profit from the fishery has to be discounted by the lowered potential for production of large piscivorous fish. Management actions on other species also influences forage fish, i.e. conservation efforts on marine mammals or sea birds have direct consequences for the predation pressure on forage fish.

The objective of the project was to provide insight and quantitative advice on the ecosystem wide consequences of management actions directly or indirectly related to forage fish.

The two overarching questions were:
- What are the consequences of forage fish fisheries on (a) predator growth and abundance, (b) economic output of fisheries on piscivorous species, and (c) ecosystem stability and the risk for regime shifts?
- What are the consequences of changes in predator populations on forage fish populations and fisheries?

The method was a combination of ecosystem models, of process studies aimed at feeding into the models, of economic models, and of data-analysis of existing data sources.

The project covered four ecosystems in detail: Norwegian-Barents Sea, Baltic Sea, North Sea and Bay of Biscay.

FACTS brought together leading European fisheries and university institutes working on creating the tools for ecosystem based management. The active involvement of the institutes in the current management has provided a means for the results of the project to feed into management. The project furthermore included a network component which has ensured a wider dissemination of methods and results within the marine scientific community.

The project was coordinated by DTU Aqua.

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Research areas: Marine Populations and Ecosystem Dynamics & Fish Biology & Ecosystem based Marine Management
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