Arctic Research Icebreaker Consortium (ARICE) (39508)
ARICE's overall aim is to provide Europe with better capacities for marine-based research in the ice-covered Arctic Ocean.
ARICE aims at reaching this goal with the existing polar fleet by:
1. Networking: ARICE will develop strategies to ensure the optimal use of the existing polar research vessels at a European and international level. The aim is to establish an International Arctic Research Icebreaker Consortium which shares and jointly funds ship time for scientists on the available research icebreakers.
2. Transnational access: ARICE will provide transnational access to four European and two international research icebreakers. Access is granted based on scientific excellence of the research proposals, which researchers need to submit during the application process. The participating icebreakers are: PRV Polarstern (Germany), IB Oden (Sweden), RV Kronprins Haakon (Norway), RRS Sir David Attenborough (United Kingdom), CCGS Amundse (Canada) and RV Sikuliaq (USA).
3. Joint research activities: ARICE will improve the research icebreakers' services by working closely together with maritime industry on a so called “ships and platforms of opportunity” programme. Through this programme, commercial vessels operating in the Arctic Ocean will collect oceanic and atmospheric data on their cruises. At the same time, science and industry will work together to explore new technologies, which can improve ship-based and autonomous measurements in the Arctic Ocean. ARICE will also implement virtual and remote access of data via an innovative 3D Virtual Icebreaker, which will provide anyone with real-time information from the Arctic.

The project is coordinated by the Alfred Wegener Institute, Germany and funded by the EU Horizon 2020 programme.

Investigation into online microbial water quality measurements (39471)
Danish SME Lagur produces a novel electromagnetic treatment system for the chemical-free treatment of water, that reduces the impact from lime scale in water on pipes, heating, and cooling systems. The system also has a significant impact on reducing microbial/bacterial levels within these systems. The product benefits have been proven through practical experience, but further expansion was limited by the customers' requirement for integrated water quality monitoring. The goal of this project is therefore to progress towards development of a system that can monitor microbial, chemical, and physical water quality with the results available online, and be integrated with Lagur's water treatment systems.

The project is coordinated by DTU Aqua and is funded by the European Regional Development Fund.

Ballast water - Tool for supporting the delimitation of a "same risk area" (39348)
A project financed by the Danish Maritime Fund via the Danish Nature Agency, to develop a decision support tool for authorities and consultants involved with the ballast water convention and measures preventing the spread of marine invasive species. The tool will support decision makers in member nations of the International Maritime Organisation (IMO) to identify and delimit marine areas with high connectivity considering hydrography and species biology. Identification of marine areas with high connectivity can provide a basis for granting exemptions in relation to the ballast water convention and the requirement for ships to treat ballast water before being discharged into the sea. The tool development is based on existing freeware including "IBM Lib" (DTU Aqua's own individual-based modeling system for linking individual-based models to hydrographical model data), Netlogo (a widely used IBM simulation system) and R (a statistical programming and data handling package).

This project is coordinated by DTU Aqua.

The project is funded by the Danish Maritime Fund via the Danish Nature Agency.
Sound herding system for sustainable fisheries (GUDP-SHS) (39365)
The purpose of the project is to develop a new type of fishing gear, Sound Herding System (SHS), which applies sound to influence fish swimming direction and thereby herding them into a trawl. The sounders are mounted on the trawl boards, so as to create a wall of sound on both sides of the trawl opening. This increases the effective width and height of the trawl opening, resulting in higher catch rates. The frequency of the sounders is selected to be 4 kHz, which can be used to affect the clupeoid species herring, sprat and anchovy. Most other relevant species are not sound sensitive at this frequency.

The system can be used to avoid by-catches of herring in the mackerel fishery by closing trawl opening for herring with sound. Customers receive economic gains from higher catch rates and smaller by catch. The gain for the environment is a reduction in CO2 emissions and improved resource utilization.

The central work in the project is the development of trawl doors equipped with sounders as tested by exploratory scare effect measurements and mapping of sound fields. Fish response to sound is studied experimentally and finally the sounders' impact on the environment is examined.

This project is coordinated by Sonus Aqua Aps, Denmark.

The project is funded by the Ministry of Environment and Food of Denmark through the Green Development and Demonstration Program (GUDP).

Collaborative modular underwater robotic system for long-term autonomous operations (REMORA) (39341)
In this project we aim to bootstrap new high-impact underwater robotics activities at DTU. We propose to develop a novel robotic platform, the REMORA1 system, for research, education and innovation. The objectives of the project are to develop the necessary infrastructure, i.e., underwater robotic system, test facilities, educational framework and external collaboration, to perform world-class research and innovation in the area of offshore underwater robotic technology.

With this project we aim to eventually strengthen the Danish maritime sector in dealing with the high cost and technical challenges of inspections and maintenance in increasing amount of offshore installations. The project is a collaboration between DTU Electrical Engineering, DTU Mechanical Engineering and DTU Aqua who have complementary expertise within development and innovation of robotic technology and applications of underwater robotics.

This project is coordinated by DTU Electrical Engineering.

The project is funded by A/S Dampskibsselskabet Orients Fond.

Danish Fisher-Researcher Network (39315)
The project aims to bring the active Danish fishing sector and operational fisheries research closer together through "fisher-researcher" networking activities. The project will contribute to the collection and exchange of information and knowledge on fisheries and research herein across sectors and generations. This knowledge exchange will take place at several levels of education (secondary schools, university studies and training of working fishermen). The project will support innovation and development of sustainable fisheries through collation of ideas as well as preparation and planning of project cooperation for the solution of current and future challenges about fisheries, fish stocks and management. Bringing the primary fishing industries in direct contact with research and management in a network will support local skills in fishing ports to serve the development and succession in the coastal communities. Workshops and demonstrations of novel development are intended to direct technology transfer, innovative collaborative proliferation of businesses and recruitment of newly qualified academic staff. In addition, Danish fishing industry participation at the international level will be strengthened through increased technical scientific support from DTU Aqua before and under meetings in e.g.
Implementing robot and drone technology in fisheries (39303)

The project aims to provide proof of concept for the use of robots in the fishery, focusing on three specific types for three different implementations. One will be used to determine the species and size composition of fish in the catch to prevent discards, the other to search for fish optically with a drone (capelin in Greenland) and the third a sailing robot to search for fish using sonar. The robots/drones to be employed are available on the marked. A development project must subsequently design software etc. to produce marketable products. It is estimated that there is a great potential in Denmark and a huge world market for these technologies that presently are not employed in fishery. This project is coordinated by DTU Aqua.

The project is funded by the Ministry of Environment and Food of Denmark through the Green Development and Demonstration Program (GUDP).

Stage, B., Project Participant, National Institute of Aquatic Resources, Arctic Section
Mosegaard, H., Project Participant, National Institute of Aquatic Resources

01/07/2015 → 01/12/2016

Keywords: Research areas: Marine Living Resources & Observation Technology

Collaborators: Blue Ocean Robotics, Partrederiet M/S Isold HG 333, Aquamind A/S, Danish Pelagic Producers Organisation

Project: Research

COLUMBUS (39239)

COLUMBUS overarching objective is to ensure that applicable knowledge generated through EC-funded science and technology research can be transferred effectively to advance the governance of the marine and maritime sectors while improving competitiveness of European companies and unlocking the potential of the oceans to create future jobs and economic growth in Europe (Blue Growth).

This project is coordinated by AquaTT UETP Ltd.

The project is funded by EU, Horizon2020.

Mariani, P., Project Participant, National Institute of Aquatic Resources
Thøgersen, T. L., Project Participant, National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography
Larsen, E., Project Participant, National Institute of Aquatic Resources

01/03/2015 → 28/02/2018

Keywords: Research areas: Oceanography & Observation Technology


Project: Research

Underwater time of flight image acquisition system (UTOFIA) (39240)

This project offers a compact and cost-effective underwater imaging system for turbid environments and will fill the current gap between short-range, high-resolution conventional video and long-range low-resolution sonar systems. The camera system utilizes high frequency laser pulses synchronized with rapid shutter operations on nano second time scales to radically reduce the interference of back scatter on visual images. Using this range-gated imaging technology, the system will extend the imaging range by factor 2 to 3 over conventional video systems. At the same time, the system will provide video-rate 3D information. UTOFIA offers a new modus operandi for the main targeted domains of application: marine life monitoring, harbour and ocean litter detection, fisheries stock assessment and aquaculture, seabed mapping, offshore industry and civil security.

The project is a collaborative effort between engineering companies producing the laser components, the camera systems, the software control and processing systems as well as the deployment platforms. The project also involves
companies charged with integrating the system and its commercialization into the market place. The role of DTU Aqua is
twofold; it is responsible for a series of field and laboratory trials to demonstrate the proof-of-concept and to feed back into
the engineering design process, and it is responsible for the exploitation and dissemination dimension of the project,
particularly with respect to marine science, fisheries and aquaculture applications.
The consortium is coordinated by SINTEF, Norway.
The project is funded by EU, Horizon2020.

Visser, A., Contact Person, National Institute of Aquatic Resources, Section for Oceans and Arctic
Mariani, P., Project Participant, National Institute of Aquatic Resources
Jonasdottir, S., Project Participant, National Institute of Aquatic Resources
Stage, B., Project Participant, National Institute of Aquatic Resources
Bridda, J., Project Participant, National Institute of Aquatic Resources
Thegersen, T. L., Project Participant, National Institute of Aquatic Resources
Behrens, J., Project Participant, National Institute of Aquatic Resources

Keyword: Research areas: Marine Living Resources & Marine Populations and Ecosystem Dynamics & Population
Keywords: Genetics & Observation Technology
Collaborators: Odos Imaging Ltd., SINTEF, Subsea Tech, AZTI-Tecnalia, Fraunhofer-Gesellschaft, Bright Solutions Srl
Project: Dynamic user-driven marine e-maps for the advancement of Danish industrial fisheries (GUPD-VIND) (39246)

Dynamic user-driven marine e-maps for the advancement of Danish industrial fisheries (GUPD-VIND) (39246)
This project aims at strengthening Danish industrial fisheries development in order to (i) reduce the search time and fuel
consumption per ton of fish caught (revenues: 16 million DKK/year), (ii) make better use of the sprat quota (revenues: 15
million DKK / year, by a full quota uptake), (iii) pave the way for sustainable self-management of resources in the industrial
fisheries sector and (iv) contribute to creating and maintaining jobs in the local fishing community.
The specific objectives of the project: Development of an IT tool that will contain (i) a platform to improve sharing of
knowledge and registration of observable and derived variables (data), and (ii) user-defined and user-controlled digital
Marine Maps with those specific data that fishermen consider important as background information in the planning and
implementation of fishing trips. These marine data include (but are not limited to) a portfolio of Marine Maps spanning from
the North Sea hydrography and bottom conditions over distribution of plankton and fish to water-DNA.
The needs for a technological development of this fishery comes from increasing average vessel size, while the number of
large vessels is reduced to about 1/8 of what it was in the past. The immediate consequence is a reduction in the
collective search performance and knowledge sharing. In addition, the area based management of the sandeel fishery
introduced in 2011 has contributed to a reduction of fishermen's opportunities to diversify fishing and explore a wider
variety of fishing grounds. Finally, the sprat fishery is uncertain because of by-catch limits and a very variable CPUE
driven by wind and weather. This has led to an underutilization of the sprat quota by around 100,000 tons per year.
Fisherman knowledge of good fishing opportunities is based on the correspondence between historical catches and
observable variables at the time of capture, such as the seasons, wind, waves and tides, and it is precisely this kind of
knowledge that the project wants to combine with a technological solution, so that all relevant data is made widely
available to the fishermen by developing user-controlled dynamic digital Marine Maps. The project includes a business
plan for the IT company Anchor Lab, which develops the user-controlled Marine Maps, and plans for derived effects in
terms of better utilization of the sprat quota and fuel savings through the use of the Marine Maps. Besides the economic
effects, the project contributes to CO2 reduction, and supports the technological development of a modern industrial
fishery sector, based on a natural resource to be managed by the EU in accordance with ICES' advice.
This project is coordinated by DTU Aqua.
The project is funded by the Ministry of Environment and Food of Denmark through the Green Development and
Demonstration Program (GUDP).
Mosegaard, H., Project Coordinator, National Institute of Aquatic Resources, Section for Marine Living Resources
Pedersen, E. M., Project Manager, National Institute of Aquatic Resources
Christensen, A., Project Participant, National Institute of Aquatic Resources
Stage, B., Project Participant, National Institute of Aquatic Resources
Eg Nielsen, E., Project Participant, National Institute of Aquatic Resources
Worsøe Clausen, L., Project Participant, National Institute of Aquatic Resources
van Deurs, M., Project Participant, National Institute of Aquatic Resources
Andersen, N. G., Project Participant, National Institute of Aquatic Resources

01/01/2015 → 30/06/2018

Keywords: Research areas: Oceanography & Fish Biology & Observation Technology
Collaborators: Danish Meteorological Institute, Anchor-Lab
Project: New methods and models for population estimates of mussels with the use of GPS data (39088)

New methods and models for population estimates of mussels with the use of GPS data (39088)
Based on the new management requirements from authorities and industry, the access to new data collection and the
desire for more mussel fishing areas, there is a need for the development of new tools for monitoring and managing
shellfish stocks.
The aim of the project was to develop new methods and models for estimating shellfish stocks in Denmark that may
include several types of information to the management. The project worked with stratified extensive sampling strategies
such as sidescan sonar, video recordings, data from automated GPS loggers from industry's own data and classical
Based on the data collected different types modeling tools was developed. The project has resulted in a new management tools for population estimation with different degrees of detail and types of information. This project was coordinated by DTU Aqua.

The project was funded by the Danish Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund (EFF).

Petersen, J. K., Project Coordinator, National Institute of Aquatic Resources, Danish Shellfish Centre
Canal-Vergès, P., Project Participant, National Institute of Aquatic Resources
Saurel, C., Project Participant, National Institute of Aquatic Resources
Thygesen, U. H., Project Participant, National Institute of Aquatic Resources
Stage, B., Project Participant, National Institute of Aquatic Resources
Kristensen, K., Project Participant, National Institute of Aquatic Resources
Pedersen, E. M., Project Participant, National Institute of Aquatic Resources
Geitner, K., Project Participant, National Institute of Aquatic Resources

01/01/2014 → 30/06/2015

Keywords: Research areas: Coastal Ecology & Observation Technology & Marine Living Resources
Collaborators: Foreningen Muslingeerhvervet, Orbicon
Project: Research

Ecosystem based method for impact assessment (39142)
The project aimed to develop a methodology for impact assessment and measures to support the implementation of the Marine Strategy Framework and Natura 2000.

The project included
- Development of an approach to impact assessment and step by step guide for management actions to ensure biodiversity, marine food webs and seabed integrity.
- A Case Study on the Dogger Bank to support the implementation of the Natura 2000 processes was evaluated and best practice identified.
- A Case study in the Kattegat with monitoring and ecosystem analysis of muddy habitats to optimize nature conservation and fisheries management under the Marine Strategy was evaluated and best practice identified.
- Development of cost-effective methods for management, monitoring and control in a report that describes the best practices in the subareas and the related costs.

The project was coordinated by DTU Aqua.

The project was funded by the Danish Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund (EFF).

Stage, B., Project Coordinator, National Institute of Aquatic Resources, Arctic Section
Pedersen, E. M., Project Participant, National Institute of Aquatic Resources
Mosegaard, H., Project Participant, National Institute of Aquatic Resources
Dinesen, G. E., Project Participant, National Institute of Aquatic Resources

23/07/2013 → 01/05/2015

Keywords: Research areas: Observation Technology & Marine Living Resources & Coastal Ecology
Collaborators: Dalsgaard Data A/S, Danish Anglers Association, Silkeborg Fiskeriforening
Project: Research

Benthic ecosystem fisheries impact study (BENTHIS) (39021)
There is general concern about the adverse impact of fisheries on benthic ecosystem which may negatively affect the fisheries yield and integrity of the sea bed. In an integrated approach to marine management, there is a need to develop quantitative tools to assess the impact of fisheries on the benthic ecosystem and at the same time collaborate with the fishing industry to develop innovative technologies and new management approaches to reduce the impact on benthic ecosystems. BENTHIS will provide the knowledge to further develop the ecosystem approach to fisheries management as required in the Common Fisheries Policy and the Marine Strategy Framework Directive. It will study the diversity of benthic ecosystem in European waters and the role of benthic species in the ecosystem functioning. Fisheries impacts will be studied on benthic organisms and on the geo-chemistry. The newly acquired knowledge will be synthesized in a number of generic tools that will be combined into a fishing/seabed habitat risk assessment method that will be applied to fisheries in the Baltic, North Sea, Western waters, Mediterranean and Black Sea. Fisheries will be selected with the fishing industry based on the impact on the benthic ecosystem. BENTHIS will integrate fishing industry partners to collaborate in testing the performance of innovative technologies to reduce fishing impact. Finally, in collaboration with the fishing industry and other stakeholders, new management approaches will be developed and tested on their effects on the ecosystem and their socio-economic consequences. As such BENTHIS will substantially improve the scientific basis to integrate the role of marine benthic ecosystems in fisheries management.

The project has 33 partners from 12 countries.
The project is coordinated by Institute for Marine Resources & Ecosystem Studies (IMARES), Wageningen University, The Netherlands.
The project is funded by EU, Framework Programme 7.

Eigaard, O. R., Project Coordinator, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Nielsen, J. R., Project Manager, National Institute of Aquatic Resources
Bastardie, F., Project Participant, National Institute of Aquatic Resources
The changes in the design is today implemented in the technical legislation in the Kattegat and Skagerrak and there were construction (number of panels, meshes in circumference, tension lines during the catch build-up. Detailed understanding of the effect of changing design parameters like panel construction, selvedges, codend weights. The final design was demonstrated in the flume tank for the industry for further discussion. The project delivered a detailed design specifications for the Nephrops fishery in Kattegat. Further, the test conducted in the project delivered a global geometry was monitored with optic stereo-system techniques over a gradient of catch of a 2-panel and 4-panel version of the SELTRA codend through extensive monitoring of their global geometry in the flume tank in Hirtshals. The global geometry was monitored with optic stereo-system techniques over a gradient of catch causing relative large losses of the economically important Nephrops. The aim of the project was to optimize the geometry of a 2-panel and 4-panel version of the SELTRA codend through extensive monitoring of their global geometry in the flume tank in Hirtshals. The global geometry was monitored with optic stereo-system techniques over a gradient of catch compared to before impact. The sediment analyses revealed nearly 100 different invertebrate species many of which lives burrowed or tube building in the sand. Overall diversity did not differ significantly between transects trawled by the two gears and the non-trawled transect. Detailed analyses showed, however, that some species (fragile sea anemones, polychaetes and echinoderms) were less abundant after impact from the conventional trawl compared with the newly-designed trawl and the control transect. A few species were more abundant in the transect trawled by the conventional trawl, including some smaller crustaceans. These results suggest the newly-designed trawl has a lower impact on benthic fauna than the conventional trawl and we expect the final analyses will support these results. The project is coordinated by DTU Aqua. The project was funded by the Danish Ministry of Food, Agriculture and Fisheries through the Green Development and Demonstration Program (GUDP). The new pelagic gear was constructed according to specifications. It behaved as intended and could easily be operated on Dogger Bank. The new gear consisting of pelagic doors and Dynema equipped trawl has attracted considerable attention among fishers and can be considered a business success. Catch volumes (tons/hour) did not differ between the experimental and standard trawl under parallel fishing. Sandeel behavioral differences could not be identified from sonar and UV-camera recordings, and size and oil content of sandeels was not systematically different between the two gears. Calibration experiments demonstrated 24 % lower fuel consumption in the new trawl. Bottom surveys were carried out annually from 2012 to 2014 in the North-eastern part of Dogger Bank (in the Dutch/NL EEZ) at approximately 35 meters depth. Sediment analyses showed a grain size composition dominated by fine sand mixed with small amounts of gravel, whereas fine particles comprises 1 % maximum ideal as a sandeel habitat. Grain size composition was not altered by trawling or time. Bottom impact with new gear is estimated to be 30 % reduced compared to a similar trawl using conventional doors. Based on the side-scan sonar recordings it was not possible to distinguish differences between the two trawl types in sediment depth penetration. The foot prints left by both sandeel trawls in one year were not discernible in subsequent years. Results from the video record analyses showed especially conch and hermit crabs were more abundant soon after trawling compared to before impact. The sediment analyses revealed nearly 100 different invertebrate species many of which lives burrowed or tube building in the sand. Overall diversity did not differ significantly between transects trawled by the two gears and the non-trawled transect. Detailed analyses showed, however, that some species (fragile sea anemones, polychaetes and echinoderms) were less abundant after impact from the conventional trawl compared with the newly-designed trawl and the control transect. A few species were more abundant in the transect trawled by the conventional trawl, including some smaller crustaceans. These results suggest the newly-designed sand eel trawl has a lower impact on benthic fauna than the conventional trawl and we expect the final analyses will support these results. The project is coordinated by DTU Aqua. The project was funded by the Danish Ministry of Food, Agriculture and Fisheries through the Green Development and Demonstration Program (GUDP). 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The sediment analyses revealed nearly 100 different invertebrate species many of which lives burrowed or tube building in the sand. Overall diversity did not differ significantly between transects trawled by the two gears and the non-trawled transect. Detailed analyses showed, however, that some species (fragile sea anemones, polychaetes and echinoderms) were less abundant after impact from the conventional trawl compared with the newly-designed trawl and the control transect. A few species were more abundant in the transect trawled by the conventional trawl, including some smaller crustaceans. These results suggest the newly-designed sand eel trawl has a lower impact on benthic fauna than the conventional trawl and we expect the final analyses will support these results. The project is coordinated by DTU Aqua. The project was funded by the Danish Ministry of Food, Agriculture and Fisheries through the Green Development and Demonstration Program (GUDP).

Efficient and low impact gear in the Danish fishery for industrial species (GUDP Tobis) (38849)
The aim of the project was to ensure the future of the Danish industrial fisheries in the increasing demands for reduced environmental impact. The Danish industrial fisheries amount to around 800 million DKK a year in first value. The industrial fishing for sandeel, was seen threatened by a potential ban against bottom trawling in the main fishing areas at Dogger Bank in the North Sea, due to appointment of a large Natura 2000 area by UK, the Netherlands and Germany where the trawl doors don't have bottom contact and where modern materials are used in the gear and for the wire. Thus, compared to traditional gear, an overall energy saving of minimum 30% on each kg fish caught was expected, and also the damages on the benthic fauna was expected to be reduced or eliminated. The objective was to develop and document a fishing method for industrial fisheries (sandeel, Norway pout and sprat) where the trawl doors don’t have bottom contact and where modern materials are used in the gear and for the wire. Thus, compared to traditional gear, an overall energy saving of minimum 30% on each kg fish caught was expected, and also the damages on the benthic fauna was expected to be reduced or eliminated.

Design optimization of SELTRA 180 (38908)
After implementation, the industry was concerned that a newly developed selective codend (SELTRA codend) was causing relative large losses of the economically important Nephrops. The aim of the project was to optimize the geometry of a 2-panel and 4-panel version of the SELTRA codend through extensive monitoring of their global geometry in the flume tank in Hirtshals. The global geometry was monitored with optic stereo-system techniques over a gradient of catch weights. The final design was demonstrated in the flume tank for the industry for further discussion. The project delivered detailed design specifications for the Nephrops fishery in Kattegat. Further, the test conducted in the project delivered a detailed understanding of the effect of changing design parameters like panel construction, selvedges, codend construction (number of panels, meshes in circumference, tension lines during the catch build-up. The changes in the design is today implemented in the technical legislation in the Kattegat and Skagerrak and there were...
no problems or difficulties raised by the industry during the commercial take-up process.
The project was coordinated by DTU Aqua.
The project was funded by the Danish Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund (EFF).
Krag, L. A., Project Manager, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Herrmann, B., Project Participant
Madsen, N., Project Participant, National Institute of Aquatic Resources
Frandsen, R., Project Participant, National Institute of Aquatic Resources
Lundgren, B., Project Participant, National Institute of Aquatic Resources
01/01/2011 → 31/12/2012
Keywords: Research areas: Fisheries Technology & Observation Technology
Collaborators: Danish Fishermen's Association
Project: Research

**Nørrefjord: A case study of coastal habitat status and restoration possibilities (38171)**
Nørrefjord has been used as a case study to study analyze Danish coastal habitats and their fate and ecological function for fish. As many other Danish coast areas the fjord has undergone dramatic changes in its biological structure and function due to human activities and influences. The fjord is nutrient loaded and eutrophication has led to reduction in the photic zone and frequent hypoxia in fjord deeper parts (>10 m). In addition, there has formerly been extraction of gravel and sand in shallow areas of the fjord (Stenberg, C., Project Manager, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Stettrup, J. G., Contact Person, National Institute of Aquatic Resources
Kristensen, L. D., Project Participant, National Institute of Aquatic Resources
01/01/2011 – 31/12/2013
Keywords: Research areas: Coastal Ecology & Observation Technology
Collaborators: Local fishermen associations, University of Southern Denmark, Danish Nature Agency, Local Municipalities (Fåborg and Assens)
Project: Research

**Electronic monitoring on smaller fishing vessels fishing with gillnets (38773)**
The aim of the project is to examine whether electronic monitoring by the use of CCTV and sensor recordings can ensure full documentation of the fisheries carried out by smaller gillnetters, and whether the use of “pingers” (acoustic deterrent devises) can be more operational.

Furthermore, the project has the aim to proof that:

- A total recording of all catches of quota managed species and a reduction of “high-grading”

- Involvement of the fishing industry in collection of detailed data and thereby ensure industry involvement for joint responsibility for the collection of data to be used as the basis for the scientific advice

- An adequately documentation that can ensure that the fishery could be carried out sustainably in sensitive marine areas such as NATURA 2000 sites

- An improved economy for vessels that participate in fully documented fishery

- A documentation that can provide the basis for the marked to be able to evaluate sustainability of the fisheries.

The project is coordinated by DTU Aqua.
Dalskov, J., Project Manager, National Institute of Aquatic Resources
Kindt-Larsen, L., Project Participant, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Larsen, F., Project Participant, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Olesen, H. J., Project Participant, National Institute of Aquatic Resources
Jensen, R., Project Participant, National Institute of Aquatic Resources
01/01/2010 → 31/12/2011
Keywords: Research areas: Fisheries Management & Observation Technology
Collaborators: Archipelago Marine Research Ltd.
Project: Research
**Fisheries management in NATURE 2000 areas (38797)**

Approximately 17% of the Danish sea territory is appointed as Nature 2000 areas. Many of these areas are also very important for fishery. To allow fishery to continue in Nature 2000 sites, it must be demonstrated that the fishery does not negatively impact the basis for appointment for the site. The project aims to establish the science base for development of a concept for Environmental Impact Assessments (EIA) for fishery and aquaculture in Nature 2000 areas, as well as establish interactions between the mussel fishery and the basis for appointment of Nature 2000 areas. The results generated will provide input to the EIA conducted by DTU Aqua and to other advisory issues related to mussel fishery, and to improve the environment in Nature 2000 areas. The approach is a combination of field experiments, model development and theoretical work. Through the project, knowledge will be generated on eelgrass, macrophyte and blue mussel ecology and abundance and interactions with mussel fishery. Development of the oyster fishery in the Wadden Sea will be developed with focus on the Nature 2000 site N89. Seabed mapping of the stone reefs in the Little Belt Sea will include an analysis of the impact of blue mussel fishery on these habitats. Finally the project will establish knowledge base for interactions between aquaculture and Nature 2000 areas.

The project is coordinated by DTU Aqua.

Dolmer, P., Project Manager, National Institute of Aquatic Resources

Christoffersen, M., Project Manager, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management

Poulsen, L. K., Project Manager, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management

Stage, B., Project Participant, National Institute of Aquatic Resources

Lisbjerg, D., Project Participant, National Institute of Aquatic Resources

Rasmussen, R. S., Project Participant, National Institute of Aquatic Resources

01/01/2010 → 30/09/2012

Keywords: Research areas: Ecosystem Based Marine Management & Observation Technology

Collaborators: Danish Shellfish Centre

Project: Research

**Evaluation of harbour porpoise behaviour in relation to acoustic alarms (pingers) (38670)**

The project included four sub-projects that were all related to development of methods for mitigation of harbour porpoise by-catch. The first sub-project investigated the effective deterrent range for a commercial pinger and whether the range changed over time (habituation). This is important to know in order to be able to evaluate the effects if pingers are to be used in marine protected areas like the Natura 2000 areas. By deploying automated porpoise click loggers (C-PODs) in a grid around an active pinger, the effective range of the pinger was assessed. The set-up was deployed both in Denmark and in Scotland to also investigate possible regional differences in porpoise reactions to pingers. The second sub-project tested the alerting-hypothesis, i.e. whether it was possible to induce porpoises in the wild to use their biosonar against a target by having the target emit artificial porpoise click trains (alerting signals). Alerting signals have a number of advantages over traditional pinger signals, including that they will not lead to exclusion of porpoises from important habitats, that the risk of habituation is smaller because the porpoises will be able to learn from their experience with the alerting pingers, and that noise pollution will be considerably smaller because the sound level of alerting pingers is much lower than for traditional pingers. The third sub-project tested if pingers emitting alerting-signals could reduce by-catch of harbour porpoises in the commercial gillnet fishery. Alerting pingers were deployed on bottom-set gillnets in a fishery with a high by-catch rates, in a double-blind experiment. The fourth sub-project investigated the behaviour of free ranging harbour porpoises in relation to a gillnet. This included land-based tracking by theodolite of porpoises approaching a bottom-set gillnet to determine detection distances and avoidance behaviour.

The project was coordinated by DTU Aqua.

The project was funded by the Danish Ministry of Food, Agriculture and Fisheries and the European Fisheries Fund (EFF).

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Keywords: Research area: Ecosystem based Marine Management & Observation Technology

Collaborators: Fjord & Bælt

Project: Research

**European eel: Investigation and assessment of their decline (EELIAD) (38410)**

The EELIAD project was a research initiative to investigate the ecology and biology of European eels during their marine migrations, and how these relate to eel condition and population of origin. The information has been integrated into models to determine the most important factors that influence silver eel production and migration success. The fulfillment of this objective will provide a means to evaluate the likely success of the EU eel recovery plan, to enable management actions...
to be most effectively directed to enhance and conserve eel stocks across Europe, and to determine the dynamics of eel population structure and reproductive success.

To achieve this aim we undertook a large-scale field program to determine the migration routes and behavior of silver eels during their spawning migration, and to determine ecological factors that influence the number and quality of silver eels leaving river catchments.

These field studies were supported by the use of cutting edge biotechnological analyses to determine population structure and innovative modeling approaches aiming to incorporate these data into fishery management models. In addition, these different studies were linked to studies and observations undertaken in other cooperative projects such as INDICANG which is a network of monitoring programs that report on the status and the development of eel populations over a large area (e.g. Atlantic Area).

The knowledge gained from the EELIAD research, aside from its scientific significance, have been of direct use to the conservation of eel stocks because it helps to clarify the reasons for the recent decline in the stock. This information will then be used to change and improve the way that eel fisheries and habitats are managed across Europe, and to help ensure that enough silver eels migrate to their spawning grounds to reproduce and sustain the species.

The project was coordinated by Centre for Environment, Fisheries and Aquaculture Sciences (CEFAS), UK.

The project was funded by EU, Framework Programme 7.

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01/01/2008 → 31/12/2012

Keywords: Research areas: Freshwater Fisheries and Ecology & Observation Technology

Collaborators: Norwegian Institute for Nature Research, Consejo Superior de Investigaciones Cientificas, Marine Institute, Centre for Agricultural and Environmental Engineering Research, Swedish National Board of Fisheries, Universite de Pau et des Pays de l'Adour, Cefas Weymouth Laboratory, IFREMER, Museum National d'Histoire Naturelle, Laboratoire de Biologie et d'Ecologie Tropicale et Méditerranéenne

Project: Research