Diel vertical interactions between Atlantic cod Gadus morhua and sprat Sprattus sprattus in a stratified water column

Information about species interactions at a spatial scale comparable to the perceptive abilities of the involved species is crucial for establishment of predictive food consumption models at the population level. Nevertheless, such information is sparse due to methodological constraints. We studied the diel vertical dynamics of species interactions between Atlantic cod Gadus morhua and its major clupeid prey, sprat Sprattus sprattus, at a location in the Bornholm Basin of the central Baltic Sea during late winter. This was accomplished by combining acoustic information on diel vertical fish distribution, time of ingestion of individual sprat estimated from cod stomach content data and observed vertical profiles of salinity, temperature and oxygen content. Predation by cod took place primarily at dusk and dawn during ascent and descent of sprat associated with school dissolution and formation, respectively. Cod resided close to the bottom outside these temporal predation windows. Sprat schools were located at the same depth as cod in the daylight hours, whereas at night dispersed sprat were situated higher in the water column. These vertical dynamics could be explained by fitness optimization using bioenergetics and trade-offs between temperature, oxygen saturation of the water and predation risk. This study forms a first step towards providing a mechanistic background for the predatory impact of cod at the basin scale and beyond.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Oceans and Arctic, Arctic Section, Section for Marine Ecology and Oceanography
Authors: Andersen, N. G. (Intern), Lundgren, B. (Intern), Neuenfeldt, S. (Intern), Beyer, J. (Intern)
Pages: 195-209
Developing a computer vision method to quantify impact on seabed of bottom gillnets

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Savina, E. (Intern), Lundgren, B. (Intern), Krag, L. A. (Intern), Madsen, N. (Intern)
Publication date: 2015
Event: Poster session presented at DEMaT’15, Aberdeen, United Kingdom.
Main Research Area: Technical/natural sciences
Electronic versions:

Publishers version
Source: PublicationPreSubmission
Source-ID: 117700321
Publication: Research › Poster – Annual report year: 2015
Reliable remote fish identification would be an important improvement in resource management as well as in commercial fishing. Optical and acoustical methods could be used either in combination or separately. However, the acoustical methods have better detection ranges than any known optical methods. Conventional acoustical methods use frequencies in the range of 10 to 500 kHz and give reasonable estimations of size distribution, if the species is known, but can only significantly support the determination of the actual species, if there are only a few known species available. It is expected that higher frequencies and broader bandwidths than used until now will give more information useful for fish species identification.

The objective of this Ph.D. study has been to develop a method to investigate the possibility of in-situ identification of fish with high-frequency, wideband ultrasound. The approach was to build a 1 MHz wideband single-element transducer system to obtain range profiles of fish, and to do fish species identification by comparing measured range profiles with libraries of reference range profiles as it is done in some radar systems used to identify aircraft. To do this, it is also necessary to investigate the properties of ultrasound backscatter of fish in the MHz frequency range to help the interpretation of the range profiles. Three case studies were investigated in this Ph.D. study.

The first case study was to investigate the ultrasound backscatter of fish in the MHz frequency range using empirical methods. Measurements using a BK Medical ultrasound scanner equipped with a dedicated research interface were performed on a saithe (Pollachius virens) and three cods (Gadus morhua) at different frequencies as well as angles between the center line of the transducer beams and the fish bodies. The frequencies are 2, 3.5, and 6 MHz. The angles are -30°, -15°, 0°, 15°, and 30°. The results show that even though there are variations, a scan of the ultrasound backscatter along a fish of a specific species contains patterns that are characteristic for that species. This is true at all frequencies in the low MHz range. The part of a fish that contributes most is not necessarily the swimbladder as the results indicate that in the low MHz frequency range bone structures, and skin surfaces are more important.

The second case study was to develop a method to generate simulated ultrasound images from computed tomography images to build simulated ultrasound range profiles of fish. It can be observed from the first case study that shadow effects are normally pronounced in ultrasound images, so they should be included in the simulation. In this study, a method to capture the shadow effects has been developed, which makes the simulated ultrasound images appear more realistic. The method using a focused beam tracing model gives diffuse shadows that are similar to the ones observed in measurements on real objects.

The last case study was to do measurements of ultrasound range profiles of free-swimming fish using a 1 MHz wideband single-element transducer system. The portable system consists of a Reson TC3210 1 MHz single-element transducer, a BlueView P900-2250 dual-frequency multi-beam sonar, and three Oregon ATC9K cameras on a fixture. The positions, orientations, and lengths of the fish were estimated by three-dimensional image analysis, while species were identified manually from the video sequences. Ex-situ experiments were performed on fish that have swimbladder (cod, European sea bass (Dicentrarchus labrax), gilthead sea bream (Sparus aurata), and Atlantic horse mackerel (Trachurus trachurus))
as well as on fish that do not have swimbladder (Atlantic mackerel (Scomber scombrus)). There are indications that the variations in the range profiles seem to have some unique details to discriminate between species like mackerel and sea bream. In some cases the range profiles also indicate whether the head or the tail is closest to the transducer. It has also been shown that the surface areas of the fish are the most important elements that decide how much energy is backscattered in the low MHz frequency range.

In conclusion, the ultrasound backscatter from fish in the MHz frequency range was investigated empirically as well as by simulation and the 1 MHz wideband single-element transducer system was developed. The results data from the ex-situ experiments in a large aquarium tank presented in the last case study can be considered comparable to data obtained in in-situ experiments in a calm shallow sea area. The single-element transducer system can therefore be considered ready for preliminary in-situ experiments. Hereby the main objectives of the Ph.D. study have been reached.

**General information**

**State:** Published

**Organisations:** National Institute of Aquatic Resources, Department of Electrical Engineering, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Biomedical Engineering, Center for Fast Ultrasound Imaging

**Authors:** Pham, A. H. (Intern), Lundgren, B. (Intern), Stage, B. (Intern), Jensen, J. A. (Intern)

**Number of pages:** 171

**Publication date:** 2013

**Publication information**

**Place of publication:** Kgs. Lyngby

**Publisher:** Technical University of Denmark (DTU)

**Original language:** English

**Main Research Area:** Technical/natural sciences

**Electronic versions:** 120913_PhD_Thesis_An_Hoai_Pham..PDF

**Relations**

**Projects:**

In-situ identification of marine organisms using high frequency, wideband ultrasound

Publication: Research › Ph.D. thesis – Annual report year: 2013

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**Localisation of nursery areas based on comparative analyses of the horizontal and vertical distribution patterns of juvenile Baltic cod (Gadus morhua)**

Knowledge of the spatial distribution of juvenile cod is essential for obtaining precise recruitment data to conduct sustainable management of the eastern and western Baltic cod stocks. In this study, the horizontal and vertical distribution and density patterns of settled juvenile 0- and 1-group Baltic cod are determined, and their nursery areas are localised according to the environmental factors affecting them. Comparative statistical analyses of biological, hydrographic and hydroacoustic data are carried out based on standard ICES demersal trawl surveys and special integrated trawl and acoustic research surveys. Horizontal distribution maps for the 2001–2010 cohorts of juvenile cod are further generated by applying a statistical log-Gaussian Cox process model to the standard trawl survey data. The analyses indicate size-dependent horizontal and distinct vertical and diurnal distribution patterns related to the seabed topography, water layer depth, and the presence of hydrographic frontal zones (pycnoclines) as well as intraspecific patterns in relation to the presence of adult cod. The extent of the nursery areas also depends on the cod year class strength. Juvenile cod (≥3 cm) are present in all areas of the central Baltic Sea (CBS), showing broad dispersal. However, their highest density in the Baltic Basins is found at localities with a 40–70 m bottom depth in waters with oxygen concentrations above 2 ml O2{l−1} and temperatures above 5°C. The smallest juveniles are also found in deep sea localities down to a 100 m depth and at oxygen concentrations between 2–4 ml O2{l−1}. The vertical, diurnally stratified and repeated trawling and hydroacoustic target strength-depth distributions obtained from the special surveys show juvenile cod concentrations in frontal zone water layers (pycnocline). However, the analyses indicate that in the CBS, juvenile cod of all sizes do not appear to aggregate in dense schooling patterns, which differs from what has been reported from the North Sea.

**General information**

**State:** Published

**Organisations:** National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Department of Applied Mathematics and Computer Science, Statistics and Data Analysis, Section for Marine Living Resources

**Authors:** Nielsen, J. R. (Intern), Lundgren, B. (Intern), Kristensen, K. (Intern), Bastardie, F. (Intern)

**Pages:** e70668

**Publication date:** 2013

**Main Research Area:** Technical/natural sciences

**Publication information**

**Journal:** P L o S One

**Volume:** 8
General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Management Systems, Section for Monitoring, SINTEF
Authors: Krag, L. A. (Intern), Karlsen, J. (Intern), Hermann, B. (Ekstern), Madsen, N. (Intern), Lundgren, B. (Intern)
Number of pages: 33
Publication date: 2012
Shadow effects in simulated ultrasound images derived from computed tomography images using a focused beam tracing model

Simulation of ultrasound images based on computed tomography (CT) data has previously been performed with different approaches. Shadow effects are normally pronounced in ultrasound images, so they should be included in the simulation. In this study, a method to capture the shadow effects has been developed, which makes the simulated ultrasound images appear more realistic.

The method using a focused beam tracing model gives diffuse shadows that are similar to the ones observed in measurements on real objects. Ultrasound images of a cod (Gadus morhua) were obtained with a BK Medical 2202 ProFocus ultrasound scanner (BK Medical, Herlev, Denmark) equipped with a dedicated research interface giving access to beamformed radio frequency data.

CT images were obtained with an Aquilion ONE Toshiba CT scanner (Toshiba Medical Systems Corp., Tochigi, Japan). CT data were mapped from Hounsfield units to backscatter strength, attenuation coefficients, and characteristic acoustic impedance. The focused beam tracing model was used to create maps of the transmission coefficient and scattering strength maps. FIELD II was then used to simulate an ultrasound image of 38.955.34.5 mm, using 106 point scatterers. As there is no quantitative method to assess quality of a simulated ultrasound image compared to a measured one, visual inspection was used for evaluation.
Ultrasound backscatter from free-swimming fish at 1 MHz for fish identification

General information
State: Published
Organisations: Section for Management Systems, Department of Electrical Engineering, Biomedical Engineering, National Institute of Aquatic Resources, Section for Population Ecology and Genetics
Authors: Pham, A. H. (Intern), Lundgren, B. (Intern), Stage, B. (Intern), Jensen, J. A. (Intern)
Publication date: 2012
Event: Poster session presented at IEEE International Ultrasonics Symposium, Dresden, Germany.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2012

Ultrasound backscatter from free-swimming fish at 1 MHz for fish identification
In the frequency range well below 1 MHz, the swimbladder is often considered the most important part for acoustic fish detection. In this work a portable system was developed to not only detect but also try to identify free-swimming fish. It has been used to measure the ultrasound backscatter at 1 MHz from fish. The system consists of a Reson TC3210 1 MHz single-element transducer, a dual-frequency, multi-beam Blueview P900-2250 sonar, and three Oregon ATC9K cameras. The Reson transducer is connected to an Olympus pulser-receiver monitored by a portable computer through a Picoscope 4226 PC oscilloscope. Exsitu experiments were performed at the NorthSea Oceanarium in
Hirtshals, Denmark. The positions, orientations, and lengths of fish were estimated by three dimensional image analysis, taking the measured acoustic distance into account, while species were identified manually. These experiments indicate that at 1 MHz the surface areas (also fins and tail) of the fish can give echoes that are much stronger (up to 3 times) than the swimbladder can, therefore important for identification of fish.

**General information**

State: Published
Organisations: Section for Management Systems, Department of Electrical Engineering, Biomedical Engineering, National Institute of Aquatic Resources, Section for Population Ecology and Genetics, Center for Fast Ultrasound Imaging
Authors: Pham, A. H. (Intern), Lundgren, B. (Intern), Stage, B. (Intern), Jensen, J. A. (Intern)
Pages: 1477 - 1480
Publication date: 2012

**Host publication information**

Title of host publication: Proceedings of IEEE International Ultrasonics Symposium 2012
Publisher: IEEE
ISBN (Print): 978-1-4673-4561-3
Main Research Area: Technical/natural sciences
Conference: IEEE International Ultrasonics Symposium, Dresden, Germany, 07/10/2012 - 07/10/2012
DOIs: 10.1109/ULTSYM.2012.0369
Publication: Research - peer-review › Article in proceedings – Annual report year: 2012

**Design of integrated survey systems to provide high quality, low-cost data for marine management.**

**General information**

State: Published
Organisations: Section for Vessels, National Institute of Aquatic Resources, Section for Management Systems
Authors: Stage, B. (Intern), Lundgren, B. (Intern), Lisbjerg, D. (Intern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 274923
Publication: Research › Poster – Annual report year: 2011

**High-resolution geo-coded mapping of shallow-water benthic ecosystems using a towed video-array: A pilot experiment**

**General information**

State: Published
Organisations: Section for Vessels, National Institute of Aquatic Resources, Section for Management Systems, Section for Population Ecology and Genetics
Authors: Stage, B. (Intern), Lundgren, B. (Intern), Pedersen, E. M. (Intern), Lisbjerg, D. (Intern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 274922
Publication: Research › Poster – Annual report year: 2011

**Simulation of shadowing effects in ultrasound imaging from computed tomography images**

**General information**

State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Vessels, Biomedical Engineering, Department of Electrical Engineering
Authors: Pham, A. H. (Intern), Stage, B. (Intern), Hemmsen, M. C. (Intern), Lundgren, B. (Intern), Pedersen, M. M. (Intern), Jensen, J. A. (Intern)
Pages: 1411-1414
Publication date: 2011

**Host publication information**
Simulation of ultrasound backscatter images from fish

The objective of this work is to investigate ultrasound (US) backscatter in the MHz range from fish to develop a realistic and reliable simulation model. The long term objective of the work is to develop the needed signal processing for fish species differentiation using US. In in-vitro experiments, a cod (Gadus morhua) was scanned with both a BK Medical ProFocus 2202 ultrasound scanner and a Toshiba Aquilion ONE computed tomography (CT) scanner. The US images of the fish were compared with US images created using the ultrasound simulation program Field II. The center frequency of the transducer is 10 MHz and the Full Width at Half Maximum (FWHM) at the focus point is 0.54 mm in the lateral direction. The transducer model in Field II was calibrated using a wire phantom to validate the simulated point spread function. The inputs to the simulation were the CT image data of the fish converted to simulated scatter maps. The positions of the point scatterers were assumed to be uniformly distributed. The scatter amplitudes were generated with a new method based on the segmented CT data in Hounsfield Units and backscatter data for the different types of tissues from the literature. The simulated US images reproduce most of the important characteristics of the measured US image.
Computersimulering - et værktøj for fiskeriforvaltningen?

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Madsen, N. (Intern), Krag, L. A. (Intern), Lundgren, B. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences

Habitat mapping as part of an ecosystem-based approach to management of coastal waters

General information
State: Published
Organisations: Research Secretariat, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Lisbjerg, D. (Intern), Pham, A. H. (Intern), Stæhr, K. (Intern), Stage, B. (Intern), Lundgren, B. (Intern)
Publication date: 2009
Event: Poster session presented at Dansk Ingeniørforenings konference: Linking science and management in the Baltic Sea Ecoregion: An international conference, 9-10 September, Copenhagen,
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 253074
Publication: Research › Poster – Annual report year: 2009

Prediction of selectivity from morphological conditions: Methodology and a case study on cod (Gadus morhua)
The FISHSELECT methodology, tools, and software were developed and used to measure the morphological parameters that determine the ability of cod to penetrate different mesh types, sizes, and openings. The shape of one cross-section at the cod's head was found to explain 97.6% of the mesh penetration results obtained in a laboratory experiment. Design guides predicting the 50% retention length (L50) of different mesh types, sizes, and openings were produced and compared with results from sea trials. Results show that the morphology-based simulations can be used to explain both the within-haul and the between-haul variations previously reported from sea trials. Finally, based on the results obtained, ideas to improve the size selection of cod in towed gear are presented.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern), Lundgren, B. (Intern), Stæhr, K. (Intern)
Pages: 59-71
Publication date: 2009
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 97
Issue number: 1-2
ISSN (Print): 0165-7836
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.985 SNIP 1.065
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.938 SNIP 1.142
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.022 SNIP 1.075
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.025 SNIP 1.274
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.906 SNIP 1.134
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.944 SNIP 1.023
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.076 SNIP 1.314
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.299 SNIP 1.22
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.934 SNIP 0.891
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.611 SNIP 0.836
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.546 SNIP 0.865
Original language: English
Morphology, Mesh penetration, FISHSELECT, Atlantic cod Gadus morhua, Size selectivity
DOIs: 10.1016/j.fishres.2009.01.002
Source: orbit
Source-ID: 233374
Publication: Research - peer-review » Journal article – Annual report year: 2009
A method for the possible species discrimination of juvenile gadoids by broad-bandwidth backscattering spectra vs. angle of incidence

Measurements were made of the broad-bandwidth (80-220 kHz) acoustic backscattering from free-swimming juvenile gadoids at various orientations and positions in an acoustic beam, under controlled conditions. The experimental apparatus consisted of a stereo-video camera system, a broad-bandwidth echosounder and echo-processor system, a narrowband 120 kHz split-beam echosounder, a large tank, and a fishnet cage. The net cage was centred on the acoustic beams and was virtually transparent, both acoustically and optically. Accurate three-dimensional positions and angular orientations of individual fish were estimated from stereo-images captured synchronously when broad-bandwidth echoes were received from passing fish. Fish positions were also estimated from data collected with a synchronized split-beam echosounder. Software was developed for image analysis and modelling, including calibration, alignment of acoustic and optical-reference frames, and automatic position-fitting of fish models to manually marked fix-points on fish images. The software also performs Fourier spectrum analysis and pulse-shape analysis of broad-bandwidth echoes. Therefore, several measurement series on free-swimming juvenile gadoids were evaluated. The method and data may be used to improve the acoustic identification of fish species and sizes, and thereby improve investigations of spatial prey-predator relationships, and the accuracy and efficiency of acoustic surveys.
cVessel-noise measurements of the fisheries research vessel Dana: a simplified cost-effective method

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Stæhr, K. (Intern), Stage, B. (Intern), Lundgren, B. (Intern)
Pages: 141
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Bioacoustics
Volume: 17
ISSN (Print): 0952-4622
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.594 SNIP 0.936 CiteScore 1.62
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.589 SNIP 0.957 CiteScore 1.13
Observed reactions of fish in captivity to replayed vessel-noise sounds from the fisheries research vessel Dana

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Management Systems
Authors: Stage, B. (Intern), Stæhr, K. (Intern), Nielsen, J. R. (Intern), Lundgren, B. (Intern)
Pages: 217-219
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Bioacoustics
Volume: 17
ISSN (Print): 0952-4622
Ratings:
BFI (2018): BFI-level 1
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.594 SNIP 0.936 CiteScore 1.62
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.589 SNIP 0.957 CiteScore 1.13
Simulering af selektivitet i fiskeredskaber

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Monitoring
Authors: Herrmann, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Lundgren, B. (Intern), Madsen, N. (Intern), Stæhr, K. (Intern)
Publication date: 2008

Publication information
Place of publication: Charlottenlund
Publisher: DTU Aqua. Institut for Akvatiske Ressourcer
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
Rapport - Simulering af selektivitet i fiskeredskaber1.pdf
Source: orbit
Source-ID: 259199
Publication: Research › Report – Annual report year: 2008

Udvikling af selektive trawl til danske fiskerier - SELTRA

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources

Publication information
Place of publication: Charlottenlund
Publisher: DTU Aqua. Institut for Akvatiske Ressourcer
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:

Source-ID: 252804
Publication: Research - peer-review › Journal article – Annual report year: 2008
FISHSELECT - Development of methodology

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Lundgren, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern), Stæhr, K. (Intern)
Publication date: 2007
Main Research Area: Technical/natural sciences
Source-ID: 225733
Publication: Research › Poster – Annual report year: 2007

FISHSELECT - Study of cod (Gadus morhua)

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Krag, L. A. (Intern), Herrmann, B. (Intern), Frandsen, R. (Intern), Stæhr, K. (Intern), Madsen, N. (Intern), Lundgren, B. (Intern)
Publication date: 2007
Event: Poster session presented at ICES/FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Dublin, April, Dublin.
Main Research Area: Technical/natural sciences
Source-ID: 226299
Publication: Research › Poster – Annual report year: 2007

FISHSELECT - Study of plaice (Pleuronectes platessa)

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Frandsen, R. (Intern), Herrmann, B. (Intern), Krag, L. A. (Intern), Stæhr, K. (Intern), Lundgren, B. (Intern), Madsen, N. (Intern)
Publication date: 2007
Event: Poster session presented at ICES/FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Dublin, April, Dublin.
Main Research Area: Technical/natural sciences
Source: orbit
Modelling the effect of interaction between fish morphology and mesh shapes on discard levels in mixed fisheries

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Management Systems
Authors: Lundgren, B. (Intern), Herrmann, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern), Stæhr, K. (Intern), Eigaard, O. R. (Intern)
Publication date: 2006
Event: Poster session presented at Fishing technology in the 21. century, Boston, MA, United States.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 225447
Publication: Research › Poster – Annual report year: 2007

Simulation of catch and discard for a fishing gear - demonstrating the PRESEMO software

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Madsen, N. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Lundgren, B. (Intern), Prior, D. (Ekstern), O'Neill, B. (Ekstern)
Publication date: 2006
Event: Poster session presented at Fishing technology in the 21st century, Boston, MA, United States.
Main Research Area: Technical/natural sciences
Bibliographical note
ICES BOS06 2:066P
Source: orbit
Source-ID: 238723
Publication: Research › Poster – Annual report year: 2006

Akustik til bestemmelse af bestandstørrelser af sild

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Authors: Lundgren, B. (Intern), Jansen, T. (Intern)
Publication date: 2005
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 229025
Publication: Research › Poster – Annual report year: 2005

Direct spectral calibration of an experimental wideband echosounder: Procedures and results

General information
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Management Systems
Authors: Lundgren, B. (Intern), Nielsen, J. R. (Intern)
Publication date: 2005
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 258085
Publication: Research › Poster – Annual report year: 2005
Experiments for possible hydroacoustic discrimination of free-swimming juvenile gadoid fish by analysis of broadband pulse spectra as well as 3D fish position from video images and split beam acoustics

**General information**
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Management Systems
Authors: Lundgren, B. (Intern), Nielsen, J. R. (Intern)
Pages: 1-16
Publication date: 2004
Main Research Area: Technical/natural sciences

**Publication information**
Journal: ICES C.M. 2004/
Volume: R:25
Original language: English
Source: orbit
Source-ID: 226483
Publication: Research › Conference article – Annual report year: 2004

Hydroacoustic ex situ target strength measurements of free-swimming juvenile gadoids in relation to variations in 3D fish position and angular orientation obtained from synchronized video images

**General information**
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Monitoring
Authors: Nielsen, J. R. (Intern), Lundgren, B. (Intern)
Publication date: 2004
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 258087
Publication: Research › Poster – Annual report year: 2004

**Publication information**
Journal: Aquatic Living Resources
Volume: 16
Issue number: 3

Vertical migration and dispersion of sprat (Sprattus sprattus) and herring (Clupea harengus) schools at dusk in the Baltic Sea

In populations of herring (Clupea harengus) or sprat (Sprattus sprattus), one typically observes a pattern of schools forming at dawn and dispersing at dusk, usually combined with vertical migration. This behaviour influences interactions with other species; hence, a better understanding of the processes could contribute to deeper insight into ecosystem dynamics. This paper reports field measurements of the dispersal at dusk and examines two hypotheses through statistical modelling: that the vertical migration and the dissolution of schools is determined by decrease in light intensity, and that the dissolution of schools can be modelled by diffusion, i.e. active repulsion is not required. The field measurements were obtained during 3 days in March at one location in the Baltic Sea and included continuous hydroacoustical monitoring, trawl samples, and hydrographical CTD data. Echogram patterns were analysed using the school detection module in Echoview® and local light intensities were calculated using a model for surface illuminance. The data and the analysis support that schools migrate upwards during dusk, possibly trying to remain aggregated by keeping the local light intensities above a critical threshold, that schools initiate their dissolution when ambient light intensity drops below this critical threshold, and that fish subsequently swim in an uncorrelated random walk pattern.

**General information**
State: Published
Organisations: Department of Informatics and Mathematical Modeling, Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology, Section for Management Systems
Pages: 317-324
Publication date: 2003
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Aquatic Living Resources
Volume: 16
Issue number: 3
Comparison of radiance and polarization values observed in the Mediterranean Sea and simulated in a Monte Carlo model

Measurements of the radiance and degree of polarization made in 1971 in the Mediterranean Sea are presented along with the simulation of all observed quantities by a Monte Carlo technique. It is shown that our independent scattering treatment utilizing a Stokes vector formalism to describe the polarization state of the light field produces remarkably good agreement with those values measured in situ. (C) 2002 Optical Society of America
Experiments for possible hydroacoustic discrimination of free-swimming juvenile gadoid fish by analysis of broadband pulse spectra as well as 3D fish position from video images and split beam acoustics

Measurements were made of the broad-bandwidth (80–220 kHz) acoustic backscattering from free-swimming juvenile gadoids at various orientations and positions in an acoustic beam, under controlled conditions. The experimental apparatus consisted of a stereo-video camera system, a broad-bandwidth echosounder and echo-processor system, a narrowband 120 kHz split-beam echosounder, a large tank, and a fishnet cage. The net cage was centred on the acoustic beams and was virtually transparent, both acoustically and optically. Accurate three-dimensional positions and angular orientations of individual fish were estimated from stereo-images captured synchronously when broad-bandwidth echoes were received from passing fish. Fish positions were also estimated from data collected with a synchronized split-beam echosounder. Software was developed for image analysis and modelling, including calibration, alignment of acoustic and optical-reference frames, and automatic position-fitting of fish models to manually marked fix-points on fish images. The software also performs Fourier spectrum analysis and pulse-shape analysis of broad-bandwidth echoes. Therefore, several measurement series on free-swimming juvenile gadoids were evaluated. The method and data may be used to improve the acoustic identification of fish species and sizes, and thereby improve investigations of spatial prey–predator relationships, and the accuracy and efficiency of acoustic surveys.

**General information**

State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Management Systems
Authors: Lundgren, B. (Intern), Nielsen, J. R. (Intern)
Pages: 297-299
Publication date: 2002
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Bioacoustics
Volume: 12
Issue number: 2-3
ISSN (Print): 0952-4622
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BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.594 SNIP 0.936 CiteScore 1.62
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Scopus rating (2014): SJR 0.353 SNIP 0.568 CiteScore 0.79
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.354 SNIP 0.613 CiteScore 0.83
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Scopus rating (2012): SJR 0.392 SNIP 0.612 CiteScore 0.85
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.484 SNIP 0.715 CiteScore 1.31
Udvalget om Miljøpåvirkninger og fiskeriressourcer: Delrapport vedr. habitatpåvirkninger

General information
State: Published
Organisations: Section for Shellfish, National Institute of Aquatic Resources, Section for Coastal Ecology, Section for Fisheries- and Monitoring Technology
Authors: Dolmer, P. (Intern), Dahl, K. (Ekstern), Frederiksen, S. (Ekstern), Berggren, U. (Ekstern), Prüssing, S. (Ekstern), Støttrup, J. (Intern), Lundgren, B. (Intern)
Number of pages: 32
Publication date: 2002

Publication information
Place of publication: Lyngby
Publisher: Danmarks Fiskeriundersøgelser
ISBN (Print): 87-90968-34-4
Original language: Danish

Series: DFU-rapport
Number: 112-02
Main Research Area: Technical/natural sciences
Electronic versions:
112-02_delrapport_om_habitatpåvirkninger.pdf
Links:
Source: orbit
Source-ID: 225336
Publication: Research › Report – Annual report year: 2002

Distribution, density and abundance of the western Baltic herring (Clupea harengus) in the Sound (ICES Subdivision 23) in relation to hydrographical features

Biomass and duration of the over-wintering period of the Rugen spring spawning herring stock (RHS) in the Sound (ICES Subdivision 23) were investigated as well as possible hydrographical factors affecting relative distribution and triggering southwards migration towards the spawning grounds. Monitoring was performed during 27 surveys over a 6-year period (1993-1998). Abundance of 45-165 000 t in August-February, 560 000 t in March-May, and
Estimation of 3D position, angle of attitude and orientation of free-swimming fish in a hydroacoustic beam field under variable lightning conditions

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Management Systems, Section for Marine Services
Authors: Lundgren, B. (Intern), Nielsen, H. (Ekstern), Nielsen, J. R. (Intern), Faber, P. (Intern)
Pages: 382-390
Publication date: 2001

Host publication information
Title of host publication: SCIA Proceedings 12th
Main Research Area: Technical/natural sciences
Conference: SCIA 12th, 01/01/2001
Source: orbit
Source-ID: 237636
Publication: Research - peer-review › Article in proceedings – Annual report year: 2001

Herring occurrence in the Sound (ICES SD23) in relation to hydrographical features

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology, Section for Marine Services
Authors: Nielsen, J. R. (Intern), Lundgren, B. (Intern), Jensen, T. F. (Intern), Stæhr, K. (Intern)
Pages: 347-356
Publication date: 2001

Host publication information
Title of host publication: Herring : Expectations for a new millennium
Place of publication: Fairbanks, Alaska
Publisher: University of Alaska Sea Grant
ISBN (Print): 978-1-56612-070-8
Series: Sea Grant AK-SG
Number: 01-14
Main Research Area: Technical/natural sciences
Conference: Lowell Wakefield symposium, Anchorage, Alaska, 01/01/2000
Source: orbit
Source-ID: 239160
Publication: Research - peer-review › Article in proceedings – Annual report year: 2001

An experimental set-up for hydroacoustic discrimination of fish species by analysis of broadband pulse spectra combined with image processing

General information
An experimental set-up for possible hydroacoustic discrimination of fish species by analysis of broadband pulse spectra combined with image processing

General information
State: Published
Organisations: National Institute of Aquatic Resources
Authors: Lundgren, B. (Intern), Nielsen, J. R. (Intern), Faber, P. (Intern)
Pages: 1-12
Publication date: 2000

Host publication information
Title of host publication: Working Documents (ICES FAST WG)
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 279022
Publication: Research › Article in proceedings – Annual report year: 2000


General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology, Section for Marine Services
Authors: Nielsen, J. R. (Intern), Lundgren, B. (Intern), Jensen, T. F. (Intern), Stæhr, K. (Intern)
Number of pages: 161
Publication date: 1999

Publication information
Place of publication: Hirtshals
Publisher: Danmarks Fiskeriundersøgelser
Hydroacoustic ex situ target strength measurements on juvenile cod (Gadus morhua L.)
Most TS-measurements on fish have been carried out for 38 kHz, and the existing TS algorithm for 120 kHz on cod is based on measurements on stunned fish. The main objective of these experiments was to establish an empirical estimate of the relation between acoustic reflection (target strength, TS) and length of live juvenile cod (7-10 cm and 15-20 cm) at 120 kHz. This was done by recording the variation in TS of freely swimming cod tracking single fish targets for the two size groups within the acoustic beam held. The experiment was set up in an open air 2000 m³ tank where the small 5-10 cm long fish were swimming freely during measurement in cages (1 x 1 x 3 m) within the acoustic beam under natural conditions in seawater with a salinity of 30 and a temperature of 11 degrees C. An EY500 split-beam acoustic system was used to detect single fish passing through the acoustic beam field, which was video recorded in order to isolate the measurements on single targets and to get an indication of their angle. A mean target strength-to-size relation was calculated for small cod based on single fish tracks with total acoustic angles below 3.5 degrees off axis in the beam field. This relationship is compared to other TS measurements on juvenile cod in literature. TS at 120 kHz for the investigated cod size range seems to decrease faster by length than the 20 logL relation used for larger cod. The results were used to check the expected range limits of TS for juvenile cod during survey, and are expected to be taken into consideration in density estimation of juvenile cod during acoustic surveys targeting young gadoids in general. (C) 1999 International Council for the Exploration of the Sea.
Distribution, abundance and stock composition of herring (Clupea harengus) in the Sound (ICES subdivision 23) during the autumn, winter and spring periods from September 1993 to May 1998

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Monitoring
Authors: Nielsen, J. R. (Intern), Lundgren, B. (Intern), Stæhr, K. (Intern), Jensen, T. F. (Ekstern), Pedersen, J. (Ekstern), Poulsen, S. (Ekstern)
Pages: 1-45
Publication date: 1998
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES CM 1998/
Volume: AA:9
Original language: English
Source: orbit
Source-ID: 226876
Publication: Research › Conference article – Annual report year: 1998

Ex situ – måling af akustisk reflektionsevne på juvenile torsk

General information
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Management Systems
Authors: Lundgren, B. (Intern), Nielsen, J. R. (Intern), Stokholm, H. (Ekstern)
Publication date: 1998

Host publication information
Title of host publication: Book of Abstracts
Main Research Area: Technical/natural sciences
Source: orbit
Describing distribution and density patterns of metamorphosed 0- and 1-group cod related to hydrographical conditions, physical frontal zones, and bottom topography using hydroacoustic and trawl sampling methods in the Central Baltic Sea

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Nielsen, J. R. (Intern), Lundgren, B. (Intern), Lehmann, K. (Ekstern)
Publication date: 1997
Main Research Area: Technical/natural sciences

EXSITU TS measurements on juvenile cod (preliminary results)

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Nielsen, J. R. (Intern), Lundgren, B. (Intern), Stokholm, H. (Ekstern)
Publication date: 1997
Main Research Area: Technical/natural sciences

Teknik for fjernmåling af fødeindtag hos fritsvømmende fisk

General information
State: Published
Organisations: Unknown
Authors: Lundgren, B. (Intern)
Pages: 65-74
Publication date: 1994
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisk & Hav
Issue number: 45
ISSN (Print): 0105-9211
ECHOANN: An analyzer for echosounder signals

ECHOANN is an instrument for collection, analysis and storage of data from hydroacoustic instruments and navigational information. The instrument can be operated on several levels of complexity, integrating information from several data sources or as a portable system collecting information from just a single echo sounder. The analysis and storage includes counting and integration. Schools are identified and integrated separately. Integration results are stored as distributions over signal level. Single fish echoes are stored with TS estimates when split beam information is available. The data stored by the system enables analysis of the shape and parameters of the echo amplitude distribution by depth as needed for evaluation of the degree of single echo overlaps and for isolating the echo integral of larger targets in an environment of small scatterers. The instrument is PC based, but includes separate hardware for signal preprocessing and parallel processing. The system is designed as a “white box” open to user modifications as software is written in high level languages and modular.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Institute for Fisheries and Marine Research
Authors: Degnbol, P. (Ekstern), Jensen, T. F. (Intern), Lundgren, B. (Intern), Vinther, M. (Intern)
Number of pages: 21
Publication date: 1990

Host publication information
Title of host publication: ICES CM 1990
Volume: B:10
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Conference: ICES Council Meeting 1990, Copenhagen, Denmark, 03/10/1990
Source: orbit
Source-ID: 246910
Publication: Research › Article in proceedings – Annual report year: 1990

A compact eight channel continuous flow analyser for shipboard use

General information
State: Published
Organisations: Danish Institute for Fisheries and Marine Research
Authors: Olsen, O. V. (Ekstern), Lundgren, B. (Intern), Iversen, P. (Ekstern)
Publication date: 1984

Host publication information
Title of host publication: ICES CM 1984
Volume: C:19
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Conference: ICES Council Meeting 1984, Copenhagen, Denmark, 07/10/1984
Source: orbit
Source-ID: 246912
Publication: Research › Article in proceedings – Annual report year: 1984

A mobile hydroacoustical integrator

General information
State: Published
Organisations: Danish Institute for Fisheries and Marine Research
A theoretical basis for accurate weighing at sea

General information
State: Published
Organisations: Danish Institute for Fisheries and Marine Research
Authors: Lundgren, B. (Intern)
Publication date: 1981

Host publication information
Title of host publication: ICES CM 1981
Volume: G:82
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Conference: ICES Council Meeting 1981, 01/01/1981
Source: orbit
Source-ID: 246913
Publication: Research › Article in proceedings – Annual report year: 1981

Projects:

BONUS BIO-C3 Cruise (39117-DCH)
The multidisciplinary research cruise (16-30 September 2015) was aiming to investigate the distribution, abundance, biomass, production, nutritional condition and genetic diversity of several, trophically interlinked Baltic key species, ranging from zoo-, and ichthyoplankton over gelatinous organisms to adult fish, including non-indigenous species. The collected samples and data are used in the BONUS project Biodiversity changes—causes, consequences and management implications (BIO-C3), aiming to significantly advance our knowledge base towards the importance and management of the Baltic Sea biodiversity in an ecosystem perspective.

Using the contrasting environments of the Arkona, Bornholm, Gdansk and Gotland Basin, the major scientific goals of the cruise have been to resolve:
- Physiological preferences and tolerances of key meso-zooplankton species (*Pseudocalanus acuspes, Temora longicornis, Centropages hamatus* and *Acartia* spp), through controlled experiments on board with specimens caught in different areas of the central Baltic in contrasting environments, including a verification of species based on genetics,
- Abundance, distribution, nutritional condition and phenology of key zooplankton (see above) and their life stages as well as gelatinous plankton species (Aurelia aurita, Cyanea capillata, *Mertensia ovum, Mnemiopsis leidyi*) in different areas of the central Baltic, through net-sampling and deploying hydroacoustics and optics, as well as biochemical analyses,
- Individual condition, abundance and distribution of spawning herring and cod based on trawl sampling and hydroacoustics including biochemical investigations on the quality of spawning products,
- Abundance and survival of herring and cod ichthyoplankton, through net-sampling based stage specific production estimates, including age determination, nutritional condition and growth in relation to abundance, phenology and composition of zooplankton prey,
- Predation pressure on copepods and fish early life stages by herring and sprat as well as gelatinous plankton (see above) through resolving the spatial overlap between predator and prey at relevant scales as well as diet composition analyses,
- Distribution (vertical and horizontal) of sprat and herring through trawl sampling and hydroacoustics in relation to hydrography, zooplankton prey and predator (cod) abundance, with specific focus on growth, condition and survival of young of the year sprat in different areas of the central Baltic.

This project was coordinated by DTU Aqua.
Economically sustainable fishery for Nephrops in Skagerrak and Kattegat (ØBJ-FISK) (38865)

Optimizing the exploitation of the resources of the sea areas Skagerrak and Kattegat is central to promote an economically sustainable development in the region. Norway lobster or Nephrops is one of the economically most important resources for the majority of the commercial fishery in the Kattegat-Skagerrak (KASK)-region where the annual first value was app. 350 million DKR in 2011. Nephrops are mainly caught in bottom trawls (95% of the total landings), where other species such as cod and sole constitute part of the by-catch. A minor fishery with creels – partly commercial and partly recreational – takes place along the Swedish and Norwegian coast in areas that are generally inaccessible to the trawlers. Taking into account the majority of the Nephrops landings in the KASK region are sold directly to the local fish processing industry or are sold directly in the local areas, the total socio-economic value is much higher than the first value.

In later years, there has been a shift towards an ecosystem-based management e.g. through the NATURA2000 regulations or the Community Action in the field of Marine Environmental Policy. The consequence of this shift is that the focus is no longer on the state of single species but on the entire marine ecosystem. This has led to regulations aiming at reducing discard of unwanted catch as well as reducing the impact of fishing on vulnerable habitats. Regulations that among other things include a discard ban (implemented for Skagerrak by Norway, Denmark and Sweden in 2013), area closures, reductions in number of days at sea, and minimization of unwanted by-catch, have caused uncertainty in the fishing industry and limits the possibilities of exploiting the resource maximally. To ensure an economically sustainable growth of the Nephrops fishery in the KASK region, an increased collaboration between science and industry is needed as is innovation in the design of low impact fishing gears and a reliable stock assessment.

The project aimed at:
- Establishing a platform where the industry, the science, and the managers could work together to identify the challenges that restrain an optimal exploitation of the Nephrops resource
- Establishing a knowledge based collaboration to identify low impact fishing methods that may lead to future economically sustainable growth in the KASK region
- Improving the biological knowledge on which the stock assessment is based - Increasing the reliability of the stock assessment.

The project was coordinated by DTU Aqua.

The project was funded by EU, InterReg (regional collaboration).
**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 optiX 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, selvages, 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).

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**In situ identification of marine organisms using High Frequency, wideband Ultrasound**

National Institute of Aquatic Resources

Period: 01/06/2012 → 31/12/2014

Number of participants: 7

Research area: Fisheries Technology & Observation Technology

Project participant:

Herrmann, Bent (Intern)
Madsen, Niels (Intern)
Frandsen, Rikke (Intern)
Lundgren, Bo (Intern)
Krag, Ludvig Ahm (Intern)

Project Coordinator:

Frandsen, Rikke (Intern)

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In-situ identification of marine organisms using high frequency, wideband ultrasound

Multisensor til dataopsamlingsmærker for undersøgelser af fisks adfærd

Project: PhD

Phd Student:
Pham, An Hoai (Intern)

Supervisor:
Jensen, Jørgen Arendt (Intern)
Lundgren, Bo (Intern)

Main Supervisor:
Stage, Bjarne (Intern)

Examiner:
Thygesen, Uffe Høgsbro (Intern)
Stepputtis, Daniel (Ekstern)
Wahlberg, Magnus (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU) Samf.

Relations
Publications:
In-situ identification of marine organisms using high frequency, wideband ultrasound

Department of Micro- and Nanotechnology
Period: 01/08/2004 → 30/04/2008
Number of participants: 7

Phd Student:
Hyldgård, Anders (Intern)

Supervisor:
Hansen, Ole (Intern)
Lundgren, Bo (Intern)

Main Supervisor:
Thomsen, Erik Vilain (Intern)

Examiner:
Hansen, Mikkel Fougt (Intern)
Brand, Oliver (Ekstern)
Christensen, Carsten (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut/centerfinansieret
Project: PhD