The diet of whiting Merlangius merlangus in the western Baltic Sea

The diet of whiting Merlangius merlangus in the western Baltic Sea was investigated and compared to the diet in the southern North Sea. Clupeids were important prey in both areas, but especially in the western Baltic Sea where they constituted up to 90% of the diet of larger individuals. Gobies, brown shrimps and polychaetes were the main prey of juveniles in the western Baltic Sea, while a wider range of species were consumed in the North Sea. The shift to piscivory occurred at smaller sizes in the western Baltic Sea and the fish prey consumed was proportionately larger than in the southern North Sea. Estimates of prey abundance and food intake of M. merlangus are required to evaluate its predatory significance in the western Baltic Sea, but its diet suggests that it could be just as significant a fish predator here as in the southern North Sea.
Improving the performance of a grid used in Norway lobster fisheries

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, SINTEF
Pages: 525-528
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
A statistical model for estimation of fish density including correlation in size, space, time and between species from research survey data

Trawl survey data with high spatial and seasonal coverage were analysed using a variant of the Log Gaussian Cox Process (LGCP) statistical model to estimate unbiased relative fish densities. The model estimates correlations between observations according to time, space, and fish size and includes zero observations and over-dispersion. The model utilises the fact the correlation between numbers of fish caught increases when the distance in space and time between the fish decreases, and the correlation between size groups in a haul increases when the difference in size decreases. Here the model is extended in two ways. Instead of assuming a natural scale size correlation, the model is further developed to allow for a transformed length scale. Furthermore, in the present application, the spatial- and size-dependent correlation between species was included. For cod (Gadus morhua) and whiting (Merlangius merlangus), a common structured size correlation was fitted, and a separable structure between the time and space-size correlation was found for each species, whereas more complex structures were required to describe the correlation between species (and space-size). The within-species time correlation is strong, whereas the correlations between the species are weaker over time but strong within the year.
Værdioptimering af fiskefangsten i dansk blandet fiskeri (VærdiFisk) - forbedret kvalitet og selektion som følge af redskabsudvikling

General information
State: Published
Authors: Karlsen, J. D. (Intern), Krag, L. A. (Intern), Lund, H. S. (Ekstern), Albertsen, C. M. (Intern), Kajgaard, L. (Ekstern), Clausen, B. (Ekstern), Thomsen, F. (Ekstern), Jensen, L. P. (Ekstern), Kajgaard, J. (Ekstern), Kusk, M. (Ekstern), Pedersen, C. (Ekstern), Madsen, N. (Intern), Frandsen, R. (Intern)
Number of pages: 60
Publication date: 2014

Publication information
Publisher: Ministeriet for Fødevarer, Landbrug og Fiskeri
Original language: Danish
Main Research Area: Technical/natural sciences
Publication: Commissioned › Report – Annual report year: 2014

Discarding of plaice (Pleuronectes platessa) in the Danish North Sea trawl fishery

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Population Ecology and Genetics
Authors: Madsen, N. (Intern), Seekings, J. P. (Intern), Levy, P. (Intern)
Pages: 129-134
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Sea Research
Volume: 75
ISSN (Print): 1385-1101
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.98 SJR 0.932 SNIP 0.931
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.008 SNIP 1.007 CiteScore 2.09
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.977 SNIP 1.024 CiteScore 2.15
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.928 SNIP 1.098 CiteScore 2
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.115 SNIP 1.06 CiteScore 2.18
ISI indexed (2012): ISI indexed yes
The effect of regulation changes and influential factors on Atlantic cod discards in the Baltic Sea demersal trawl fishery

The proportion of Atlantic cod (Gadus morhua) discarded in the Danish Baltic Sea cod trawl fishery has been as high as 40%. This, combined with a stock that has declined dramatically over the past 30 years, has led to numerous technical regulations being introduced to reduce the capture of juveniles and thus discards. One method that has been widely adopted in the Baltic Sea has been to improve gear selectivity, subsequently allowing young individuals to escape capture. To understand the effects that changes to gear selectivity and minimum landing size have had on discard rates, as well as the effects of a range of additional explanatory factors, generalized additive mixed models were used. Gear regulation changes enforced in the Danish demersal trawl fishery in the Baltic Sea and other factors, such as minimum landings size, juvenile abundance, catch mass, price, and their spatial and temporal distribution, were found to significantly affect discard rates. The newest and currently legislated gears were identified as having the lowest discard rates. The increase in minimum landing size from 35 to 38 cm has increased discard rates.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Feekings, J. (Intern), Lewy, P. (Intern), Madsen, N. (Intern)
Pages: 534-542
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 70
Issue number: 4
ISSN (Print): 0706-652X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.56 SJR 1.322 SNIP 1.163
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.256 SNIP 1.051 CiteScore 2.22
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.443 SNIP 1.379 CiteScore 2.6
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.421 SNIP 1.081 CiteScore 2.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.324 SNIP 1.196 CiteScore 2.29
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.423 SNIP 1.09 CiteScore 2.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.425 SNIP 1.118
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.451 SNIP 1.196
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.589 SNIP 1.379
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.621 SNIP 1.236
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.354 SNIP 1.267
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.558 SNIP 1.553
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.744 SNIP 1.542
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.097 SNIP 1.622
Scopus rating (2002): SJR 1.909 SNIP 1.457
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.769 SNIP 1.46
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.5 SNIP 1.464
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.928 SNIP 1.436
Estimating the relationship between abundance and distribution
Numerous studies investigate the relationship between abundance and distribution using indices reflecting one of the three aspects of distribution: proportion of area occupied, aggregation, and geographical range. Using simulations and analytical derivations, we examine whether these indices provide unbiased estimates of the relationship when estimated from count data. The indices investigated include the proportion of empty samples, the proportion of structurally empty samples, Lloyds index of patchiness, measures derived from Lorenz curves (such as D95 and the Gini index), and measures based on Euclidean distance to the centre of gravity of the spatial distribution. Only the proportion of structurally empty areas, Lloyds index, and indices of the distance to the centre of gravity of the spatial distribution are unbiased at all levels of abundance. The remaining indices generate relationships between abundance and distribution even in cases where no underlying relationships exists, although the problem decreases for measures derived from Lorenz curves when samples contain more than four individuals on average. To illustrate the problem, the indices are applied to juvenile North Sea cod, Gadus morhua.

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources
Authors: Rindorf, A. (Intern), Lewy, P. (Intern)
Pages: 382-397
Publication date: 2012
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 69
Issue number: 2
ISSN (Print): 0706-652X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.56 SJR 1.322 SNIP 1.163
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.256 SNIP 1.051 CiteScore 2.22
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.443 SNIP 1.379 CiteScore 2.6
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.421 SNIP 1.081 CiteScore 2.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.324 SNIP 1.196 CiteScore 2.29
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.423 SNIP 1.09 CiteScore 2.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
The impact of gear regulation changes on discard rates: the case of the Baltic Sea cod fishery

Technical regulations have been introduced in almost all developed fisheries worldwide during the last 30 years. The main objective of these regulations has been to improve the state of the fishery or the stocks within by allowing juveniles and young individuals to escape. In the Baltic Sea, cod stocks have decline considerably over the past 30 years which has subsequently led to numerous legislations and policies being introduced to improving the state of the stocks. We evaluate whether the developments made to trawls used in the Baltic Sea cod fishery to improve selectivity and the increase in minimum landing size (MLS) have had any marked effect on the discard rates of the target species, cod. Results show that the gear regulation changes enforced in the Baltic demersal trawl fishery have had diverse effects on discard rates and are largely dependent on the gear, recruitment, and compliance by the fishermen.

General information
State: Published
Authors: Feekings, J. P. (Intern), Madsen, N. (Intern), Lewy, P. (Intern)
Publication date: 2012
Event: ImproveD mEthodology for Baltic COD age Estimation (DECODE)
Publication: Research - peer-review › Journal article – Annual report year: 2012
Modelling the distribution of fish accounting for spatial correlation and overdispersion

The spatial distribution of cod (Gadus morhua) in the North Sea and the Skagerrak was analysed over a 24-year period using the Log Gaussian Cox Process (LGCP). In contrast to other spatial models of the distribution of fish, LGCP avoids problems with zero observations and includes the spatial correlation between observations. It is therefore possible to predict and interpolate unobserved densities at any location in the area. This is important for obtaining unbiased estimates of stock concentration and other measures depending on the distribution in the entire area. Results show that the spatial correlation and dispersion of cod catches remained unchanged during winter throughout the period, in spite of a drastic decline in stock abundance and a movement of the centre of gravity of the distribution towards the northeast in the same period. For the age groups considered, the concentration of the stock was found to be constant or declining in the period. This means that cod does not follow the theory of density-dependent habitat selection, as the concentration of the stock does not increase when stock abundance decreases.
Statistical aspects of heterogeneous population dynamics

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Kristensen, K. (Intern), Nielsen, S. F. (Ekstern), Jacobsen, M. (Ekstern), Lewy, P. (Intern), Thygesen, U. H. (Intern)
Number of pages: 87
Publication date: 2009

Publication information
Place of publication: Charlottenlund, Denmark
Publisher: Technical University of Denmark (DTU)
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
Phd_afhandling_Kasper_Kristensen.pdf

Bibliographical note
Thesis submitted for the Ph.D. degree, University of Copenhagen
Source: orbit
How to validate a length-based model of single species fish stock dynamics

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Kristensen, K. (Intern), Lewy, P. (Intern), Beyer, J. (Intern)
Pages: 2531-2542
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 63
Issue number: 11
ISSN (Print): 0706-652X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.56 SJR 1.322 SNIP 1.163
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.256 SNIP 1.051 CiteScore 2.22
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.443 SNIP 1.379 CiteScore 2.6
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.421 SNIP 1.081 CiteScore 2.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.324 SNIP 1.196 CiteScore 2.29
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.423 SNIP 1.09 CiteScore 2.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.425 SNIP 1.118
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.451 SNIP 1.196
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.589 SNIP 1.379
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.621 SNIP 1.236
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.354 SNIP 1.267
Prey switching of cod and whiting in the North Sea

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Rindorf, A. (Intern), Gislason, H. (Intern), Lewy, P. (Intern)
Pages: 243-253
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Marine Ecology - Progress Series
Volume: 325
ISSN (Print): 0171-8630
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.4
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 2.56
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 2.75
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 2.79
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 2.9
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
Warm, windy winters drive cod north and homing of spawners keeps them there

1. Climatic and anthropogenic effects often interact leading to unexpected results. For example, climate may lead to a change in the spatial distribution of a fish stock and thereby its vulnerability to exploitation. The North Sea cod stock is currently under pressure from both environmental change and human exploitation. This stock has experienced a series of poor recruitments since the late 1990s and, concomitant with the decrease in abundance, the distribution of cod has changed. While it has been suggested that the change in distribution can be linked to increasing temperatures and fishing pressure, there is little evidence for this hypothesis. 2. Using winter and summer survey catches, we investigated whether a directional shift in the distribution of cod has taken place over the years 1983-2003. We then examined whether the change could be linked to climatic conditions, fishing mortality, stock size or limited directional movement of cod. Using the derived models, we investigated whether fishing has increased the sensitivity of the cod population to climate-induced distribution changes. 3. A series of winters characterized by high temperatures and southerly winds during the egg and larval phases of cod led to a northerly shift in the distribution of juvenile North Sea cod the following year. A concomitant northern shift of mature fish around the time of spawning was linked directly to a tendency for northerly distributed juveniles to remain northerly throughout their life. This shift of the spawners further augmented that of the new recruits. 4. Although fishing mortality on a North Sea scale was not directly correlated with the displacement of any of the age groups, fishing has severely decreased the number of fish in older age groups. This increased the sensitivity of the distribution of the cod stock to climatic changes. 5. Synthesis and applications. The centre of gravity of North Sea cod has moved north as a result of the effect of a series of warm, windy winters on the distribution of recently settled cod. The shift was followed by a northwards shift in the distribution of older age groups. Unless a series of cold and calm years combined with a reduced mortality in the southern areas allows a southern spawning population to rebuild, the cod stock is unlikely to return to its previous area of distribution. Furthermore, protecting adult cod mainly in northern areas is unlikely to result in improved recruitment to the southern North Sea.

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Rindorf, A. (Intern), Lewy, P. (Intern)
Pages: 445-453
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Applied Ecology
Volume: 43
Issue number: 3
ISSN (Print): 0021-8901
Bias in estimating food consumption of fish from stomach-content analysis
This study presents an analysis of the bias introduced by using simplified methods to calculate food intake of fish from stomach contents. Three sources of bias were considered: (1) the effect of estimating consumption based on a limited number of stomach samples, (2) the effect of using average contents derived from pooled stomach samples rather than individual stomachs, and (3) the effect of ignoring biological factors that affect the evacuation of prey. Estimating consumption from only two stomach samples yielded results close to the actual intake rate in a simulation study. In
contrast to this, a serious positive bias was introduced by estimating food intake from the contents of pooled stomach samples. An expression is given that can be used to correct analytically for this bias. A new method, which takes into account the distribution and evacuation of individual prey types as well as the effect of other food in the stomach on evacuation, is suggested for estimating the intake of separate prey types. Simplifying the estimation by ignoring these factors biased estimates of consumption of individual prey types by up to 150% in a data example.
Modelling stochastic age-length-structured multi-species stock dynamics

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Fisheries Advice
Authors: Lewy, P. (Intern), Vinther, M. (Intern)
Pages: 1-33
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES C.M. 2004/
Volume: FF:20
Original language: English
Source: orbit
Source-ID: 227285
Publication: Research - peer-review › Journal article – Annual report year: 2004

Stock dynamics of sandeel in the North Sea and sub-regions including uncertainties

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Fisheries Advice
Authors: Lewy, P. (Intern), Nielsen, A. (Intern), Gislason, H. (Intern)
Pages: 237-248
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 68
Issue number: 1/3
ISSN (Print): 0165-7836
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
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
DOIs:
10.1016/j.fishres.2003.12.004
Survey gear calibration independent of spatial fish distribution

Trawl surveys provide important information for evaluation of relative stock abundance fluctuations over time. Therefore, when survey gears or vessels are changed, it is important to compare the efficiency and selectivity of old and new gears and vessels. A method for estimation of conversion factors is developed based on a survey design where paired hauls are taken in the same trawl track line. The method explicitly accounts for changes in fish density caused by trawling disturbance. A generalized linear model for paired hauls catches is analytically derived and the gear conversion and disturbance parameters with their precision are obtained using standard software. Simulation studies carried out additionally showed that the estimated conversion factors were practically unbiased. Because of the independence of the spatial fish distribution, the new method is preferable to the traditional paired hauls design for which it is generally not possible to obtain the statistical properties of the estimated conversion factors. The paper is concluded with suggestions on how to optimize survey design. The method was used to estimate conversion factors for Atlantic cod (Gadus morhua) from Danish gear calibration experiments in the Baltic Sea.

General information

State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Management Systems
Authors: Lewy, P. (Intern), Nielsen, J. R. (Intern), Hovgård, H. (Intern)
Pages: 636-647
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information

Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 61
Issue number: 4
ISSN (Print): 0706-652X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.56 SJR 1.322 SNIP 1.163
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.256 SNIP 1.051 CiteScore 2.22
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.443 SNIP 1.379 CiteScore 2.6
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.421 SNIP 1.081 CiteScore 2.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.324 SNIP 1.196 CiteScore 2.29
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.423 SNIP 1.09 CiteScore 2.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.425 SNIP 1.118
Modelling stochastic fish stock dynamics using Markov Chain Monte Carlo

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Fisheries Advice
Authors: Lewy, P. (Intern), Nielsen, A. (Intern)
Pages: 743-752
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 60
Issue number: 4
ISSN (Print): 1054-3139
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.63
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.18
Web of Science (2015): Indexed yes
Comparison of the frequentist properties of Bayes and the maximum likelihood estimators in an age-structured fish stock assessment model

General information
State: Published
Organisations: Section for Fisheries Advice, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Authors: Nielsen, A. (Intern), Lewy, P. (Intern)
Pages: 136-143
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 59
Issue number: 1
ISSN (Print): 0706-652X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Analyses of length and age distributions using continuation-ratio logits

Sampling of length and age distributions of catches is important for the assessment of commercially fished stocks. This paper presents a new method for statistical analyses and comparisons of length and age distributions based on
generalised linear models of continuation-ratio logits. The method allows statistical testing of the effects of both continuous and discrete variables. Further, by utilising the smoothness of length and age distributions as a function of length, the method provides more accurate estimates of these distributions than traditional methods. The observations are assumed to be multinomially distributed, but cases in which the variance exceeds that of this distribution may also be analysed. The implementation of the method in existing statistical analysis software is straightforward and is demonstrated using length and age distributions of the lesser sandeel, Ammodytes marinus Raitt.
Estimating uncertainty in fish stock assessment and forecasting

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Patterson, K. (Ekstern), Cook, R. (Ekstern), Darby, C. (Ekstern), Gavaris, S. (Ekstern), Kell, L. (Ekstern), Lewy, P. (Intern), Mesnil, B. (Ekstern), Punt, A. (Ekstern), Restrepo, V. (Ekstern), Skagen, D. (Ekstern), Stefánsson, G. (Ekstern)
Pages: 125-157
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Modelling the population dynamics of sandeel (Ammodytes marinus) populations in the North Sea on a spatial resolved level: Final report

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Jensen, H. (Intern), Rindorf, A. (Intern), Horsten, M. (Ekstern), Mosegaard, H. (Intern), Brogaard, P. (Intern), Lewy, P. (Intern), Wright, P. (Ekstern), Kennedy, F. (Ekstern), Gibb, I. (Ekstern), Ruxton, G. (Ekstern), Arnott, S. (Ekstern), Leth, J. (Ekstern)
Number of pages: 102
Publication date: 2001

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Original language: English

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Publication: Research › Report – Annual report year: 2001

Comparison of uncertainty estimates in short term using real data

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Gavaris, S. (Ekstern), Patterson, K. (Ekstern), Darby, C. (Ekstern), Lewy, P. (Intern), Mesnil, B. (Ekstern), Punt, A. (Ekstern), Cook, R. (Ekstern), Kell, L. (Ekstern), O’Brien, C. (Ekstern), Restrepo, V. (Ekstern), Skagen, D. (Ekstern), Stefansson, G. (Ekstern)
Pages: 1-29
Publication date: 2000
Main Research Area: Technical/natural sciences

An overview of Danish Sandeel investigations

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Lewy, P. (Intern), Wright, P. (ed.) (Ekstern), Kennedy, F. (ed.) (Ekstern)
Pages: 12-13
Publication date: 1999
Workshop: Workshop on Sandeel biology and its implications to management, Aberdeen, United Kingdom, 22/02/1999 - 22/02/1999
Main Research Area: Technical/natural sciences

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Journal: Fisheries Research Services Report
Volume: 12/99
Original language: English
Links:
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Publication: Research › Conference article – Annual report year: 1999

Assessments of the lesser sandeel (Ammodytes marinus) in the North Sea based on revised stock divisions

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Pedersen, S. (Ekstern), Lewy, P. (Intern), Wright, P. (Ekstern)

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Journal: ICES C.M. 2000/
Volume: V:03
Original language: English
Source-ID: 225478
Publication: Research › Conference article – Annual report year: 2000
Does the diet of cod and whiting reflect the species composition estimated from trawl surveys?

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Rindorf, A. (Intern), Gislason, H. (Intern), Lewy, P. (Intern)
Pages: 1-23
Publication date: 1998
Main Research Area: Technical/natural sciences

Population structure in the lesser sandeel (Ammodytes marinus) and its implications for fishery-predator interactions

General information
State: Published
Organisations: Section for Ocean Ecology and Climate, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Number of pages: 200
Publication date: 1998

Specification and documentation of the 4M package containing multispecies, multi-fleet and multi-area models

General information
State: Published
Organisations: Section for Fisheries Advice, National Institute of Aquatic Resources, Section for Freshwater Fisheries Ecology, Section for Population- and Ecosystem Dynamics
Authors: Vinther, M. (Intern), Thomesen, L. (Intern), Lewy, P. (Intern)
Number of pages: 65
Publication date: 1998
The influence of physical factors on distribution of lesser sandeel, Ammodytes marinus, and its relevance to fishing pressure in the North Sea

Should total landings be used to correct estimated catch in numbers or mean-weight-at-age?

Many ICES fish stock assessment working groups have practised Sum Of Products, SOP, correction. This correction stems from a comparison of total weights of the known landings and the SOP over age of catch in number and mean weight-at-age, which ideally should be identical. In case of SOP discrepancies some countries correct catch in numbers while others correct mean weight-at-age by a common factor, the ratio between landing and SOP. The paper shows that for three sampling schemes the SOP corrections are statistically incorrect and should not be made since the SOP is an unbiased estimate of the total landings. Calculation of the bias of estimated catch in numbers and mean weight-at-age shows that SOP corrections of either of these estimates may increase the bias. Furthermore, for five demersal and one pelagic North Sea species it is shown that SOP discrepancies greater than 2% from the landings are very unlikely. Larger discrepancies probably are indications of problems with the sampling design. The proper action is to reexamine the sampling programme and to revise it where needed. (C) 1997 International Council for the Exploration of the Sea.
A generalized Dirichlet distribution accounting for singularities of the variables

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Lewy, P. (Intern)
Pages: 1394-1409
Publication date: 1996
Main Research Area: Technical/natural sciences

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Journal: Biometrics
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Selectivity of gillnets in the North Sea, English Channel and Bay of Biscay

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Authors: Hovgård, H. (Intern), Lewy, P. (Intern)
Number of pages: 107
Publication date: 1996

Publication information
Place of publication: Charlottenlund
Publisher: Danish Institute for Fisheries Research
ISBN (Print): 87-88047-04-0
Original language: English
Sampling methods and errors in the Danish North Sea industrial fishery

General information
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Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Lewy, P. (Intern)
Pages: 39-64
Publication date: 1995
Main Research Area: Technical/natural sciences

Publication information
Journal: DANA
Volume: 11
Issue number: 1
ISSN (Print): 0106-553X
Ratings:
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Original language: English
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Specification and documentation of the 4M package containing multi-species, multi-fleet and multi-area models

General information
State: Published
Organisations: Section for Fisheries Advice, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics, Section for Freshwater Fisheries Ecology
Authors: Vinther, M. (Intern), Lewy, P. (Intern), Thomsen, L. (Intern), Petersen, U. (Ekstern)
Publication date: 1995
Conference: ICES W.G. on Multispecies Assessment of Baltic Fish, 01/01/1995
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES W.G. on Multispecies Assessment of Baltic Fish
Original language: English

Bibliographical note
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Publication: Research › Conference article – Annual report year: 1995

Usikkerhed ved estimation af fiskebestande og stikprøvetagning af fangster

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Lewy, P. (Intern)
Publication date: 1995
A variety of ‘indices’ of distribution are often considered: occurrence, aggregation and geographical range. However, the estimators of these indices are frequently biased and the results often do not reflect changes in distribution, often due to effects of non-random sampling in space and time. Another type of bias in many existing methods results from the assumption that the individual observations of abundance in an area are all independent and spatial correlation is ignored. Methods that do take spatial correlation into account, such as kriging, are often inappropriate because they do not handle the high frequency of zero observations, which are typical of survey data. During this task we will develop new types of models using the so-called “Log Gaussian Cox Process” (e.g. Lewy and Kristensen 2009; Kristensen 2008), which account for spatial correlation and better involve the information from zero observations. These models will further strengthen our ability to detect changes in distribution and provide useful indices of biological aggregation or ‘clumping’ based on the degree of spatial correlation.

24 research institutes and 14 universities are partners in the project.

The project is coordinated by Plymouth Marine Laboratory, UK.

National Institute of Aquatic Resources
Section for Marine Living Resources
Period: 01/01/2011 → 31/12/2011
Number of participants: 3
Research area: Marine Living Resources
Project participant:
Rindorf, Anna (Intern)
Project Manager, organisational:
Lewy, Peter (Intern)
Project Manager, academic:
Gislason, Henrik (Intern)
Project

Vectors of change (VECTORS) (38907)
Marine life makes a substantial contribution to the economy and society of Europe. VECTORS aimed at elucidating the drivers, pressures and vectors that cause change in marine life, the mechanisms by which they do so, the impacts that they have on ecosystem structures and functioning, and on the economics of associated marine sectors and society. VECTORS particularly focused on causes and consequences of invasive alien species, outbreak forming species, and changes in fish distribution and productivity. New and existing knowledge and insight was synthesized and integrated to project changes in marine life, ecosystems and economies under future scenarios for adaptation and mitigation in the light of new technologies, fishing strategies and policy needs. VECTORS also evaluated current forms and mechanisms of marine governance in relation to the vectors of change. Based on its findings, VECTORS outlined solutions and tools for relevant stakeholders and policymakers during the lifetime of the project. The VECTORS consortium included a mixture of natural scientists with knowledge of socio-economic aspects, and social scientists (environmental economists, policy and governance analysts and environmental law specialists) with interests in natural system functioning.

DTU Aqua contributed to VECTORS by developing new statistical models of fish species distributions, by further developing spatially resolved bio-economic models of fishing, and by analyzing fish species richness and distribution in the north Atlantic and the general relationship between changes in fish stock abundance and distribution area. We coordinated the Baltic WP where we implemented the ATLANTIS end-to-end model and performed initial scenario testing. We also analyzed the most important drivers of fish population dynamics in the Baltic, and contributed to the study of invasive species.

VECTORS comprised a total of 37 European Universities, research institutions and professional associations dealing with applied maritime and marine research.
The project included marine environmental scientists, fisheries scientists, conservation biologists, sociologists and economists from across the European scientific community providing expertise in marine ecosystems, management, fisheries, maritime transport, tourism and coastal development.

The project was coordinated by Plymouth Marine Laboratory, UK.

The project was funded by EU, Framework Programme 7.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Period: 01/01/2011 → 31/01/2015
Number of participants: 9
Research areas: Ecosystem based Marine Management & Fisheries Management & Marine Living Resources
Contact person:
Köster, Fritz (Intern)
Project participant:
Nielsen, J. Rasmus (Intern)
Lewy, Peter (Intern)
Rindorf, Anna (Intern)
Bastardie, Francois (Intern)
Kristensen, Kasper (Intern)
Huwer, Bastian (Intern)
Project Manager, academic:
Gislason, Henrik (Intern)
Eero, Margit (Intern)

Developing fisheries management indicators and targets (DEFINEIT) (38763)
DEFINEIT constructed operational models of fish stock dynamics explicitly taking into account exploitation and climatic conditions and combine these models with basic economic models. To ensure an outstanding scientific level in each of these areas, the project brought together key competences in operational multispecies modelling, stock recruitment relationships, population dynamics of non-target fish species and economic modelling of fisheries from a wide geographic area ranging from the Barents Sea to the North Sea. The project used multispecies models to investigate changes in predation induced by differences in the distribution and the amount of alternative food. Effects of technical interactions in the fishing process were considered to avoid delivering management advice for different stocks which is mutually inconsistent. Integrating the knowledge gained, the project suggested methods for estimating reference points. The project identified the main causes of variation in recruitment patterns between stocks as well as the key processes from spawning to recruitment of selected stocks. The consequences of using proxies to describe stock reproductive potential were determined and survival during early life stages was investigated in order to identify the role of the physical and biological environment. The improved understanding of recruitment variability was used in individual stock assessment and included in multispecies models to provide reliable predictions. The maximum level of fishing effort consistent with sustainment of susceptible species was estimated along with the effect of discard of by-catch on economic yield. The project developed resource indicators that combine economic, social and biological indicators and relate directly to the benefit for the society. Future stock dynamics limits to sustainable ecosystem exploitation and the fishing levels delivering maximum sustainable economic yield under selected climatic scenarios were analyzed in unison to ensure the delivery of mutually consistent management advice. General properties of the ecosystems were used to suggest rules of thumb for management in areas where the amount of data available is insufficient to construct similar models.

The project was coordinated by DTU Aqua.

The project was funded by EU, MariFish, ERA-NET.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Cefas
Institute of Marine Research
Hellenic Centre for Marine Research
Marine Research Institute
Fehmarn Belt science provision project: Fehmarn Belt fish and fisheries and related environmental investigations (38669)

Objectives and Background
The purpose of the project was to investigate main exploited fish stock and fisheries dynamics in relation to the marine environment with focus on the Fehmarn Belt area in the Western Baltic Sea, and to provide science and research based investigations and results, as well as reports and scientific peer reviewed journal papers on this. The work was associated to the scientific baseline investigations (2009-13) and impact assessment of the projection of the Fehmarn Belt Fixed Link between Denmark and Germany involving a science cooperation between DTU Aqua, Thünen-Institute and Femern Bælt A/S in order to generate knowledge on potential impacts of establishment of the fixed link. Focus was on the most important commercial fisheries and fish stocks in the area (cod, herring, and sprat, but also flatfish and eels).

Tasks and Deliverables
The work covered WP0: Prospecting, planning and development of the investigations, producing outline and main contents of the science provision contract and coordination of tasks hereunder with DTU Aqua as inter-national project coordinator; WP1: Review of know-ledge: Review, provision of data, and analysis of selected historical data on fish stock and fisheries dynamics; WP2: Extension of existing, standard research surveys and linking to standard survey time series to detect potential effects on important fish stocks; WP3: Evaluation of potential integrated effects on important fish stocks and fisheries; WP4: Evaluation of potential effects of change and variability in hydrographical features and conditions on recruitment for important fish stocks (cod, herring, sprat); WP5: Evaluation of herring occurrences and migrations as well as separation of spring and autumn spawning herring stock components in the area.

WP1 included provision of state of the art knowledge from historical surveys and review of quality of survey indices, commercial fisheries data, and information on recruitment dynamics with emphasis on fluctuations in distribution and productivity with respect to environmental and anthropogenic drivers of change including species interactions and fisheries.

WP 2 included extension of existing standard surveys in the near field area and analyses of both the standard and extended time series with respect to variability in distribution, density and abundance patterns of relevant stocks, as well as developing advanced scientific survey evaluation models and methods for doing this.

WP 3 analyzed stock and fisheries dynamics by use and development of complex multi-fleet-multi-stock bio-economic management evaluation models performing analyses on a very high spatial and temporal resolution scale using integrated fisheries, stock and survey data. The models evaluated different management options and scenarios relevant for the establishment of the fixed link.

WP 4 evaluated variability in recruitment and important spawning areas according to hydrographic features and in relation to impact of the fixed link among other by use and further development of complex hydro-dynamic models.

WP 5 evaluated herring stock occurrence and migration patterns in the Baltic area by use of genetic identity markers, otolith micro-structures and information from fisheries and research surveys in order to evaluate impact of the fixed link. The project has besides a long row of project reports produced around 30 scientific peer reviewed journal papers where DTU Aqua are first author on more than half and co-author on more than 20 of the papers.

The project was coordinated by DTU Aqua.

The project was funded by the 3 partners with external funding from Femern Bælt A/S.
Sustainable fisheries, climate change and the North Sea ecosystem (SUNFISH) (38135)

Global climate changes will seriously challenge the governance of fisheries in the North Sea and elsewhere. Changes in temperature, wind conditions, river runoff and currents will affect primary and secondary production, the distribution, feeding, growth and survival of commercially exploited fish at all stages of life. Without improved knowledge about the effect of climate on the basic biological processes involved in fish production, it will be increasingly difficult to separate the effects of fishing from those of environmental fluctuations and change, identify biological reference points, and to develop management strategies for sustainable fisheries. By combining models of the effects of climate on the hydrographical and biological processes important for fish production with models of fish stock dynamics and fishing, the project provided a basis for improved predictions of the effects of climate change on the sustainable exploitation and maximum yield of North Sea fish stocks. The dynamics of cod (a top predator), herring and sandeel (two important prey for fish), seabirds and marine mammals were studied in detail. Their spawning, egg and larval drift, juvenile and adult distribution, growth and survival were investigated through experiments, statistical analyses of collected data and advanced bio-oceanographic models. The sustainability of exploitation under changing climate conditions were examined by modifying an existing stochastic multispecies fisheries model to make it account for climate effects on fish ecology. The project provided an integrated modelling framework for developing sustainable fisheries management strategies superior to using simple extrapolations of observed historical trends to predict the likely outcome of climate change on the North Sea ecosystem.

The project was coordinated by DTU Aqua.

The project was funded by the Danish Council for Strategic Research.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
University of Copenhagen
Aarhus University
Danish Meteorological Institute
Marine Scotland
Automated fish ageing (AFISA) (38111)
Most of European fish stocks are assessed using age-based models, the cost of the acquisition of age data from otolith readings raises several million euros annually. Low uncertainty in age estimation is however reached for only 25% of fish stocks under ICES advising process. The impact of ageing errors on stock assessment is obvious though obscure. In this context, automated ageing systems would provide a mean to standardize ageing among laboratories and to control ageing consistency while reducing the cost of the acquisition of age data. No such system is currently available, although preliminary results provide the basis for such developments.

This two-year project aims at developing fully automated and robust systems for routine ageing. It will comprise four work packages in addition to project management (WP0): the collation of the otolith material and the creation of bases of annotated otolith images (WP1), the development of algorithms for fish ageing automation from otolith features (WP2), the implementation these automated ageing modules in a software platform dedicated to otolith imaging (WP3), the cost-benefit analysis of the proposed automated ageing systems (WP4).

The whole processing chain from the acquisition of otolith data to the actual ageing issue using pattern recognition or statistical inference will be coped with. The demonstration component will include the demonstration of the degree of automation of the proposed systems and a cost-benefit analysis of these automated solutions for three case studies: cod from Faeroes, North Sea and North East Artic, plaice from the Eastern English Channel (VIId) and Iceland, and anchovy from the Bay of Biscay. The focus will be on demonstrating the consistency of automated age estimation with respect to the major steps of the processing chain and to the joint analysis of ageing precision and acquisition costs with respect to stock assessment objectives.

The project is coordinated by Institut Francais de Recherche pour l'Exploitation de la Mer (IFREMER), France.
Improved methodology for cod age estimation (DECODE) (38120)
The objective of this project is to develop and implement an objective method for the age-determination of Eastern Baltic cod. The assessment for Eastern Baltic Cod (Sub-divisions 25-32) has presented a number of problems in recent years. The key problem is the severe inconsistencies in age determination which affect both the catch-at-age and the survey data. The methods to be developed within this project are based on the use of otolith biometrics. This procedure has proven successful in other stocks with age-reading problems. The data series on commercial and survey catch length distributions, otolith biometrics and biological parameters (collected for ICES Study Group on Ageing Issues in Baltic Cod (SGABC)) will be extended back as far as 2000. Mixture and conditional models to estimate age structure for a given component in stock assessment will be developed as statistically robust approaches to age-determination. Based on this new method, the historic catch and survey data will be reconstructed. The primary focus is on data for routine single-species assessments, but data for multi-species assessments will also be updated where possible.

The project is coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Marine Living Resources
Bundesforschungsanstalt für Fischerei
Swedish National Board of Fisheries
Morski Instytut Rybacki w Gdynia
Latvian Fish Resources Agency
Cefas

Period: 01/01/2007 → 31/12/2009
Number of participants: 5
Research area: Marine Living Resources
Project participant:
Lewy, Peter (Intern)
Mosegaard, Henrik (Intern)
Heilmann, Jens (Intern)
Worsøe Clausen, Lotte (Intern)

Project Manager, organisational:
Hüssy, Karin (Intern)