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.
Geostatistical modelling of the spatial life history of post-larval deepwater hake Merluccius paradoxus in the Benguela Current Large Marine Ecosystem

Optimal and sustainable management of fish resources cannot be ensured without a thorough understanding of the migration patterns and population (demographic stock) structure. Recent studies suggest that these aspects of the economically and ecologically important deepwater hake Merluccius paradoxus are not reflected in the current assessment and management practices for the Benguela Current Large Marine Ecosystem. In this study, we compiled data from multiple demersal trawl surveys from the entire distribution area and applied state-of-the-art geostatistical population modelling (GeoPop) to estimate growth rate, mortality, and spatial and temporal distribution patterns of M. paradoxus. The data and the model enabled us to follow temporal and spatial changes in the distribution and infer movements from the recruitment/nursery areas, through the juvenile phase and the adults' migration to the spawning areas outside/upstream of the nursery areas. The results indicated one primary recruitment/nursery area on the west coast of South Africa and a secondary less-productive recruitment/nursery area on the south coast near Port Elizabeth. Juveniles initially migrated away from the main recruitment area, followed by natal homing by larger individuals. This pattern was highly consistent through the time-series of the study. This perception of a, primarily, panmictic population that performs transboundary migrations between Namibia and South Africa corresponds largely to the hypothesis and data plots given in recent studies. We recommend that fisheries assessment, advice and management take into consideration these aspects of the distribution and population (stock) structure of M. paradoxus

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Oceans and Arctic, Department of Applied Mathematics and Computer Science , Section for Marine Living Resources, Department for Agriculture, Forestry and Fisheries, Ministry of Fisheries and Marine Resources
Pages: 349-361
Publication date: 2017
Main Research Area: Technical/natural sciences
When in life does density dependence occur in fish populations?
Migration, distribution and population (stock) structure of shallow-water hake (Merluccius capensis) in the Benguela Current Large Marine Ecosystem inferred using a geostatistical population model

Shallow-water hake (Merluccius capensis) is of considerable ecological and economic importance in the Benguela Current Large Marine Ecosystem in South Africa and Namibia. Optimal management of the resource is currently constrained by the limited understanding of migration patterns and population (stock) structure. We combined data from multiple demersal trawl surveys from the entire distribution area to estimate growth rate, mortality and spatial and temporal patterns of M. capensis. Analyses were conducted using the geostatistical model GeoPop. The complexity of the model and the amount of data required a new level of soft- and hardware performance. This was achieved by utilizing Template Model Builder and high-end computational hardware (Amazon Elastic Compute Cloud, EC2). The data and the model enabled us to follow the distribution and infer movements of M. capensis from the recruitment/nursery areas, through the juvenile phase and the adults' migration to the spawning areas outside/upstream of the nursery areas. This revealed some previously unknown migration patterns and indicated natal homing and the existence of three primary population components in the region, namely the Walvis (central and northern Namibia), the Orange (Southern Namibia-Northern SA) and the Agulhas (Southern part of SA) components. Our results also indicated substantial regional differences in mortality. We recommend that fisheries assessment, advice and management take consideration of these aspects of the distribution and population (stock) structure of M. capensis in the Benguela Current Large Marine Ecosystem.

General information
State: Published
Organisations: Section for Marine Living Resources, National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Marine Ecology and Oceanography, Benguela Current Commission, Ministry of Fisheries and Marine Resources, Institute of Marine Research, Department for Agriculture, Forestry and Fisheries, Rhodes University
Pages: 156-167
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 179
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
Web of Science (2016): Indexed yes
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
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
Aquatic Science, Benguela Current, Demersal trawl, Geostatistics, Hake, LGC, Merluccius capensis, Migration, Mortality, Namibia, Natal homing, Population structure, South Africa, Template Model Builder, TMB, Trans-boundary
DOIs:
10.1016/j.fishres.2016.02.026
Source: FindIt
Source-ID: 2302798303
Publication: Research - peer-review › Journal article – Annual report year: 2016

Har du fået skældt din biolog ud i dag?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography
Authors: Beyer, J. (Intern)
Pages: 12
Publication date: 2015

Publication information
Pages (from-to): 12
Newspaper: Fiskeritidende
Volume: 22
No.: 23
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Samarbejde er nødvendigt - men hvordan?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography
Authors: Beyer, J. (Intern)
Pages: 8-9
Publication date: 2015

Publication information
Pages (from-to): 8-9
Newspaper: Fiskeritidende
Volume: 22
No.: 33
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Publication: Communication › Newspaper article – Annual report year: 2015

Size structure, not metabolic scaling rules, determines fisheries reference points
Impact assessments of fishing on a stock require parameterization of vital rates: growth, mortality and recruitment. For 'data-poor' stocks, vital rates may be estimated from empirical size-based relationships or from life-history invariants. However, a theoretical framework to synthesize these empirical relations is lacking. Here, we combine life-history invariants, metabolic scaling and size-spectrum theory to develop a general size- and trait-based theory for demography and recruitment of exploited fish stocks. Important concepts are physiological or metabolic scaled mortalities and flux of individuals or their biomass to size. The theory is based on classic metabolic relations at the individual level and uses asymptotic size $W_\infty$ as a trait. The theory predicts fundamental similarities and differences between small and large species in vital rates and response to fishing. The central result is that larger species have a higher egg production per recruit than small species. This means that density dependence is stronger for large than for small species and has the consequence that fisheries reference points that incorporate recruitment do not obey metabolic scaling rules. This result implies that even though small species have a higher productivity than large species their resilience towards fishing is lower than expected from metabolic scaling rules. Further, we show that the fishing mortality leading to maximum yield per recruit is an ill-suited reference point. The theory can be used to generalize the impact of fishing across species and for making demographic and evolutionary impact assessments of fishing, particularly in data-poor situations.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography
Authors: Andersen, K. H. (Intern), Beyer, J. (Intern)
Pages: 1–22
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Fish and Fisheries
Volume: 16
Issue number: 1
ISSN (Print): 1467-2960
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 7.7 SJR 3.606 SNIP 3.245
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 3.668 SNIP 3.034 CiteScore 7.05
Estimating spatio-temporal dynamics of size-structured populations

Spatial distributions of structured populations are usually estimated by fitting abundance surfaces for each stage and at each point of time separately, ignoring correlations that emerge from growth of individuals. Here, we present a statistical model that combines spatio-temporal correlations with simple stock dynamics, to estimate simultaneously how size distributions and spatial distributions develop in time. We demonstrate the method for a cod population sampled by trawl surveys. Particular attention is paid to correlation between size classes within each trawl haul due to clustering of individuals with similar size. The model estimates growth, mortality and reproduction, after which any aspect of size-structure, spatio-temporal population dynamics, as well as the sampling process can be probed. This is illustrated by two applications: 1) tracking the spatial movements of a single cohort through time, 2) predicting the risk of by-catch of undersize individuals. The method demonstrates that it is possible to combine stock assessment and spatio-temporal dynamics, however at a high computational cost. The model can be extended by increasing its ecological fidelity, although computational feasibility eventually becomes limiting.
Optimization of fisheries resource exploitation in the Skagerrak (Oskar)

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Monitoring, Section for Management Systems, Department of Informatics and Mathematical Modeling, DTU Data Analysis, Section for Ocean Ecology and Climate
Publication date: 2012

Publication information
Place of publication: Charlottenlund
Publisher: DTU Aqua. Institut for Akvatiske Ressourcer
ISBN (Print): 978-87-7481-138-1
Original language: English
Series: DTU Aqua Report
Number: 239-2011
ISSN: 1395-8216
Main Research Area: Technical/natural sciences

Bibliographical note
Work package contributions from Bo S. Andersen, Jakob H. Hansen, Karin Hüsey, Kasper Kristensen, Niels Madsen, Patrizio Mariani and Bjørne Stage
In co-operation with the Danish Fishermen’s Association
Source: orbit
Source-ID: 317741
Publication: Research › Report – Annual report year: 2012

Reconsidering the consequences of selective fisheries

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Population Ecology and Genetics
Authors: Garcia, S. M. (Ekstern), Kolding, J. (Ekstern), Rice, J. (Ekstern), Rochet, M. (Ekstern), Zhou, S. (Ekstern), Arimoto, T. (Ekstern), Beyer, J. E. (Intern), Borges, L. (Ekstern), Bundy, A. (Ekstern), Dunn, D. (Ekstern), Fulton, E. A. (Ekstern), Hall, M. (Ekstern), Heino, M. (Ekstern), Law, R. (Ekstern), Makino, M. (Ekstern), Rijnsdorp, A. D. (Ekstern), Simard, F. (Ekstern), Smith, A. D. M. (Ekstern)
Pages: 1045-1047
Publication date: 2012
Main Research Area: Technical/natural sciences

Publication information
Journal: Science
Volume: 335
Issue number: 6072
ISSN (Print): 0036-8075
Stock assessment in the BCC region

General information
State: Published
Organisations: National Institute of Aquatic Resources, Institute Management, Section for Monitoring and Data, Section for Marine Ecology and Oceanography
Authors: Köster, F. (Intern), Degel, H. (Intern), Rademeyer, R. (Ekstern), Kainge, P. I. (Intern), Kirchner, C. (Ekstern), Beyer, J. (Intern)
Publication date: 2012
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

Food web framework for size-structured populations
We synthesise traditional unstructured food webs, allometric body size scaling, trait-based modelling, and physiologically structured modelling to provide a novel and ecologically relevant tool for size-structured food webs. The framework allows food web models to include ontogenetic growth and life-history omnivory at the individual level by resolving the population structure of each species as a size-spectrum. Each species is characterised by the trait ‘size at maturation’, and all model parameters are made species independent through scaling with individual body size and size at maturation. Parameter values are determined from cross-species analysis of fish communities as life-history omnivory is widespread in aquatic systems, but may be reparameterised for other systems. An ensemble of food webs is generated and the resulting communities are analysed at four levels of organisation: community level, species level, trait level, and individual level. The model may be solved analytically by assuming that the community spectrum follows a power law. The analytical solution provides a baseline expectation of the results of complex food web simulations, and agrees well with the predictions of the full model on biomass distribution as a function of individual size, biomass distribution as a function of size at maturation, and relation between predator–prey mass ratio of preferred and eaten food. The full model additionally predicts the diversity distribution as a function of size at maturation.

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources
Authors: Hartvig, M. (Intern), Andersen, K. H. (Intern), Beyer, J. (Intern)
Pages: 113-122
Publication date: 2011
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

Publication information
Journal: Journal of Theoretical Biology
Volume: 272
Issue number: 1
ISSN (Print): 0022-5193
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): SJR 0.918 SNIP 0.932 CiteScore 2.16
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.084 SNIP 1.017 CiteScore 2.21
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.07 SNIP 1.048 CiteScore 2.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.04 SNIP 1.044 CiteScore 2.44
Hvad sker der med REX-projektet?

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 6-7
Publication date: 2011

Publication information
Pages (from-to): 6-7
Newspaper: Fiskeritidende
Volume: 18
No.: 3
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Introducing state-space stock assessment (SAM), split species issues and spatial modelling

General information
State: Published
Organisations: National Institute of Aquatic Resources, Institute Management, Section for Monitoring and Data, Section for Marine Ecology and Oceanography
Authors: Köster, F. (Intern), Kainge, P. I. (Intern), Beyer, J. (Intern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Electronic versions:
BCC Annual Forum 2011 Koester et al ECOFISH WP1 final [Compatibility Mode]
Links:
Publication: Research › Paper – Annual report year: 2011

Oskars forsøgsfiskeri er afsluttet

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Pedersen, E. M. (Intern), Wieland, K. (Intern), Beyer, J. (Intern)
Pages: 11
Publication date: 2011

Publication information
Pages (from-to): 11
Newspaper: Fiskeritidende
Volume: 18
No.: 1
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 272527
Publication: Communication › Newspaper article – Annual report year: 2011

Potential bias in estimates of abundance and distribution of North Sea cod (Gadus morhua) due to strong winds prevailing prior or during a survey

The impact of strong winds on catches of cod (Gadus morhua) was studied using different fishing methods during small-scale surveys with commercial fishing vessels in the north-eastern central North Sea. Catch per unit effort of a flyshooter and a trawler were considerably lower in the shallower coastal water than in the deeper parts of the study area after a three week period with strong winds and rough weather conditions during the survey. At the same time, catches taken with a gillnetter showed an opposite pattern with the highest catch rates occurring at depths shallower than 50 m relative close to the coast. In another situation in which the weather conditions prior and during the survey were more moderate, the flyshooter and the trawler recorded high catch rates in the shallow coastal waters as well. Generalized Linear Model analyses revealed that wind speed prior to and during the survey had significant effects on the catch rates in particular for the trawler. These results supports fishermen's opinion that strong winds may cause an underestimation of biomass of cod in shallow waters and a bias in the resulting spatial distribution derived from bottom trawl surveys.

General information
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Population Ecology and Genetics
Selective fishing and balanced harvest in relation to fisheries and ecosystem sustainability: Report of a scientific workshop organized by the IUCN-CEM Fisheries Expert Group (FEG) and the European Bureau for Conservation and Development (EBCD) in Nagoya (Japan)

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources
Number of pages: 33
Publication date: 2011

Publication information
Place of publication: Gland, Switzerland
Publisher: IUCN, International Union for Conservation of Nature
ISBN (Print): 978-2-8317-1336-6
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
2011-001.pdf
Links:
Source: orbit
Source-ID: 281225
Publication: Research › Report – Annual report year: 2011

Changes of cod abundance in the north-eastern central North Sea based on surveys with commercial fishing vessels in 2006 to 2009

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Population Ecology and Genetics
Authors: Wieland, K. (Intern), Pedersen, E. M. (Intern), Olesen, H. J. (Intern), Beyer, J. (Intern)
Publication date: 2010

Host publication Information
Title of host publication: ICES WGNSSK
Main Research Area: Technical/natural sciences
Conference: ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, 01/01/2010
Source: orbit
Source-ID: 271007
Publication: Research › Article in proceedings – Annual report year: 2010
Estimating a catchability coefficient for a commercial fishing vessel

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Olesen, H. J. (Intern), Wieland, K. (Intern), Thygesen, U. H. (Intern), Beyer, J. (Intern)
Publication date: 2010
Event: Poster session presented at 70th International Fishing Fair, Ancona, Italy.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 270935
Publication: Research › Poster – Annual report year: 2010

Hvordan optimerer vi udnyttelsen af fiskeressourcerne

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Management Systems
Authors: Andersen, N. G. (Intern), Andersen, B. S. (Intern), Pedersen, E. M. (Intern), Beyer, J. (Intern)
Pages: 8
Publication date: 2010

Publication information
Pages (from-to): 8
Newspaper: Fiskeritidende
Volume: 17
No.: 50-51-52
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 271632
Publication: Communication › Newspaper article – Annual report year: 2010

RESOURCE-projektet er i gang

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Pedersen, E. M. (Intern), Olesen, H. J. (Intern), Wieland, K. (Intern), Beyer, J. (Intern)
Pages: 8
Publication date: 2010

Publication information
Pages (from-to): 8
Newspaper: Fiskeritidende
Volume: 17
No.: 41
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 267917
Publication: Communication › Newspaper article – Annual report year: 2010
Spatially-explicit management methods for North Sea cod – a Danish fishermen science collaboration (REX):
Fisker/forsker samarbejdet REX om Nordsø torsk - REX III report FERV, June 2010

General information
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Population Ecology and Genetics
Authors: Wieland, K. (Intern), Pedersen, E. M. (Intern), Olesen, H. J. (Intern), Karlsen, J. (Intern), Andersen, N. G. (Intern), Beyer, J. (Intern)
Number of pages: 137
Publication date: 2010

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 268693
Publication: Research › Report – Annual report year: 2010

The OSkar project: a collaborative fishermen-scientist project on "Optimizing sustainable use of fish resources in the Skagerrak"

General information
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Population Ecology and Genetics
Authors: Wieland, K. (Intern), Pedersen, E. M. (Intern), Olesen, H. J. (Intern), Lund, H. S. (Ekstern), Andersen, N. G. (Intern), Poulsen, J. (Ekstern), Nielsen, J. (Ekstern), Jakobsen, J. (Ekstern), Pedersen, C. H. (Ekstern), Hansen, J. (Ekstern), Beyer, J. (Intern)
Publication date: 2010
Event: Poster session presented at 70th International Fishing Fair, Ancona, Italy.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 268682
Publication: Research › Poster – Annual report year: 2010

The REX project: a collaborative fishers-scientists project on the geographical distribution of Atlantic cod in the northeastern part of the central North Sea

General information
State: Published
Organisations: Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Monitoring
Publication date: 2010
Event: Poster session presented at 70th International Fishing Fair, Ancona, Italy.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 270936
Publication: Research › Poster – Annual report year: 2010

Cod spatial dynamics and vertical movements in European waters and implications for fishery management (CODYSSEY)

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Righton, D. (Ekstern), Metcalfe, J. (Ekstern), McCloghrie, P. (Ekstern), Hetherington, S. (Ekstern), Mills, C. (Ekstern), Kooij, J. V. D. (Ekstern), Michalsen, K. (Ekstern), Fernø, A. (Ekstern), Huse, G. (Ekstern), Ádlandsvik, B. (Ekstern), Subbey, S. (Ekstern), Quayle, V. (Ekstern), Aldridge, J. (Ekstern), Little, A. (Ekstern), Heffernan, O. (Ekstern), Neuenfeldt, S. (Intern), Mosegaard, H. (Intern), Beyer, J. (Intern), Andersen, N. G. (Intern), Andersen, K. H. (Intern), Worsøe Clausen, L. (Intern), Hüssy, K. (Intern), Nielsen, B. (Intern), Wright, P. (Ekstern), Neat, F. (Ekstern), Gibb, I. (Ekstern), Gibb, F. (Ekstern), Zuur, A. (Ekstern), Thorsteinsson, V. (Ekstern), Valdimarsson, H. (Ekstern), Palsson, O. (Ekstern), Sæmundsson, K. (Ekstern), Strand, E. (Ekstern), Hinrichsen, H. (Ekstern), Kraus, G. (Ekstern), Lehmann, A.
Effect of bottom type on catch rates of North Sea cod (Gadus morhua) in surveys with commercial fishing vessels

Seven surveys with commercial fishing vessels were conducted during a collaborative fishermen-scientist project on the distribution of cod in the north-eastern North Sea between June 2006 and June 2008. A flyshooter, a trawler and a gillnetter participated in this study. In general, catch rates were substantially higher on gravel or stone bottom and at ship wrecks than on sand bottom. The difference in the catch rates between the two bottom categories at paired stations within a short distance was highly significant for all the three fishing methods. Similarly, average CPUE for most surveys was several times higher on rough than on smooth bottom. These differences were highly significant for early autumn surveys conducted with the flyshooter and trawler and all gillnet surveys, the summer surveys for the flyshooter and the gillnetter, but not for the winter surveys with the trawler and the flyshooter. The latter suggest that bottom type preference may change with season, e.g. with respect to spawning migrations in winter and in relation with changes in the availability of food during spring and summer.
Estimating abundance and biomass of North Sea cod based on surveys with commercial fishing vessels

**General information**
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Authors: Wieland, K. (Intern), Pedersen, E. M. (Intern), Olesen, H. J. (Intern), Berg, C. (Ekstern), Beyer, J. (Intern)
Pages: 1-28
Publication date: 2009

**Host publication information**
Title of host publication: ICES C.M.
Volume: L:03
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 252466

DOI: 10.1016/j.fishres.2008.11.010
Source-ID: 233150
Publication: Research - peer-review → Journal article – Annual report year: 2009
Estimating a catchability coefficient for a commercial fishing vessel

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Olesen, H. J. (Intern), Wieland, K. (Intern), Thygesen, U. H. (Intern), Beyer, J. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 252455
Publication: Research › Poster – Annual report year: 2009

How community ecology links natural mortality, growth, and production of fish populations

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Andersen, K. H. (Intern), Farnsworth, K. (Ekstern), Pedersen, M. (Intern), Gislason, H. (Intern), Beyer, J. (Intern)
Pages: 1978-1984
Publication date: 2009
Main Research Area: Technical/natural sciences
Publication information
Journal: ICES Journal of Marine Science
Volume: 66
Issue number: 9
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
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.62
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.46
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 2.35
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 2.32
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
REX Nordsø-projektet sikret frem til 31. marts 2010

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 6
Publication date: 2009

Publication information
Pages (from-to): 6
Newspaper: Fiskeritidende
Volume: 16
No.: 2
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 249673
Publication: Communication › Newspaper article – Annual report year: 2009

REX - status 2008

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Beyer, J. (Intern), Wieland, K. (Intern)
Pages: 7
Publication date: 2009

Publication information
Pages (from-to): 7
Newspaper: Fiskeritidende
Volume: 16
No.: 2
Ratings:
ISI indexed (2013): ISI indexed no
The REX project: a collaborative fishermen-scientist project on the geographical distribution of Atlantic cod in the north-eastern part of the central North Sea

Trophic and individual efficiencies of size-structured communities

Individual and trophic efficiencies of size-structured communities are derived from mechanistically based principles at the individual level. The derivations are relevant for communities with a size-based trophic structure, i.e. where trophic level is strongly correlated with individual size as in many aquatic systems. The derivations are used to link Lindeman's trophic theory and trophic theory based on average individuals with explicit individual-level size spectrum theory. The trophic efficiency based on the transfer of mass between trophic levels through predator-prey interactions is demonstrated to be valid only when somatic growth can be ignored. Taking somatic growth into account yields an average individual growth efficiency that is smaller than the trophic efficiency.
Using individual-based stomach and data storage tag data to improve multispecies modelling: linking spatial overlap between predator-prey populations and individual functional response

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Neuenfeldt, S. (Intern), Beyer, J. (Intern)
Publication date: 2009

Host publication information
Title of host publication: ICES C.M.
Volume: J:07
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 252260
Er torskebestanden i Skagerrak på vej op?

General information
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Authors: Wieland, K. (Intern), Pedersen, E. M. (Intern), Beyer, J. (Intern)
Pages: 10
Publication date: 2008

Publication information
Pages (from-to): 10
Newspaper: Fiskeri Tidende
Volume: 15
No.: 28-32
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 249816
Publication: Communication › Newspaper article – Annual report year: 2008

Fangstrater af torsk påvirkes af kuling

General information
State: Published
Organisations: Section for Monitoring, National Institute of Aquatic Resources, Section for Population- and Ecosystem Dynamics
Authors: Wieland, K. (Intern), Pedersen, E. M. (Intern), Beyer, J. (Intern)
Pages: 8
Publication date: 2008

Publication information
Pages (from-to): 8
Newspaper: Fiskeri Tidende
Volume: 15
No.: 28-32
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 249817
Publication: Communication › Newspaper article – Annual report year: 2008

Fiskeriforskning der nytter

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern), Lund, H. (Intern)
Pages: 7
Publication date: 2008

Publication information
Pages (from-to): 7
Newspaper: Fiskeri Tidende
Volume: 15
Life-history constraints on the success of the many small eggs reproductive strategy

The reproductive strategy of most fishes is to produce a large number of tiny eggs, leading to a huge difference between egg size and asymptotic body size. The viability of this strategy is examined by calculating the life-time reproductive success $R_0$ as a function of the asymptotic body size. A simple criterion for the optimality of producing small eggs is found, depending on the rate of predation relative to the specific rate of consumption. Secondly it is shown that the success of the reproductive strategy is increasing with asymptotic body size. Finally the existence of both upper and lower limits on the allowed asymptotic sizes is demonstrated. A metabolic upper limit to asymptotic body size for all higher animals is derived.
Precision of ingestion time and evacuation predictors for individual prey in stomachs of predatory fishes

Without evaluating precision, gastric evacuation models in combination with stomach data are widely used to investigate the feeding biology of wild predatory fishes. Assuming each predator individual to operate with its own evacuation rate parameter, the precision of estimated ingestion times for individual prey in the stomachs of predatory fishes was derived in this study. This way, the variability of gastric evacuation not accounted for by a deterministic model of gastric evacuation was described. The variability of initial body mass of ingested prey was included as well. General values 0.03 and 0.10 of the coefficients of variation $\sigma(m)$ and $\sigma(e)$ were obtained for the square root of initial prey mass and the evacuation rate parameter, respectively. They were estimated from length-mass data on a variety of fresh prey fishes and from data on gastric evacuation in the predatory gadoids whiting (Merlangius merlangus), Atlantic cod (Gadus morhua), and saithe (pollock) (Pollachius virens). Deriving the variance of gastric evacuation rate, evacuation time, and remaining prey mass, the study also established a basis for statistical analyses of the results obtained from laboratory experiments on gastric evacuation. (C) 2007 Elsevier B.V. All rights reserved.

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Andersen, N. G. (Intern), Beyer, J. (Intern)
Pages: 11-22
Predicting ingestion times of individual prey from information about stomach contents of predatory fishes in the field

In contrast to previous approaches, and incorporating interactions between individual prey in the stomach, the cylinder model of gastric evacuation predicted accurately the ingestion times of individual prey recovered from stomachs of predatory gadoids sampled in laboratory experiments. For application to field situations, estimates of the variance \(\sigma^2(\tau) = \sigma^2(\tau,e) + \sigma^2(\tau,m)\) of the predicted time interval \(\tau\) between prey ingestion and stomach sampling were obtained from generalised considerations about the errors of estimated gastric evacuation rate \(\sigma(\tau,e)\) congruent to 0.1 \(\tau\) and prey size at ingestion \(\sigma(\tau,m)\) increased from 1 h to 2.5 h with increasing number and body size of other prey in the stomach. The bias originating from non-observable prey (that were completely evacuated from the stomach prior to sampling) may amount to more than 20% and should be taken into consideration. In contrast, the sensitivity of \(\tau\) to estimated body lengths of other prey recovered as small remains from the stomach was generally low. These error and bias considerations render possible an appraisal in advance of the precision and the accuracy and, so, of the usefulness of the method in specific field studies on the feeding biology of predatory fishes. (C) 2007 Elsevier B.V. All rights reserved.
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.2007.12.004
Source: orbit
Source-ID: 224722
Publication: Research - peer-review › Journal article – Annual report year: 2008

REX II - Fase 2: Fisker-forsker samarbejde om forsøgsfiskeri efter torsk i Nordsøen

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology, Section for Monitoring
Publication date: 2008

Publication information
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
REX II fase 2 - Bilag beskåret printvenlig.pdf
REX II fase 2 - Slutrapport1.pdf
Bibliographical note
Projektet er støttet af Fødevareministeriet og EU gennem fiskerisektorprogrammet FIUF

Source: orbit
Source-ID: 231410
Publication: Research › Report – Annual report year: 2008

REX III vil gøre tingene færdige

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 8
Publication date: 2008

Publication information
Pages (from-to): 8
Newspaper: Fiskeri Tidende
Volume: 15
No.: 27
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 249845
Publication: Communication › Newspaper article – Annual report year: 2008

REX-projekter i 2008

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 7
Publication date: 2008

Publication information
Pages (from-to): 7
Newspaper: Fiskeri Tidende
Volume: 15
No.: 7
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 249846
Publication: Communication › Newspaper article – Annual report year: 2008

Sådan finder fiskere og forskere frem til torskens tilstand

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Beyer, J. (Intern), Wieland, K. (Intern)
Pages: 10
Publication date: 2008

Publication information
Markovian Building Blocks for Individual-Based Modelling

The present thesis consists of a summary report, four research articles, one technical report and one manuscript. The subject of the thesis is individual-based stochastic models. The summary report is composed of three parts and a brief history of some basic models in population biology. This history is included in order to provide a reader that has no previous exposure to models in population biology with a sufficient background to understand some of the biological models that are mentioned in the thesis. The first part of the rest of the summary is a description of the dramatic changes in the degree of aggregation of sprat or herring in the Baltic during the day, with special focus on the dispersion of the fish from schools at dusk. The next part is a brief introduction to Markovian arrival processes, a type of stochastic processes with potential applications as sub-models in population dynamical models. The last part introduces Markov additive processes as a means of simplifying some individual-based models. In the first part I present the background to article A and some extra material that were not included in the final article. The basic observation is that fish in schools migrate up toward the surface and disperse at dusk and aggregate in schools close to the bottom at dawn. This creates a periodically varying prey field to cod. Apart from humans, cod is the main predator of herring and sprat in the Baltic. In order to evaluate the consequences to cod of this variability it was necessary to describe this prey field. It was shown that the schools follow lines of constant light intensity and that they disperse below a critical light threshold. We propose that the dispersion is due to a random walk when light levels become sub-critical and provide time-scales for the dispersion of this type for different school geometries (random or on a regular square grid)—the time-scales are of the same order as those observed on the echosounder. The second part is an introduction to Markovian arrival processes (MAPs), this is the background needed to understand papers C, B, E, and F, given some previous exposure to Markov chains in continuous time (see e.g. Grimmett and Stirzaker, 2001)). Markovian arrival processes are very general point processes that are relatively easy to analyse. They have, so far, been largely unknown to the ecological modelling community. The article C deals with a functional response in a heterogeneous environment. The functional response is a model of the mean ingestion rate of prey per predator as a function of prey and possibly predator density that appears in most models for populations. A previously proposed model for prey encounter in heterogeneous environments is reanalyzed, it is a stochastic process that easily can be implemented as a MAP. In article C we show that transferring a standard functional response to a heterogeneous environment does not preserve the functional form, contrary to previous assertions. In this simple case we provide a time-scale for when the heterogeneous environment can be assumed to be well-mixed, or close to a Poisson process, for the predator. It is also shown that in some cases the variability may be more important than the mean, thus the mean rate does not necessarily provide sufficient information for the population dynamics. Article B provides the mathematical apparatus for evaluating any moment of a MAP, and also the means for evaluating the conditional moments of a transient or terminating MAP. Transient MAPs are suitable as modelling tools when an important property of the system is that it can stop. This is the case for the young of many animals, where most of a large clutch die rather quickly, and yet it is the survivors that are interesting. The conditional moments can for instance be constructed such that one can evaluate the mean or the variance of the ingestion rate given that the animal did not die. Several different methods are used to obtain the formulas, which is an interesting aspect since some of these methods may be more suitable in situations where it is problematic to proceed using the standard formalism. I provide material on how to model periodic MAPs in paper E. These are, or could be, important since most animals live in a periodic environment and a periodic system generally have dynamics that are different from the corresponding system with mean rates. The technical report F concerns how to model Markovian stomachs. Both aspects can be used in more advanced functional or numerical responses. The third part concerns a larger class of Markov processes, to which the above mentioned MAPs belong. These are the Markov additive processes, which are bivariate Markov processes (XT,Nt) where the transition probabilities depend on the Xt process only. The XT process is marginally a Markov process, and the Nt process is a process with conditionally independent increments given the state of the XT process. This class is rich enough to provide substantial realism into individual-based models yet it is so simple that it is not a great extra burden to solve the partial differential equations (PDEs) that arise for the evaluation of the moments. They are particularly useful in oceanographic contexts since here the apparatus for solving the PDEs is usually present due to the need of solving fluid flow equations. The greatest benefit of the method is due to that it circumvents the need for statistical evaluation of the individual-based models. In all three parts further work has been proposed.
Er Nordsøtorsken truet?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring, Section for Population Ecology and Genetics
Authors: Wieland, K. (Intern), Beyer, J. (Intern)
Pages: 9
Publication date: 2007

Publication information
Pages (from-to): 9
Newspaper: Fiskeritidende
Volume: 14
No.: 28-32
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 227784
Publication: Communication › Newspaper article – Annual report year: 2007

Fangstraten er størst på hård bund

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Beyer, J. (Intern), Wieland, K. (Intern)
Pages: 11
Publication date: 2007

Publication information
Pages (from-to): 11
Newspaper: Fiskeri Tidende
Volume: 14
No.: 28-32
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 250142
Publication: Communication › Newspaper article – Annual report year: 2007
Fisker-forsker-samarbejdet skal fortsætte

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 9
Publication date: 2007

Publication information
Pages (from-to): 9
Newspaper: Fiskeri Tidende
Volume: 14
No.: 50
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 250143
Publication: Communication › Newspaper article – Annual report year: 2007

Forsøgsfiskeri bruger fiskernes viden

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 12
Publication date: 2007

Publication information
Pages (from-to): 12
Newspaper: Fiskeri Tidende
Volume: 14
No.: 15
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 250144
Publication: Communication › Newspaper article – Annual report year: 2007

Higher order moments and conditional asymptotics in the Batch Markovian Arrival Process

General information
State: Published
Organisations: Mathematical Statistics, Department of Informatics and Mathematical Modeling, Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Pages: 1-26
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Stochastic Models
Volume: 23
Issue number: 1
ISSN (Print): 1532-6349
Ratings:
How are prey fishes of multiple meals evacuated from the stomach of a piscivorous fish?

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Andersen, N. G. (Intern), Beyer, J. (Intern)
Pages: 219-234
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Hvor mange torsk er der pr. kvadratsømil?

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Monitoring
Authors: Beyer, J. (Intern), Thygesen, U. H. (Intern), Wieland, K. (Intern)
Pages: 12
Publication date: 2007

Publication information
Pages (from-to): 12
Newspaper: Fiskeri Tidende
Volume: 14
No.: 43
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 250145
Publication: Communication › Newspaper article – Annual report year: 2007

Minister til REX II -møde på Slottet

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 10
Publication date: 2007

Publication information
Pages (from-to): 10
Newspaper: Fiskeri Tidende
Volume: 14
No.: 24
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 250146
Publication: Communication › Newspaper article – Annual report year: 2007

Pilotprojekt i Skagerrak

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring, Section for Population Ecology and Genetics
REX - et fisker-forsker-samarbejde

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 12
Publication date: 2007

Publication information
Pages (from-to): 12
Newspaper: Fiskeri Tidende
Volume: 14
No.: 15
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 250147
Publication: Communication › Newspaper article – Annual report year: 2007

REX II skal undersøge variationer i fangster

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Pages: 10
Publication date: 2007

Publication information
Pages (from-to): 10
Newspaper: Fiskeri Tidende
Volume: 14
No.: 28-32
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 250149
Publication: Communication › Newspaper article – Annual report year: 2007
The evolutionary pressure from fishing on size at maturation of Baltic cod

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Andersen, K. H. (Intern), Farnsworth, K. (Ekstern), Thygesen, U. H. (Intern), Beyer, J. (Intern)
Pages: 246-252
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Ecological Modelling
Volume: 204
Issue number: 1-2
ISSN (Print): 0304-3800
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 2.43 SJR 0.941 SNIP 1.089
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.087 SNIP 1.112 CiteScore 2.43
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.135 SNIP 1.353 CiteScore 2.7
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.153 SNIP 1.329 CiteScore 2.53
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.029 SNIP 1.229 CiteScore 2.28
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.183 SNIP 1.134 CiteScore 2.34
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.077 SNIP 1.132
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.294 SNIP 1.26
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.335 SNIP 1.312
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.335 SNIP 1.363
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.223 SNIP 1.548
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.441 SNIP 1.327
Asymptotic size determines species abundance in the marine size spectrum

The majority of higher organisms in the marine environment display indeterminate growth; that is, they continue to grow throughout their life, limited by an asymptotic size. We derive the abundance of species as a function of their asymptotic size. The derivation is based on size-spectrum theory, where population structure is derived from physiology and simple arguments regarding the predator-prey interaction. Using a hypothesis of constant satiation, which states that the average degree of satiation is independent of the size of an organism, the number of individuals with a given size is found to be proportional to the weight raised to the power -2.05, independent of the predator/prey size ratio. This is the first time the spectrum exponent has been derived solely on the basis of processes at the individual level. The theory furthermore predicts that the parameters in the von Bertalanffy growth function are related as K proportional to L-infinity(-1).
Aquatic ecosystems are environmentally heterogeneous with features such as fronts or clines of temperature and salinity. This heterogeneity varies over time and is likely to cause changes in predator-prey overlaps, which will affect the diet composition of the predators. We investigated how inflows of oxygenated and saline deep water alternating with stagnation periods affect the consumption rates of the herring Clupea harengus L. and the sprat Sprattus sprattus L. by the cod Gadus morhua in the Bornholm basin of the Baltic Sea. We developed conceptual models for the effect of predator-prey overlaps on the aggregate diet of the predator population to test the hypothesis that the effects of inflows on the aggregate diet are mediated by changes in cod-clupeid overlaps. After estimating salinity and oxygen thresholds of the spatial distributions of cod and clupeids and calculating cod-clupeid overlaps from March 1958 to 2004, we applied the models relating cod-clupeid overlaps to observed numbers and masses of herring and sprat in cod stomachs. Our study indicated that (1) the ratio of consumed herring to sprat increases faster than proportionally to the ratio of cod-herring to cod-sprat overlaps, and (2) the ratio of consumed herring to sprat increases slower than proportionally to the ratio of herring to sprat in the sea. The latter is most pronounced at the low ratios of overlaps that occur during stagnation periods, which destabilise the clupeid populations, and may have contributed to the drastic increase in the sprat abundance during the late 1980s.

**General information**

State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Neuenfeldt, S. (Intern), Beyer, J. (Intern)
Pages: 151-163
Publication date: 2006
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Marine Ecology - Progress Series
Volume: 310
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
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
Management options for reversing depressed maturation-size in Baltic Cod

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Andersen, K. H. (Intern), Farnsworth, K. (Ekstern), Thygesen, U. H. (Intern), Beyer, J. (Intern)
Pages: 1-3
Publication date: 2006

Host publication information
Title of host publication: International Council for the Exploration of the Sea
Volume: H:04
Place of publication: Copenhagen
Publisher: ICES
ISBN (Print): 87-7482-051-6
Series: ICES C.M./2006
Number: H:04
Main Research Area: Technical/natural sciences

Bibliographical note
Extended abstract
Source: orbit
Source-ID: 284448
Publication: Research › Conference abstract in proceedings – Annual report year: 2006

Baltic cod recruitment - the impact of climate variability on key processes

General information
State: Published
Organisations: Institute Management, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology, Section for Population- and Ecosystem Dynamics, Section for Population Ecology and Genetics
Pages: 1408-1425
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 62
Issue number: 7
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
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.62
Web of Science (2014): Indexed yes
Estimation of Interrupted Poisson Process Parameters from Counts

General information
State: Published
Organisations: Mathematical Statistics, Department of Informatics and Mathematical Modeling, Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Nielsen, B. F. (Intern), Beyer, J. (Intern)
Publication date: 2005

Publication Information
Place of publication: Institut Mittag-Leffler
Publisher: The Royal Swedish Academy of Sciences
Original language: English

Series: No. 21, 2004/2005, fall
Main Research Area: Technical/natural sciences
Links:
Source: orbit
Source-ID: 228105
Publication: Research » Report – Annual report year: 2005

Gastric evacuation of mixed stomach contents in predatory gadoids: an expanded application of the square root model to estimate food rations
How optimal life history changes with the community size-spectrum

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Thygesen, U. H. (Intern), Farnsworth, K. (Ekstern), Andersen, K. H. (Intern), Beyer, J. (Intern)
Pages: 1323-1331
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Proceedings of the Royal Society B-Biological Sciences
Volume: 272
Issue number: 1570
ISSN (Print): 0962-8452
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 3.89 SJR 2.541 SNIP 1.474
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.948 SNIP 1.535 CiteScore 4.08
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.916 SNIP 1.673 CiteScore 4.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 3.091 SNIP 1.762 CiteScore 5.08
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 2.947 SNIP 1.881 CiteScore 4.99
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.234 SNIP 1.789 CiteScore 5.02
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Mechanistic modelling of gastric evacuation in predatory gadoids applying the square root model to describe surface-dependent evacuation

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Andersen, N. G. (Intern), Beyer, J. (Intern)
Pages: 1392-1412
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Fish Biology
Volume: 67
Issue number: 5
ISSN (Print): 0022-1112
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 1.57 SJR 0.741 SNIP 0.882
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.951 SNIP 0.935 CiteScore 1.64
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.944 SNIP 0.934 CiteScore 1.76
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Oxygen and salinity characteristics of predator-prey distributional overlaps shown by predatory Baltic cod during spawning

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Neuenfeldt, S. (Intern), Beyer, J. (Intern)
Pages: 168-183
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Fish Biology
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
ISSN (Print): 0990-7440
Ratings:
BFI (2019): BFI-level 1
Web of Science (2019): Indexed Yes
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 1.41 SJR 0.59 SNIP 0.743
Web of Science (2016): Indexed Yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.747 SNIP 0.848 CiteScore 1.39
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.641 SNIP 0.905 CiteScore 1.25
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.547 SNIP 0.68 CiteScore 1.15
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.554 SNIP 0.618 CiteScore 1.19
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed Yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.628 SNIP 0.697 CiteScore 1.17
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed Yes
A comparative analysis of the North Sea based on Ecopath with Ecosim and multi-species virtual population analysis

General information
State: Published
Organisations: Danish Institute for Fisheries and Marine Research, University of Copenhagen
Authors: Christensen, V. (Ekstern), Beyer, J. (Intern), Gislason, H. (Intern), Vinther, M. (Intern)
Number of pages: 48
Publication date: 2002

Host publication information
Title of host publication: Proceedings of the INCO-DC Conference Placing Fisheries in their Ecosystem Context
Main Research Area: Technical/natural sciences
Conference: INCO-DC Conference on Placing Fisheries in their Ecosystem Context, Galápagos, Ecuador, 01/01/2000
Source: orbit
Source-ID: 282334
Publication: Research › Conference abstract in proceedings – Annual report year: 2002

A method to determine size-specific natural mortality applied to westcoast steenbras (Lithognathus aureti) in Namibia
In traditional single-species fish stock assessment natural mortality is considered constant, independent of age or size. It is argued that predation mortality is generally related to prey size, that it decreases with increasing size and that such size-specific signals can best be detected in stocks that are close to a virgin state. Size-specific natural mortality rates of westcoast steenbras (Lithognathus aureti) were determined by using length frequencies of rod-caught fish from a lightly exploited and closed population at Meob Bay, Namibia. It was assumed that natural mortality is inversely proportional to (body) length and approaching a constant minimum rate (M- infinity) as the fish grow bigger. Simple and new length-based catch curve methods were developed using the traditional simplification of neglecting variations in length at age. The von Bertalanffy growth parameters for annual mean growth as well as the coefficient of variation of length at age were estimated from analyzing age-length data. A simple deterministic simulation model was developed to examine the robustness of the methods and the impact of variability in individual growth. The model assumes that fish grow with a constant coefficient of variation in length at age. The simple method works within 10% precision criteria in most real cases. It is shown that overestimating mean length at old ((L) over bar(infinity)) counteracts the effects of overlapping lengths for consecutive age groups. This fact can be used to estimate fundamental mortality-to-growth ratio (M-infinity/K) without any prior knowledge on growth. The application of M-infinity for steenbras to obtain size-specific natural mortality rate for silver kob (Argyrosomus inodorus), as an input parameter for virtual population analysis, is also proposed. (C) 1999 Elsevier Science B.V. All rights reserved
Estimation of total catch of silver kob Argyrosomus inodorus by recreational shore-anglers in Namibia using a roving-roving creel survey

A statistical sampling method is described to estimate the annual catch of silver kob Argyrosomus inodorus by recreational shore-anglers in Namibia. The method is based on the theory of progressive counts and on-site roving interviews of anglers, with catch counts and measurements at interception, using data taken during a survey from 1 October 1995 to 30 September 1996. Two different methods of estimating daily catch were tested by sampling the same population of anglers using a complete and an incomplete survey. The mean rate estimator, calculated by the ratio of the means with progressive angler counts and averaged fishing times, provides the best estimate of daily catch.

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Kirchner, C. (Ekstern), Beyer, J. (Intern)
Pages: 191-199
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: African Journal of Marine Science
Volume: 21
ISSN (Print): 1814-232X
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 1.36 SJR 0.661 SNIP 0.8
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.696 SNIP 0.732 CiteScore 1.19
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.568 SNIP 0.879 CiteScore 1.15
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.71 SNIP 0.749 CiteScore 1.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.529 SNIP 0.488 CiteScore 1.04
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.608 SNIP 0.611 CiteScore 1.15
ISI indexed (2011): ISI indexed yes
Stochastic stomach theory of fish: An introduction

Fish stomach dynamics is discussed and introduced analytically by a simple individually-based stomach model for total stomach content. The predator encounters food (meals) in a Poisson process, starting to search for a new meal when the stomach is empty. Basic equations for the frequency distributions of stomach content are derived for general classes of meal-size distributions and rate models of gastric evacuation. Probability characteristics in steady-state of empty and non-empty stomachs are evaluated from first principles with particular attention to the square root rate model of gastric evacuation. The average rate of food consumption and the functional response are derived from simple renewal theory and from obtaining the average of the gastric evacuation rates. Effects of meal size biased stomach sampling are introduced. As a primer on modelling the stomach content of piscivorous fish, the model is discussed in relation to the empirical distribution of the individual stomach content for more than 4000 North Sea whiting in the length range 20-30 cm. Implications of identical meals and variable meal sizes, exemplified by the log-normal distribution, are considered. Estimated average meal searching time and meal size as well as the average rate of food consumption decrease considerably in the more realistic case of variable meal sizes. The model is able to account for the high frequency of empty stomachs, which occurs simultaneously with a relatively high observed mean stomach content. Need and direction for further developments of fish stomach theory are discussed. (C) 1998 Elsevier Science B.V. All rights reserved.
Predator foraging in patchy environments: the interrupted poisson process (IPP) model unit

**General information**

State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Mathematical Statistics, Department of Informatics and Mathematical Modeling
Authors: Beyer, J. (Intern), Nielsen, B. F. (Intern)
Pages: 65-130
Publication date: 1996
Main Research Area: Technical/natural sciences
Functional heterogeneity: Using the interrupted poisson process (IPP) model unit in addressing how food aggregation may affect fish ration

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources
Authors: Beyer, J. (Intern)
Publication date: 1995
Main Research Area: Technical/natural sciences

Projects:

Development of ecological sustainable fisheries practices in the Benguela Current Large Marine Ecosystem (EcoFish) (38847)
EcoFish promotes the ecosystem approach to fisheries (EAF) and is conducted in the Benguela Current Large Marine Ecosystem (BCLME), encompassing fish stocks from Angola, Namibia and South Africa.

The objectives are:
1. Adaptation of state-of-art assessments methods and Marine Protected Areas (MPA) planning tools
2. Validation or modification of current assessment practices based on spatially explicit analyses
3. Incorporation of stakeholders' knowledge in data collection and analysis
4. Strengthening of regional capacity to apply the developed assessment tools on a regular basis.

The project represents a paradigm shift compared to DTU Aqua 20 years of FAO/Danida courses in the 80's and 90's, where fish stock assessment was taught in 85 countries by using comparative simple techniques. In contrast EcoFish applies advance stock assessment methodology based on open access, web-based state space (SAM) and geostatistical (GeoPop) tools. Thus the capacity building involved also includes a focus on DTU Aqua because of similar ongoing challenges in the Nordic seas, and two DTU Aqua PhD projects are integrated in EcoFish.

Focus in Ecofish is on hake, horse mackerel and sardinella, coordination to important donor projects in the area such as the Norwegian climate project NansClim and EAF-Nansen is ensured through the leadership of Benguela Current Commission. There are potential synergies to several EU projects (FP6 IMAGE, FP7 MEECE and FP7 FACTS) as well as national projects such as Sunfish (Description of the life cycle and recruitment of cod) and REX/RESOURCE (fishermen-science collaboration on cod in the North Sea). The potential database for BCLME is unique and EcoFish offers the possibility for developing a master example to be used as a generic tool in African Large Marine Ecosystems as well as the large lakes.

The project is coordinated by Benguela Current Commission, Namibia.

The project is funded by EuropeAid.

National Institute of Aquatic Resources
Geographical distribution of fish resources and optimizing of fishery practice in the north-eastern North Sea (RESOURCE) (38878)

RESOURCE is a collaborative fishermen-scientist project in direct continuation of the REX projects in the north-eastern North Sea conducting small-scale scientific surveys, but only with one commercial trawler, encompassing also geographical distributional aspects as in OSKAR.

The REX project showed that changes in the biomass densities of cod differ between bottom types (and may depend on stock size) and the proportion of the cod population found on smooth bottoms is not constant. However, due to scaling problems and too short a time series the achieved results have so far had no impact on the assessment procedure or any (measurable) effect on the TAC’s (but the RAC discussions may have affected decisions by the European Commission). Continuation of the field work with the trawler in 2010-12 in the RESOURCE project should produce a sufficient time series for supplementing the abundance indices for the older ages in the assessment, which at present are based only on the catch rates in the international scientific surveys (IBTS). This total REX-RESOURCE time series will be used in the state space assessment of North Sea cod (SAM) and various other approaches applied to document how commercial CPUE may be used in the tuning procedure. Particular attention will be given to evaluate the size of the spawning stock of cod.

Mechanistic knowledge on vital rates together with REX, RESOURCE, OSKAR and IBTS (and possibly also UK) survey data will be used as input to the geostatistical tool GeoPop to estimate the temporal and spatial dynamics of the size distribution of the cod stock. This part of the project will represent a direct continuation of OSKAR principles including considerations to how to design an operational fishery-forecast system for North Sea cod.

The project is coordinated by DTU Aqua.

National Institute of Aquatic Resources

Section for Marine Ecology and Oceanography

Danish Fishermen's Association
Period: 01/01/2010 → 30/09/2012
Number of participants: 13
Research area: Marine Populations and Ecosystem Dynamics
Project participant:
Andersen, Niels Gerner (Intern)
Pedersen, Eva Maria (Intern)
Andersen, Bo Sølgaard (Intern)
Hüussy, Karin (Intern)
Kristensen, Kasper (Intern)
Nielsen, Anders (Intern)
Stage, Bjarne (Intern)
Mosegaard, Henrik (Intern)
Optimizing the exploitation of fishery resources in Skagerrak (OSKAR) (38720)

The purpose of this project was formulated in 2008 to establish knowledge on the geographical distribution of target species in Skagerrak, which enables the fishermen to plan and execute sustainable fisheries on these species with a minimum of discard and unwanted by-catch of cod, and without drastically reductions or unjustified closure of areas.

OSKAR was a collaborative fishermen-scientist project building on the experience from the REX-project conducting small-scale scientific surveys with commercial ships.

To separate control issues of the mixed fishery of Skagerrak from the issues of using fishermen’s and scientists’ combined knowledge and experience to produce more selective fisheries, some of the key questions addressed were:

- Is it feasible to predict the size distribution of cod on a small spatial scale (single trawl haul) from surveys?
- How important are the seasonal changes for the spatial distribution of cod in Skagerrak?
- Can fishermen’s anecdotic knowledge on the distribution of cod be used?
- Which role does mechanistic process knowledge play in determining critical spatial dynamics of cod?
- Taking also gear technology into account then how can we best produce e.g. a useful cod avoidance tool?

A new advanced geostatistical tool GeoPop was introduced in order to use all available survey data in the maximum likelihood estimation of temporal and spatial dynamics of the size distribution of the stock. Real time closures, future disallowance of discards etc. put the perspective of OSKAR into focus.

The development of GeoPop in this fishermen-scientist project has proven valuable (see Jansen et al 2016, Fish. Res. 179: 156-167 and refs herein). The method was published in 2013 (Kristensen et al 2013, Can. J. Fish. Aquat. Sci. 99: 1-19). Particular attention in GeoPop is paid to correlation between size classes within each trawl haul due to clustering of individuals with similar size. Extracting this nugget effect produces clearer population signals and allows e.g. following cohorts in space and time and determining stock structures. Although GeoPop today is fully TMB operated it is the present computer capacity which sets the limits to exploring e.g. the impacts of spatial heterogeneity on fishery stock assessment.

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).

Spatially-explicit management methods for North Sea cod – a Danish fishermen-science collaboration (REX, REX II, REX III) (38430, 38431, 38541)

The REX project started in 2006 as a protest from the Danish Fishermen Association because fishers had a less pessimistic perception of the status of the cod stock in the North Sea than ICES, and they considered the agreed TAC levels far too low. In particular the fishers considered the scientific surveys as inappropriate due to extremely low catches of large cod because of wrong gear and fishing on smooth bottom only. This seemed to call for more spatially-explicit oriented approaches and REX was born with an aim of getting closer to a common understanding of the true
The number of adult cod in the North Sea by focusing on communication and collaboration in developing and implementing a scientifically sound and robust survey strategy with commercial ships in a north-eastern area selected by the Danish Fishermen Association using three vessels presenting different fishing methods (flyshooter, trawler and gillnetter).

The development of the fishermen-scientists collaboration with mutual respect has increased the understanding on both sides. In particular the emphasis on defining common goals, facing and solving conflicts immediately and extending thorough collaboration from survey planning, conducting of field work to interpretation of results during workshops have contributed to bridging the communication gap.

A better understanding of cod biology has also been a focal point in these projects through the new field studies incorporating fishermen’s knowledge. This includes distribution and migration, feeding behavior and importance of Hot-Spots (e.g. ship wrecks). Electronic tags were applied to learn about migration also in the Baltic. Together with the aim of continuing to obtain better assessments of the stocks such more mechanistically oriented studies are needed to answer two apparently simple questions “Where are the cod and why?”

The REX projects have strengthened the scientific collaboration with fishermen and produced several results and types of knowledge that will influence future work on developing spatial explicit management tools. REX also represents capacity building for DTU Aqua’s interdisciplinary field research and monitoring towards the spatial dynamics of cod.

The project is coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Marine Living Resources
Danish Fishermen’s Association
Period: 01/01/2006 → 31/01/2010
Number of participants: 17
Research area: Marine Living Resources
Project participant:
Pedersen, Eva Maria (Intern)
Olesen, Hans Jakob (Intern)
Andersen, Ken Haste (Intern)
Thygesen, Uffe Høgsbro (Intern)
Kristensen, Kasper (Intern)
Berg, Casper Willestofte (Intern)
Storr-Paulsen, Marie (Intern)
Vinther, Morten (Intern)
Christensen, Per (Intern)
Jensen, Rasmus Frydenlund (Intern)
Pedersen, Jan (Intern)
Grønbj, Søren Larsen (Intern)
Thaarup, Flemming (Intern)
Project Manager, organisational:
Neuenfeldt, Stefan (Intern)
Project Manager, academic:
Beyer, Jan (Intern)
Andersen, Niels Gerner (Intern)
Wieland, Kai (Intern)
Project:
Optimal foraging theory applied to simple models of patchy environments
Department of Informatics and Mathematical Modeling
Period: 15/03/2001 → 08/02/2007
Number of participants: 6
Phd Student:
Nilsson, Lars Anders Fredrik (Intern)
Supervisor:
Beyer, Jan (Intern)
Thygesen, Uffe Høgsbro (Intern)
Main Supervisor:
 Nielsen, Bo Friis (Intern)
Examiner:
 Rootzén, Helle (Intern)
 Haccou, Patricia (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD