Acute hyperoxia induces systemic responses with no major changes in peripheral tissues in the Senegalese sole (Solea senegalensis Kaup, 1858)

Senegalese sole Solea senegalensis is currently farmed in recirculation aquaculture systems that often involve water reoxygenation, which in turn may cause acute or prolonged hyperoxia exposures. In order to understand the impact of acute hyperoxia on the fish immune system and peripheral tissues such as gills and gut, Senegalese sole juveniles (30g) were exposed to normoxia (100% O2sat) as control and two hyperoxic conditions (150 and 200% O2sat) and sampled at 4 and 24 h. Fish haematological profile, total and differential blood cell counts and plasma immune parameters were analysed. Histomorphology and immunofluorescence analyses of gills and intestine were performed, respectively, whereas head-kidney samples were used for assessing the expression of immune-related genes. Results indicate that acute hyperoxia exposure may reduce fish erythrocyte and haemoglobin levels. Moreover, decreases in total leucocytes numbers, circulating lymphocytes, monocytes, alternative complement pathway activity and expression of cyclooxygenase-2 were observed in fish exposed to hyperoxia. In contrast, hyperoxia did not induce major effects on gill histomorphology nor in the protein content of ion and glucose cotransporters as well as a macrophage marker (V-ATPase) in the intestine. Although the activation of humoral mechanisms and immune-related genes were not dramatically affected by acute hyperoxia, the compromised immune cell status and the reduction of some inflammatory indicators are issues to consider under acute hyperoxia conditions.
Effect of bait type and size on catch efficiency of narrow-barred Spanish mackerel (Scomberomorus commerson) in the Persian Gulf handline fisheries

In the Persian Gulf handline fishery, fishers mostly use Cutlassfish (Trichiurus lepturus) bait for targeting narrow-barred Spanish mackerel (Scomberomorus commerson). However, Cutlassfish are expensive compared to other baits and also a commercially important species that is typically exported to Asian countries. In order to conserve Cutlassfish resources and reduce costs of fishing, the effect of changing bait type and size on the catch efficiency and size structure of narrow-barred Spanish mackerel caught in the Persian Gulf handline fishery was investigated. The alternative baits investigated, Indian mackerel (Rastrelliger kanagurta) and artificial bait (lead lure), resulted in a lower overall catch efficiency and a shift in catch pattern towards smaller individuals. The two alternative baits had very similar overall catch efficiencies. The results obtained demonstrate that bait type and size affects both overall catch efficiency and size structure of narrow-barred Spanish mackerel caught in the Persian Gulf handline fishery. This implies that managing bait type and size might complement standard harvest regulations and facilitate changing exploitation pattern in the Persian Gulf handline fishery.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Gorgan University of Agricultural Sciences and Natural Resources, SINTEF Fisheries and Aquaculture
Authors: Eighani, M. (Ekstern), Paighambari, S. Y. (Ekstern), Herrmann, B. (Ekstern), Feekings, J. (Intern)
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Web of Science (2006): Indexed yes
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Web of Science (2003): Indexed yes
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Effects of chronic bottom trawling on soft-seafloor macrofauna in the Kattegat

Impact studies of chronic bottom trawling aiming to reveal long-term effects on benthic organisms are often hampered by the lack of comparable untrawled conditions and the difficulty in assessing the spatial distribution of trawling intensity. We sampled soft-seafloor macrofauna over a precise trawling gradient in the Kattegat using hourly vessel monitoring systems and logbooks. The gradient included the establishment of a marine protected area (MPA), where trawling intensity declined sharply to zero. Our results show shifts in the macrofauna assemblage and non-linear responses, with decreases in the number and diversity of species at low to medium trawling intensities. The benthic community was dominated by burrowing brittle stars, of which one species, Amphiura chiajei, increased in abundance from low to medium trawling intensities. We interpret this positive response to increasing trawling intensities as a consequence of reduction in predation by benthivorous flatfish and Norway lobster Nephrops norvegicus, which are significant catches of the fishery. The response was supported by a corresponding trend towards lower abundance of the dominating brittle stars following enforcement of the MPA and presumably an increase in benthivore density and predation pressure within the MPA. We conclude that chronic bottom trawling reduces diversity and may boost the abundances of species resistant to bottom trawling. The results emphasize the need to consider food web effects when assessing the impact of bottom trawling.

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Gear technical contributions to an ecosystem approach in the Danish bottom set nets fisheries

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Savina, E. (Intern)
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Identifying choke species challenges for an individual demersal trawler in the North Sea, lessons from conversations and data analysis

A likely side-effect of introducing the landing obligation of the 2013 Common Fisheries Policy into mixed fisheries is the occurrence of the “choke species” problem. When discarding no longer is an option, leasing quota or changing fishing practices remain important tools to avoid choke species. Here, the scale and tactics linked to using avoidance behaviour to reduce choke species is investigated by analysing the fishing behaviour of a single demersal trawler in the North Sea. Analysis combined qualitative information collected from through interviews with the vessel owner and skipper, along with quantitative analysis on fisheries data. From the interviews, saithe and cod were identified as potential choke species and subsequent analysis focused on these two species. The analysis of catch and quota composition showed that cod would choke the fishery early if no catch-quota balancing options were available, resulting in a 87% reduction in revenue, while saithe could choke the fishery later, resulting in a 43% reduction in revenue. Avoidance behaviour was difficult to detect from fisheries data, which was explained by avoidance taking primarily place through very fine-scale tactical choices rather than large displacements. Catch composition showed that saithe is distributed more patchily than cod, with most hauls containing small amounts of saithe and a few hauls containing large amounts. In conclusion this paper supplies an view on the choke species problem seen from the perspective of an individual fisher and highlights the amount of real-time tactical decisions and trade-offs that need to be made when operating in mixed-fisheries

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Scopus rating (2016): CiteScore 2.7 SJR 1.335 SNIP 1.182
Individual transferable quotas, does one size fit all?: Sustainability analysis of an alternative model for quota allocation in a small-scale coastal fishery

The introduction of vessel-based Individual Transferable Quotas (ITQs) in Danish demersal fisheries in 2007 caused significant structural changes in the fleet, towards fewer and larger vessels deploying otter trawls. Mainly smaller coastal vessels deploying Danish seines and gillnets reduced in numbers. The ecosystem effects of this structural change were investigated by comparing the sustainability of a local, small-scale, coastal fishery (Thorupstrand) using Danish seines and gillnets with that of demersal trawling by larger vessels using the same fishing grounds. The fisheries were compared using six ecological and socio-economic indicators: 1) discards (food web), 2) by-catch incidences (food web/biodiversity), 3) seabed impacts, 4) fuel use efficiency, 5) quality of fish landed (food provision), and 6) social and cultural gains and drawbacks (social and cultural features). Except for by-catch of vulnerable species, the fisheries using Danish seines and gillnets scored better in all indicators when compared to otter trawls. Additional commercial and cultural benefits of establishing a local fishery guild with share-owned quotas and land-based facilities were investigated. The results and lessons learned are discussed in the context of an ecosystem approach to fisheries management and the current reform of the common fisheries policy of the European Union.
Influence of swimming behavior of copepod nauplii on feeding of larval turbot (Scophthalmus maximus)

Feeding in larval fish is influenced by a range of factors and among these are the morphological and behavioral characteristics of their prey. We investigated the influence of the swimming behavior of two species of calanoid copepods, Acartia tonsa and Temora longicornis, on larval turbot feeding. The nauplii of these species represent two contrasting swimming behaviors: A. tonsa is a jump-sink type swimmer, while T. longicornis is a cruise swimming type. Three replicates of ten larvae aged 7 and 9 days post hatch (DPH) were observed feeding on one of the two copepod species using a 2-dimensional video setup. The results showed that the duration of aiming postures by turbot larvae was 2.3 times higher when turbot larvae approached T. longicornis as compared to A. tonsa nauplii, indicating that larvae can more easily position themselves, preparing for attack, when the prey is of the jump-sink type. The attack speed of turbot larvae feeding on A. tonsa nauplii decreased slightly from DPH 7 to DPH 9, whereas it increased when attacking T. longicornis nauplii. Capture success rate by turbot larvae feeding on A. tonsa was 58% and slightly higher, but not significantly different to capture success rate when feeding on T. longicornis (54%). We conclude that the differences between behavior and other characteristics of these prey species have only minor effect on larval fish feeding, suggesting that copepods species for live feed should be selected according to their ease to culture more than to their species-specific characteristics.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Section for Oceans and Arctic, Roskilde University
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ISI indexed (2013): ISI indexed yes
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Scopus rating (2012): SJR 0.599 SNIP 1.04 CiteScore 1.15
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Integrated ecological-economic fisheries models - evaluation, review and challenges for implementation

Marine ecosystems evolve under many interconnected and area-specific pressures. In order to fulfill society's intensifying and diversifying needs whilst ensuring ecologically sustainable development, more effective marine spatial planning and broader-scope management of marine resources is necessary. Integrated ecological–socioeconomic fisheries models (IESFM) of marine systems are needed to evaluate impacts and sustainability of potential management actions and understand, and anticipate ecological, economic, and social dynamics at a range of scales from local to national and regional. To make these models most effective, it is important to determine how model characteristics and methods of communicating results influence the model implementation, the nature of the advice that can be provided and the impact on decisions taken by managers. This paper presents a global review and comparative evaluation of 35 IESFM’s applied to marine fisheries and marine ecosystem resources to identify the characteristics that determine their usefulness, effectiveness and implementation. The focus is on fully integrated models that allow for feedbacks between ecological and human processes through not all the models reviewed achieve that.

General information

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Oceans and Arctic, National Oceanographic and Atmospheric Administration, Christian-Albrechts-Universität zu Kiel, CSIRO, University of Washington, Plymouth Marine Laboratory, IFREMER, Thünen Institute of Sea Fisheries, New Economics Foundation, University of British Columbia, University of Vigo, AZTI-Tecnalia, Université Bretagne Loire, Institut de Ciències del Mar-CSIC, Wageningen University, National Marine Fisheries Research Institute, Scottish Pelagic Fishermen’s Association, AZTI Technalia, University of Southern Denmark, Swiss Federal Institute of Aquatic Science and Technology, Wageningen IMARES, Commonwealth Scientific and Industrial Research Organisation, University of Copenhagen, Swedish Agency for Marine and Water Management, Stockholm University, Lund University

Ontogenetic development of attack behaviour by turbot larvae when exposed to copepod prey

Identification of fish larval behavioural traits permitting capture of specific live prey sizes is an important part of optimizing production of marine larvae. We investigated the capture success of turbot larvae (Scophthalmus maximus) at two development stages, 8 and 10 days post-hatch (DPH), when offered small nauplii (129–202 μm), large nauplii (222–278 μm) and copepodites (342–542 μm), of the calanoid copepod Acartia tonsa. At 8 DPH, turbot larvae had the highest capture success (67%) when offered small nauplii, with a lower capture success of large nauplii (27%) but totally lacked the capabilities to capture copepodites. At DPH 10, the larvae increased the capture success of large nauplii (47%) and achieved a few successful attacks on copepodites. Energetically, large nauplii were the most beneficial at both larval development stages. The swimming kinematics of the period prior to a strike by the larva on the copepod was examined, and the approach pattern of the larva was identified as a controlling mechanism for their strike distance, with the initial approach speed of larva at DPH 10 being significantly less than at DPH 8. In all successful attacks, the strike distance was less than 1.17 mm and was significantly lower than unsuccessful attacks. Since the approach pattern of the larva is linked to its capture success, it could be used as the basis for a feeding scheme based on the swimming performance of individual batches of turbot larvae.

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Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.674 SNIP 0.943 CiteScore 1.23
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ISI indexed (2013): ISI indexed yes
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Scopus rating (2010): SJR 0.645 SNIP 0.936
Web of Science (2010): Indexed yes
Overarching sustainability objectives overcome incompatible directions in the Common Fisheries Policy

The lack of clarity in the objectives of the Common Fisheries Policy (CFP) must be addressed to create a more efficient balance across diverse ecological, economic and social dimensions. Particularly economic and social objectives present at an overarching level must be made explicit and addressed in lower level management measures, in order to link them to biological objectives and allow policy to build a balance across types of objectives. Selecting clear objectives is essential, particularly for policy impact assessment. The aim of this paper is to demonstrate how more specific high level objectives to managing fisheries can be derived from stakeholders. The paper first reviews the definition of objectives, from a historical and conceptual perspective. Secondly, it discusses the issues of manageability and acceptability, and finally describes an articulation of the high level objectives derived from extensive stakeholder consultations at European and regional level. The results from workshops at the European level to identify objectives were further examined at regional level for the Baltic and North Seas in additional individual consultations. The German case addresses two seas (Baltic and North Seas), has a complex governance structure (due to federalism) and significant roles for the three types of actors (industry, government and environmental NGOs). The analysis suggests that establishing higher level sustainability objectives within the CFP can help diverse interest groups to develop a consensus on management actions to meet complex social goals.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Sea Fisheries, Marine Institute, Thünen Institute of Baltic Sea Fisheries, National University of Ireland
Testing spatial heterogeneity with stock assessment models

This paper describes a methodology that combines meta-population theory and stock assessment models to gain insights about spatial heterogeneity of the meta-population in an operational time frame. The methodology was tested with stochastic simulations for different degrees of connectivity between sub-populations and applied to two case studies, North Sea cod (Gadus morua) and Northeast Atlantic sardine (Sardina pilchardus). Considering that the biological components of a population can be partitioned into discrete spatial units, we extended this idea into a property of additivity of sub-population abundances. If the additivity results hold true for putative sub-populations, then assessment results based on sub-populations will provide information to develop and monitor the implementation of finer scale/local management. The simulation study confirmed that when sub-populations are independent and not too heterogeneous with regards to productivity, the sum of stock assessment model estimates of sub-populations' SSB is similar to the SSB estimates of the meta-population. It also showed that a strong diffusion process can be detected and that the stronger the connection between SSB and recruitment, the better the diffusion process will be detected. On the other hand it showed that weak to moderate diffusion processes are not easy to identify and large differences between sub-populations productivities may be confounded with weak diffusion processes. The application to North Sea cod and Atlantic sardine exemplified how much insight can be gained. In both cases the results obtained were sufficiently robust to support the regional analysis.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, European Commission - Joint Research Center, Instituto Português do Mar e da Atmosfera, IFREMER, AZTI Technalia, Instituto Español de Oceanografía, Cefas
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Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Web of Science (2014): Indexed yes
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Isi indexed (2013): Isi indexed yes
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Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
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Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
Achieving maximum sustainable yield in mixed fisheries: a management approach for the North Sea demersal fisheries

Achieving single species maximum sustainable yield (MSY) in complex and dynamic fisheries targeting multiple species (mixed fisheries) is challenging because achieving the objective for one species may mean missing the objective for another. The North Sea mixed fisheries are a representative example of an issue that is generic across most demersal fisheries worldwide, with the diversity of species and fisheries inducing numerous biological and technical interactions. Building on a rich knowledge base for the understanding and quantification of these interactions, new approaches have emerged. Recent paths towards operationalizing MSY at the regional scale have suggested the expansion of the concept into a desirable area of “pretty good yield”, implemented through a range around FMSY that would allow for more flexibility in management targets. This article investigates the potential of FMSY ranges to combine long-term single-stock targets with flexible, short-term, mixed-fisheries management requirements applied to the main North Sea demersal stocks. It is shown that sustained fishing at the upper bound of the range may lead to unacceptable risks when technical interactions occur. An objective method is suggested that provides an optimal set of fishing mortality within the range, minimizing the risk of total allowable catch mismatches among stocks captured within mixed fisheries, and addressing explicitly the trade-offs between the most and least productive stocks.

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, IFREMER, Cefas, Wageningen IMARES, European Commission - Joint Research Center, Thünen Institute of Sea Fisheries
Authors: Ulrich, C. (Intern), Vermard, Y. (Ekstern), Dolder, P. J. (Ekstern), Brunel, T. (Ekstern), Jardim, E. (Ekstern), Holmes, S. J. (Ekstern), Kempf, A. (Ekstern), Mortensen, L. O. (Intern), Poos, J. (Ekstern), Rindorf, A. (Intern)
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Analysis of marine protected areas – in the Danish part of the North Sea and the Central Baltic around Bornholm: Part 1: The coherence of the present network of MPAs

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Organisations: National Institute of Aquatic Resources, Section for Oceans and Arctic, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Monitoring and Data, DHI Denmark, Geological Survey of Denmark and Greenland, Aarhus University, University of Copenhagen
Authors: Edelvang, K. (Intern), Gislason, H. (Intern), Bastardie, F. (Intern), Christensen, A. (Intern), Egekvist, J. (Intern), Dahl, K. (Ekstern), Göke, C. (Ekstern), Petersen, I. K. (Ekstern), Sveegaard, S. (Ekstern), Heinänen, S. (Ekstern),
Analysis of marine protected areas – in the Danish part of the North Sea and the Central Baltic around Bornholm: Part 2: Ecological and economic value, human pressures, and MPA selection

Applying a new ensemble approach to estimating stock status of marine fisheries around the world: Estimating global fisheries status
Assessing and mitigating of bottom trawling. Final BENTHIS project Report (Benthic Ecosystem Fisheries Impact Study)

BENTHIS developed the scientific basis to quantify the impact of bottom trawling on the seafloor and the benthic ecosystem. Based on insight in how fishing gear affects the seafloor, an assessment framework was developed that provide indicators of impact and seafloor status on a continuous scale that can be applied in the context of the MSFD. The mechanistic approach allows us to set reference values of impact (status) to estimate the proportion of a region or habitat where the impact is below (status is above) the threshold. The methodology combines estimates of trawling intensity with the depth to which the fishing gear penetrates into the sea bed (penetration profile) and the sensitivity of the habitat. Habitat sensitivity is estimated from the longevity composition of the benthic community that is related to the recovery rate. The mortality imposed by trawling was shown to be related to penetration depth of the fishing gear. The framework was applied to explore which fisheries had the greatest impact and which habitats were impacted the most. Fishers concentrate their activities in only a part of their total fishing area. These core fishing grounds are characterised by a relative low status (high impact). Additional fishing in these core grounds have only a small impact. In the peripheral areas where fishing intensity is low, additional fishing will have a much larger impact. Hence, shifting trawling activities from the core fishing grounds to the peripheral areas will increase the overall impact. Shifting activities from the peripheral grounds...
to the core will reduce the overall impact. This asymmetry provides the possibility to reduce the impact at a minimal cost. It was shown that implementing a habitat credit management system can provide incentives to reduce fishing in peripheral areas at minimal cost. In collaboration with the fishing industry and gear manufacturers, technological innovations were studied to reduce the impact of trawling. Promising results were obtained showing that (semi-) pelagic otter doors can be applied to reduce bottom impact and at the same time reduce the fuel cost without affecting the catch rate of the target species. Replacing mechanical stimulation by tickler chains with electrical stimulation in the beam trawl fishery for sole, reduced footprint and penetration depth as well as the fuel cost. Electrical stimulation is also a promising innovation to reduce the bycatch and bottom contact in the beam trawl fishery for brown shrimps. Sea trials to replace bottom trawls with pots were inconclusive. Results suggest that creels may offer an alternative for small Nephrops fishers in the Kattegat. In waters off Greece, the catch rates were very low. Sea trials with the blue mussel fishery showed that fishers could reduce their footprint by deploying acoustic equipment to detect mussel concentrations that allow the fishers to more precisely target the mussel beds and hence reduce fishing in areas with low mussel density. A review of the various case studies carried out in BENTHIS revealed the critical success factors for implementing technological innovations to mitigate trawling impact. While economic investment theory predict that economic profitability should lead to investment in innovative gears, it appeared that many other factors play a role in the successful uptake of new technology such as social, regulatory, technological and environmental factors. For the successful development and implementation of gear innovations, collaboration between fishers, gear manufacturers, policy makers, scientist and society is important

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State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Wageningen University, National Research Council of Italy, Synthesa, Wageningen IMARES, Cefas, Bangor University, Institute for Agricultural and Fisheries Research, IFREMER, Central Fisheries Research Institute
Authors: Rijnsdorp, A. D. (Ekstern), Eigaard, O. R. (Intern), Kenny, A. (Ekstern), Hiddink, J. G. (Ekstern), Hamon, K. (Ekstern), Piet, G. J. (Ekstern), Sala, A. (Ekstern), Nielsen, J. R. (Intern), Polet, H. (Ekstern), Laffargue, P. (Ekstern), Zengin, M. (Ekstern), Gregersen, Ø. (Ekstern)
Number of pages: 28
Publication date: 2017

Publication information
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Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Publication: Research › Report – Annual report year: 2018

Avoiding pitfalls in interdisciplinary education
As the world’s social-environmental problems increasingly extend across boundaries, both disciplinary and political, there is a growing need for interdisciplinarity, not only in research per se, but also in doctoral education. We present the common pitfalls of interdisciplinary research in doctoral education, illustrating approaches towards solutions using the Nordic Centre for Research on Marine Ecosystems and Resources under Climate Change (NorMER) research network as a case study. We provide insights and detailed examples of how to overcome some of the challenges of conducting interdisciplinary research within doctoral studies that can be applied within any doctoral/postdoctoral education programme, and beyond. Results from a selfevaluation survey indicate that early-career workshops, annual meetings and research visits to other institutions were the most effective learning mechanisms, whereas single discipline-focused courses and coursework were among the least effective learning mechanisms. By identifying the strengths and weaknesses of components of NorMER, this case study can inform the design of future programmes to enhance interdisciplinarity in doctoral education, as well as be applied to science collaboration and academic research in general

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Oceans and Arctic, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, University of Bergen, University of Iceland, Stockholm University, University of Oslo, University of Helsinki, University of the Faroe Islands, Abo Akademi University
Pages: 121-129
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Main Research Area: Technical/natural sciences

Publication information
Journal: Climate Research
Behavioural changes of Atlantic cod (Gadus morhua) after marine boulder reef restoration: Implications for coastal habitat management and Natura 2000 areas

While marine reefs are degraded globally, the responses of fish to marine reef restoration remain uncertain, particularly in temperate waters. This study measured the effect of marine boulder reef restoration on the behaviour of Atlantic cod, Gadus morhua L., in a Natura 2000 area using acoustic telemetry. Cod were tagged and released in the study area before and after the restoration and tracked continuously for six months. A larger fraction of the released fish remained in the study area after restoration (94%) than before (53%). Moreover, throughout the study period, cod spent significantly more hours per day and prolonged their residence time in the study area after the restoration. The study indicates that marine reefs subjected to boulder extraction can be restored and function as favourable cod habitats. Temperate marine boulder reef restoration represents a valuable management tool to improve habitats for temperate fish species.
Changes in distributional patterns of plaice Pleuronectes platessa in the central and eastern North Sea; do declining nutrient loadings play a role?

Since the beginning of the 1990s, there has been a change in the relative distribution of smaller age-classes of plaice Pleuronectes platessa (age 1–3) in the North Sea. The abundances have increased in deeper, more offshore areas, while coastal abundances have been stagnant or declining. For the same time period available time series data on nutrient conditions in the coastal North Sea area show that the freshwater nitrogen loading has decreased by about 50%. While nutrient concentrations in the ambient environment have been shown to influence growth in juvenile plaice through influence on their prey, we here inspect the potential linkage between distributional changes in plaice and the decline in nutrient loading. We compare plaice observations in coastal areas in the eastern North Sea, which have experienced large changes in eutrophication with observations for the Dogger Bank, a large sandbank in a shallow offshore area of the North Sea. The Dogger Bank was used as a reference location assuming this area has been less influenced from coastal eutrophication but similar regional climate conditions, and here we found no changes in the abundances of juvenile plaice. The increase in the use of offshore habitats as nursery areas by juvenile plaice in the North Sea appears not related to water depth per se but driven by specific processes dominating in near-shore areas and may be related to changes in
nutrient loadings. This point to the importance of separating more general depth-related factors from conditions specific for near-shore areas, such as nutrient loadings in coastal waters and export offshore. The concurrent changes in environment and in distribution of juvenile plaice may have implications for environmental and fisheries management.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Department of Electrical Engineering, Section for Marine Ecology and Oceanography, Japan International Research Centre for Agricultural Sciences
Authors: Støttrup, J. G. (Intern), Munk, P. (Intern), Kodama, M. (Ekstern), Stedmon, C. (Intern)
Pages: 164-172
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Main Research Area: Technical/natural sciences

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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
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.371 SNIP 1.28 CiteScore 2.5
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.267 SNIP 1.242
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.261 SNIP 1.071
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.289 SNIP 1.156
Scopus rating (2007): SJR 1.402 SNIP 1.179
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.325 SNIP 1.165
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.987 SNIP 0.923
Scopus rating (2004): SJR 0.932 SNIP 0.957
Changes in reproductive life history and resource allocation impacting population dynamics of Baltic cod

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Monitoring and Data, Section for Ecosystem based Marine Management, Institute Management
Authors: Tomkiewicz, J. (Intern), Huwer, B. (Intern), Cordón, C. T. F. (Intern), Storr-Paulsen, M. (Intern), Eero, M. (Intern), Köster, F. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2017

**Codend selectivity in a commercial Danish anchor seine**

Danish seining (or anchor seining) is a fishing technique that is gaining increasing attention because it is considered to be a fuel-efficient fishing method with low environmental impact. However, scientific documentation of the selectivity characteristics of Danish seines is lacking, and the gear generally is grouped with bottom trawls and Scottish seines in fisheries management legislation. In this study, we developed a codend cover to estimate the selectivity of a standard commercial Danish seine codend for four fish species. The data for the dominant species, dab (Limanda limanda) and plaice (Pleuronectes platessa), was best described by models that combine two or three logistic models, which indicated that more than one selection process was at work. Selectivity of cod (Gadus morhua) was best described by a Richard curve and selectivity of red gurnard (Chelidonichthys lucernus) by a logistic curve. The estimated selectivity curve of dab indicated, contrary to cod and plaice, low retention of individuals below MLS. Confidence limits for larger length classes of cod and red gurnard were relatively wide. For plaice, the estimated selection factor, which is the length with 50% retention divided by mesh size, was comparable to literature values from trawl studies. The average value for cod was similar for Danish and Scottish seines, but lower for trawls. The results are discussed in the context of fisheries management with focus on the landing obligation of the new Common Fisheries Policy

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Baltic Sea Fisheries, Aalborg University
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Web of Science (2017): Indexed yes
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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
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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.2016.10.006
Combining litter observations with a regional ocean model to identify sources and sinks of floating debris in a semi-enclosed basin: The Adriatic Sea

Visual ship transect surveys provide crucial information about the density, and spatial distribution of floating anthropogenic litter in a basin. However, such observations provide a 'snapshot' of local conditions at a given time and cannot be used to deduce the provenance of the litter or to predict its fate, crucial information for management and mitigation policies. Particle tracking techniques have seen extensive use in these roles, however, most previous studies have used simplistic initial conditions based on bulk average inputs of debris to the system. Here, observations of floating anthropogenic macro debris in the Adriatic Sea are used to define initial conditions (number of particles, location, and time) in a Lagrangian particle tracking model. Particles are advected backward and forward in time for 60 days (120 days total) using surface velocities from an operational regional ocean model. Sources and sinks for debris observed in the central and southern Adriatic in May 2013 and March 2015 included the Italian coastline from Pescara to Brindisi, the Croatian island of Mljet, and the coastline from Dubrovnik through Montenegro to Albania. Debris observed in the northern Adriatic originated from the Istrian peninsula to the Italian city of Termoli, as well as the Croatian island of Cres and the Kornati archipelago. Particles spent a total of roughly 47 days afloat. Coastal currents, notably the eastern and western Adriatic currents, resulted in large alongshore displacements. Our results indicate that anthropogenic macro debris originates largely from coastal sources near population centers and is advected by the cyclonic surface circulation until it strands on the southwest (Italian) coast, exits the Adriatic, or recirculates in the southern gyre.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Florida Atlantic University, Consiglio Nazionale delle Ricerche, Jerusalem College of Technology, National Institute of Oceanography and Experimental Geophysics, Universita Politecnica delle Marche
Authors: Carlson, D. F. (Ekstern), Suaria, G. (Ekstern), Aliani, S. (Ekstern), Fredj, E. (Ekstern), Fortibuoni, T. (Ekstern), Griffa, A. (Ekstern), Russo, A. (Ekstern), Melli, V. (Intern)
Publication date: 2017
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BFI (2018): BFI-level 1
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Scopus rating (2016): CiteScore 0.53 SJR 0.173 SNIP 0.109
BFI (2015): BFI-level 1
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Original language: English
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Danish seine – Ecosystem effects of fishing
In 2014, the project “Danish seine – Ecosystem effects of fishing” got initiated in order to establish a better scientific understanding around Danish anchor seining and its effects on the environment. By comparing catch profiles of Danish seiners and demersal otter trawlers, we could show that the Danish seine is an efficient gear to catch flatfish, but is not as
flexible as trawlers in terms of fishing areas because it is restricted to relatively flat areas. Furthermore, selectivity characteristics of the codend and other parts of the gear were investigated. We attached a large cover around the codend and a novel arrangement of 12 small mesh bags on different parts of the seine net to collect fish and invertebrates that would escape under commercial conditions. By doing so, we could estimate codend selectivity parameters for relevant species, which were relatively similar to estimates for trawls, and found that the majority of fish attempted to escape through the seine codend. For invertebrates, we observed high escapement rates from gear parts forward of the codend, indicating that there are effects that are ignored in conventional selectivity studies which primarily focus on codend catches. In another set of sea trials, we attached GPS loggers and various self-invented observation systems to the gear to monitor and describe the fishing process in detail. Animations showing the fishing operation with a Danish seine were created, including information about net opening, net spread, tensile forces between net and ropes and rope behavior. We documented that the majority of fish enters the seine net very late, that fishermen can conduct efficient seine fishing although they do not use any gear monitoring sensors, and that impacts of seine ropes on the sea floor were limited to slight smoothening effects. The PhD project increased the basic scientific understanding of Danish seining and developed methods and equipment than can be used to collect more detailed information in the future. The broad information established here provide data that is of high relevance for tomorrow’s discussions about the fisheries in European waters including the implementation of the new Common Fisheries Policy and its landing obligation.
developed three new grids using made by polyurethane to make them flexible: One grid had horizontal bars, one had vertical bars, and one had vertical bars and a guiding funnel in front of the grid. Four unselective net bags were used to collect the catch escaping through different parts of the grid or escaping without passing through the grid. Water flow around the grid bars was measured in a flume tank. The three grids were tested from a commercial trawler in the Kattegat and Skagerrak area. Underwater filming was conducted to assess grid performance and fish behavior. Results showed that a bottom hole in the lower part of the grid allowed species in the lower part of the gear to pass and retained in the bag behind the hole. More flatfish passed the grid with horizontal bars compared to that with vertical bars, but the retention rate was still low. Use of the guiding funnel increased the contact with the grid considerably for both target and unwanted species. In all three grid designs, there were losses of Norway lobster above minimum landing size.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aalborg University, University of Oslo, SINTEF
Authors: Madsen, N. (Intern), Holst, R. (Ekstern), Frandsen, R. (Intern), Hansen, K. (Ekstern)
Pages: 26-33
Publication date: 2017
Main Research Area: Technical/natural sciences

**Publication information**

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- 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
Diet composition and food consumption rate of harbor porpoises (Phocoena phocoena) in the western Baltic Sea

Stomach content composition and prey-specific consumption rates of juvenile and adult harbor porpoises (Phocoena phocoena) were estimated from a data set including 339 stomachs collected over a 32 yr period (1980−2011) in the western Baltic Sea. The stomach contents were mainly hard parts of fish prey and in particular otoliths. The bias originating from differential residence time of otoliths in the stomachs was addressed by use of a recently developed approach. Atlantic cod and herring were the main prey of adults, constituting on average 70% of the diet mass. Juvenile porpoises also frequently consumed gobies. Here, the mass contribution by gobies was on average 25%, which was as much as cod. Other species such as whiting, sprat, eelpout, and sandeels were of minor importance for both juveniles and adults. The diet composition differed between years, quarters, and porpoise acquisition method. Yearly consumption rates for porpoises in the western Baltic Sea were obtained in three scenarios on the daily energy requirements of a porpoise in combination with an estimate including the 95% CIs of the porpoise population size. Cod of age groups 1 and 2 and intermediate-sized herring suffered the highest predation from porpoises.

General information
State: Published
Organisations: Section for Marine Ecology and Oceanography, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Veterinary Medicine Hannover
Authors: Andreasen, H. (Intern), Ross, S. D. (Intern), Siebert, U. (Ekstern), Andersen, N. G. (Intern), Ronnenberg, K. (Ekstern), Gilles, A. (Ekstern)
Pages: 1053-1079
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Main Research Area: Technical/natural sciences

Publication information
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Issue number: 4
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
There is an implicit requirement under contemporary policy drivers to understand the characteristics of benthic communities under anthropogenically-unimpacted scenarios. We used a trait-based approach on a large dataset from across the European shelf to determine how functional characteristics of unimpacted benthic assemblages vary between different sedimentary habitats.

Assemblages in deep, muddy environments unaffected by anthropogenic disturbance show increased proportions of downward conveyors and surface deposit-feeders, while burrowing, diffusive mixing, scavenging and predation traits assume greater numerical proportions in shallower habitats. Deep, coarser sediments are numerically more dominated by sessile, upward conveyors and suspension feeders. In contrast, unimpacted assemblages of coarse sediments in shallower regions are proportionally dominated by the diffusive mixers, burrowers, scavengers and predators. Finally, assemblages of gravelly sediments exhibit a relatively greater numerical dominance of non-bioturbators and asexual reproducers. These findings may be used to form the basis of ranking habitats along a functional sensitivity gradient.
Discard survival assessment of plaice (Pleuronectes platessa) and lemon sole (Microstomus kitt) caught by demersal otter trawling in Skagerrak

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Noack, T. (Intern), Karlsen, J. D. (Intern), Savina, E. (Intern)
Publication date: 2017
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Main Research Area: Technical/natural sciences

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Do spatio-temporal spawning closures promote the recovery of cod in the Baltic Sea?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Institute Management, Section for Monitoring and Data
Authors: Eero, M. (Intern), Hinrichsen, H. H. (Ekstern), Huwer, B. (Intern), Köster, F. (Intern), Mosegaard, H. (Intern), Storr-Paulsen, M. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

Eastern Baltic cod recruitment revisited—dynamics and impacting factors
The Eastern Baltic cod abundance started rapidly to increase in the mid-2000s as evidenced by analytical stock assessments, due to increased recruitment and declining fishing mortality. Since 2014, the analytical stock assessment is not available, leaving the present stock status unclear and casting doubts about the magnitude of the recent increase in recruitment. Earlier studies identified main factors impacting on cod reproductive success to be related to the loss of two out of three spawning areas in the 1980s caused by lack of major Baltic inflows with a concurrent reduction in salinity and oxygen. Other important factors include prey availability for first-feeding larvae, egg predation by sprat and herring and cannibalism on juveniles, all in one way or the other related to the prevailing hydrographic conditions. These factors cannot explain increased reproductive success in the last decade, as the period was characterized by an absence of large-scale Baltic inflows since 2003 and persistent anoxic conditions in the bottom water of the deep Baltic basins. This questions the perception of the increased recruitment in later years and challenges our present understanding of cod recruitment dynamics in the Baltic Sea. In this contribution, we review evidence from the recent literature supplemented by information from latest research cruises to elucidate whether cod reproductive success indeed has increased during the last decade, and we suggest the key processes responsible for the recent dynamics in cod recruitment and outline directions for future research.

General information
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Organisations: National Institute of Aquatic Resources, Institute Management, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, GEOMAR - Helmholtz Centre for Ocean Research Kiel, Fishery Resources Research Department, National Marine Fisheries Research Institute, Institute for Hydrobiology and Fisheries Science, Thünen Institute of Baltic Sea Fisheries
Authors: Köster, F. (Intern), Huwer, B. (Intern), Hinrichsen, H. (Ekstern), Neumann, V. (Intern), Makarchouk, A. (Ekstern), Eero, M. (Intern), Dewitz, B. V. (Ekstern), Hüssy, K. (Intern), Tomkiewicz, J. (Intern), Margonski, P. (Ekstern), Temming, A. (Ekstern), Hermann, J. (Ekstern), Oesterwind, D. (Ekstern), Dierking, J. (Ekstern), Kotterba, P. (Ekstern), Plikshs, M. (Ekstern)
Pages: 3-19
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication information
Effectiveness of fully documented fisheries to estimate discards in a participatory research scheme

A key challenge for fisheries science and management is the access to reliable and verifiable catch data. In science, the challenge is to collect reliable, precise and traceable data to provide sound advice. In management, the challenge is that catch documentation is necessary to enforce regulations. Currently, catch inspection at sea, self-reporting through e-log and on-board observers are the primary methods to document catches at sea. However, at-sea control and on-board observers are costly and have limited coverage, while self-reporting
is susceptible to fraud and provides limited coverage. New cost-effective methods are currently emerging involving Remote Electronic Monitoring (REM) and on-board cameras. Previous studies have tested REM with promising results. However, evaluation of the potential biases of REM is needed before full benefits can be obtained. We deployed REM with on-board cameras on 14 fishing vessels and were able to inspect 56% of 1523 hauls made in the 6 month trial period, using an estimated 582 man-hours of video audit. The results showed an overall good agreement between the fishers self-reported discards and the video inspectors discard estimates. However, there was large variation in precision between individual vessels and species. Additionally, trial setup and process errors were shown to have a large effect on the precision of the video inspectors discard estimates. Nevertheless, despite challenges, REM was evaluated to have the potential to streamline monitoring and scientific documentation in a medium-size fishing fleet.

General information
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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
Soak duration in the gillnet fisheries can vary from a few hours to several days. The industry reports a variation of soak tactics between target species, but also between seasons for the same species. These are determined by the robustness of the target species and the catch of unwanted species. Different soak tactics were compared to estimate the role that the choice of a soak tactic plays in the catch efficiency of both target and unwanted species. In the Danish summer gillnet fishery targeting plaice (Pleuronectes platessa), nets are deployed approximately 12 h (h) during day. Unwanted species are common dab (Limanda limanda) and edible crab (Cancer pagurus). The commercially used 12 h deployment during day was compared to 12 h deployment during night and 24 h deployment. On average, there were about 1.5 more catches of commercial size plaice (above 27 cm), and 2 and 4 times less catches of the unwanted dab and edible crab, respectively, for 12 h at day compared to the other soak tactics (12 h at night or 24 h). Gillnetters participating in the coastal summer fishery for plaice follow the theoretical optimal soak tactic. The commercially used 12 h deployment during day maximises the catch of commercial sized plaice and limits handling time by catching less unwanted dab and crabs.
Effect of nanosilver on metabolism in rainbow trout (Oncorhynchus mykiss): An investigation using different respirometric approaches

Nanosilver (nAg) has been incorporated into many consumer products, including clothing and washing machines, because of its antimicrobial properties. Consequently, the potential for its release into aquatic environments is of significant concern. Documented toxic effects on fish include altered gene expression, gill damage, and impaired gas exchange, as well as mortality at high nAg concentrations. The present study reports the effects of nAg on the metabolism of rainbow trout (Oncorhynchus mykiss). Fish were exposed to environmentally relevant concentrations (0.28 ± 0.02 μg/L) and higher (47.60 ± 5.13 μg/L) for 28 d, after which their standard metabolic rate (SMR), forced maximum metabolic rate (MMRf), and spontaneous maximum metabolic rate (MMRs) were measured. There was no effect observed in SMR, MMRf, or MMRs, suggesting that nAg is unlikely to directly affect fish metabolism. On average, MMRs tended to be greater than MMRf, and most MMRs occurred when room lighting increased. The timing of MMRf chase protocols was found to affect both MMRf and SMR estimates, in that chasing fish before respirometric experiments caused higher MMRf estimates and lower SMR estimates. Although compounded effects involving nAg and other environmental stressors remain unknown, the present study indicates that the tested range of nAg is unlikely to constrain fish metabolism.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Manitoba, Lakehead University, Fisheries and Oceans Canada
Authors: Murray, L. (Ekstern), Rennie, M. D. (Ekstern), Svendsen, J. C. (Intern), Enders, E. C. (Ekstern)
Pages: 2722-2729
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Main Research Area: Technical/natural sciences

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BFI (2018): BFI-level 2
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BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.74 SJR 1.19 SNIP 1.031
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.446 SNIP 1.055 CiteScore 3
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.506 SNIP 1.129 CiteScore 2.89
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.653 SNIP 1.092 CiteScore 2.88
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.642 SNIP 1.107 CiteScore 2.81
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.937 SNIP 1.168 CiteScore 3.05
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.708 SNIP 0.997
Effects of acoustic telemetry transmitters on gill ventilation rate and haematocrit levels of round goby Neogobius melanostomus

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management
Authors: Behrens, J. (Intern), Svendsen, J. C. (Intern), Deurs, M. V. (Intern), Sokolova, M. (Intern), Christoffersen, M. (Intern)
Pages: 416-419
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Management and Ecology
Volume: 24
Issue number: 5
ISSN (Print): 0969-997X
Ratings:
BFI (2018): BFI-level 1
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.85 SJR 0.843 SNIP 0.88
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.988 SNIP 1.159 CiteScore 1.91
BFI (2014): BFI-level 1
Effects of changes in stock productivity and mixing on sustainable fishing and economic viability

Within the new FMSY European paradigm, this paper shows how a combination of changes in fish stock mixing, non-stationarity in productivity, and constraints on unit stock concepts undermine the effective management of fisheries, especially when management reference points are not adjusted accordingly. Recent changes in stock structures, conditions and stock mixing between eastern and western Baltic cod can jeopardize the reliability of stock assessments and of the fishery economy. We modelled how different management, individual vessel decision-making, and stock growth and mixing scenarios have induced alternative individual vessel spatial effort allocation and economic performance by affecting fishing costs and by changing the relative stock abundance and size distribution. Stock mixing heavily influences profit and stock abundance for stocks that have experienced increased fishing mortality (F) levels. Western cod F has increased from a higher total allowed catches (TAC) advised in the medium-term due to the westward migration of eastern cod while eastern cod F has increased from reduced growth in the east. Greater pressures on western cod and decreased eastern cod growth and conditions greatly reduce the overall cod spawning stock biomass, thus changing the landing size composition and associated fishery profits. As a cumulative effect, fishing efforts are redirected towards western areas depending on management (quotas). However, total profits are less affected when traditional fishing opportunities and switching possibilities for other species and areas are maintained. Our evaluation indicates that current management mechanisms
cannot correct for potential detrimental effects on cod fisheries when effort re-allocation changes landing origins. By investigating different economic starting conditions we further show that Baltic cod mis-management could have resulted in unintended unequal (skewed) impacts and serious consequences for certain fleets and fishing communities compared with others. Our management strategy evaluation is instrumental in capturing non-linear effects of different recommendations on sustainability and economic viability, and we show that fixed F-values management is likely not an attainable or sufficient goal in ensuring the sustainability and viability of fisheries and stocks given changing biological conditions.
Effects of dietary Gracilaria sp. and Alaria sp. supplementation on growth performance, metabolic rates and health in meagre (Argyrosomus regius) subjected to pathogen infection

Effects of dietary seaweed supplementation on basal physiology and health biomarkers were assessed in meagre (Argyrosomus regius) subjected to bacterial infection, using Photobacterium damselae subsp. Piscicida (Phdp) as the etiologic agent. Three test diets were prepared by supplementing a basal control formulation (44 % protein, 16 % lipid, 22 KJ g⁻¹ energy) with 0 % seaweed (control), 5 % Gracilaria sp. or 5 % Alaria sp. During the growth trial, 180 fish (39.70 ± 0.33 g) were daily fed for 69 days with the experimental diets. After the growth trial, 60 fish from each dietary treatment were divided into two groups, infected and non-infected. The infected group was injected intraperitoneally with a saline solution (HBSS) with 2.91 x 10³ CFU Phdp g⁻¹ fish, whereas the non-infected group was injected with HBSS without Phdp. Dietary seaweed supplementation did not affect fish growth performance. Standard and routine metabolic rates, and aerobic metabolic scope did not vary significantly among dietary treatments. Conversely, maximum metabolic rate was significantly higher in fish fed Alaria sp. diet when compared to control group. Non-infected fish had higher hematocrit levels than the infected group, regardless of diet. Lactate levels were significantly higher in fish fed Alaria sp. diet when compared to control, with no interaction between diet and infection. Lipid peroxidation was significantly higher in fish fed control diet than supplemented diets. Infected groups had lower antioxidant enzymes activities when compared to non-infected. An interaction between infection and diet was found for glutathione peroxidase and reduced glutathione activities. The current study suggests that dietary seaweed supplementation modulates metabolic rates and biomarker responses in meagre, which may confer advantages in coping with biotic stressors.
Effects of low-oxygen conditions on embryo growth in the painted turtle, Chrysemys picta

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Iowa State University, University of Porto
Authors: Cordero, G. A. (Ekstern), Karnatz, M. L. (Ekstern), Svendsen, J. C. (Intern), Gangloff, E. J. (Ekstern)
Pages: 148-156
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Journal: Integrative Zoology
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Web of Science (2018): Indexed yes
Web of Science (2017): Indexed yes
Scopus rating (2016): SJR 0.85 SNIP 1.039 CiteScore 1.81
Scopus rating (2015): SJR 1.002 SNIP 0.917 CiteScore 1.72
Scopus rating (2014): SJR 0.766 SNIP 0.837 CiteScore 1.55
Scopus rating (2013): SJR 0.817 SNIP 0.741 CiteScore 1.49
Scopus rating (2012): SJR 0.724 SNIP 0.729 CiteScore 1.49
Scopus rating (2011): SJR 0.624 SNIP 0.633 CiteScore 1.09
Erfaringsopsamling med kirurgisk implantering af akustiske transmittere i sortmundet kutling (Neogobius melanostomus)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Christoffersen, M. (Intern), Sokolova, M. (Intern), Svendsen, J. C. (Intern), Deurs, M. V. (Intern), Behrens, J. (Intern)
Publication date: 2017
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences

Estimating escapement of fish and invertebrates in a Danish anchor seine

The codend is generally presumed to be the place where the main selectivity of fish occurs in towed fishing gears, but other parts of the net have been found to contribute to the selectivity process of several invertebrate species. This means that conventional selectivity or survival studies may ignore the selectivity of net parts other than the codend for certain species. By attaching 12 small meshed collecting bags to different parts of a Danish anchor seine net and conducting normal commercial fishing activities, this study showed that there is a substantial escapement of fish and (especially) invertebrates from the forward parts of the seine net. For seven species of demersal fish, most fish escaped through the lower panel close to the codend. All invertebrate species were found in higher numbers in the collecting bags than in the codend where many organisms escaped in the lower panel of the wings or the belly. Mean levels of visible damage ranged from 1.00 to 3.25 for collected invertebrates and were similar for all gear parts. Common starfish (Asterias rubens), however, showed highest damage in the extension part of the net.
Estimation of individual growth trajectories when repeated measures are missing

Individuals in a population vary in their growth due to hidden and observed factors such as age, genetics, environment, disease, and carryover effects from past environments. Because size affects fitness, growth trajectories scale up to affect population dynamics. However, it can be difficult to estimate growth in data from wild populations with missing observations and observation error. Previous work has shown that linear mixed models (LMMs) underestimate hidden individual heterogeneity when more than 25% of repeated measures are missing. Here we demonstrate a flexible and robust way to model growth trajectories. We show that state-space models (SSMs), fit using R package growmod, are far less biased than LMMs when fit to simulated data sets with missing repeated measures and observation error. This method is much faster than Markov chain Monte Carlo methods, allowing more models to be tested in a shorter time. For the scenarios we simulated, SSMs gave estimates with little bias when up to 87.5% of repeated measures were missing.
We use this method to quantify growth of Soay sheep, using data from a long-term mark-recapture study, and demonstrate that growth decreased with age, population density, weather conditions, and when individuals are reproductive. The method improves our ability to quantify how growth varies among individuals in response to their attributes and the environments they experience, with particular relevance for wild populations.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Zurich, University of Edinburgh
Authors: Brooks, M. E. (Intern), Clements, C. (Ekstern), Pemberton, J. (Ekstern), Ozgul, A. (Ekstern)
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BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.63 SJR 2.672 SNIP 1.419
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.814 SNIP 1.365 CiteScore 3.52
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 3.267 SNIP 1.613 CiteScore 4.22
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 3.173 SNIP 1.643 CiteScore 4.52
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.416 SNIP 1.657 CiteScore 4.68
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.867 SNIP 1.673 CiteScore 4.72
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 4.219 SNIP 1.761
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 3.973 SNIP 1.762
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 4.022 SNIP 1.737
Scopus rating (2007): SJR 4.269 SNIP 1.892
Scopus rating (2006): SJR 4.337 SNIP 1.978
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 3.959 SNIP 2.001
Scopus rating (2004): SJR 4.064 SNIP 2.021
Scopus rating (2003): SJR 4.138 SNIP 2.204
Scopus rating (2002): SJR 4.832 SNIP 2.233
Scopus rating (2001): SJR 4.041 SNIP 2.022
Scopus rating (2000): SJR 4.225 SNIP 2.095
Scopus rating (1999): SJR 3.956 SNIP 1.992
Evidence of cormorant-induced mortality, disparate migration strategies and repeatable circadian rhythm in the endangered North Sea houting (Coregonus oxyrinchus): A telemetry study mapping the postspawning migration

Life history theory predicts a trade-off between migration and residency where migration is favoured when it infers elevated fitness. Although migration to more favourable environments offers higher growth rates, migrants often experience increased mortality due to predation. Here, we investigated mortality and migration behaviour of the North Sea houting (Coregonus oxyrinchus), an anadromous salmonid endemic to the Wadden Sea. We used acoustic telemetry to map the migration of the only remaining indigenous population by applying stationary hydrophones combined with manual tracking. Data suggested a total mortality of 26%, with 30% of the total mortality attributed to predation by great cormorants (Phalacrocorax carbo sinensis), highlighting that North Sea houting conservation could be jeopardised by increased cormorant predation. Risk of cormorant predation was size-dependent, with smaller fish suffering higher risk of predation. The study found North Sea houting to exhibit disparate migration strategies and identified a lentic area in the estuary as an important habitat. Two newly established artificial lakes within the river system significantly reduced the migration speeds, possibly indicating constrained navigation through the lakes. The migration into the Wadden Sea correlated with temperature perhaps indicating osmoregulatory constraints of sea entry. Unlike most salmonid species, migration occurred both day and night. Moreover, fish exhibited repeatable individual differences in diel activity patterns, suggesting that individuals differ consistently in their migratory activity throughout the 24-hr period. Our study provides novel information on salmonid migration, which is crucial for the development of science-based conservation strategies.

General information
State: Accepted/In press
Organisations: National Institute of Aquatic Resources, Section for Freshwater Fisheries Ecology, Section for Ecosystem based Marine Management, Aalborg University, Institut National des Sciences Appliquees de Lyon
Authors: Jensen, L. F. (Ekstern), Rognon, P. (Ekstern), Aarestrup, K. (Intern), Bøttcher, J. W. (Ekstern), Pertoldi, C. (Ekstern), Thomsen, S. N. (Ekstern), Hertz, M. (Ekstern), Winde, J. (Ekstern), Svendsen, J. C. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences

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BFI (2018): BFI-level 1
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.66 SJR 0.804 SNIP 0.885
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.022 SNIP 1.192 CiteScore 1.92
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.866 SNIP 0.994 CiteScore 1.58
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.971 SNIP 1.072 CiteScore 1.77
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.061 SNIP 1.247 CiteScore 2.05
ISI indexed (2012): ISI indexed yes
Extending electronic length frequency analysis in R

Electronic length frequency analysis (ELEFAN) is a system of stock assessment methods using length-frequency (LFQ) data. One step is the estimation of growth from the progression of LFQ modes through time using the von Bertalanffy growth function (VBGF). The option to fit a seasonally oscillating VBGF (soVBGF) requires a more intensive search due to two additional parameters. This work describes the implementation of two optimisation approaches ("simulated annealing" and "genetic algorithm") for growth function fitting using the open-source software "R." Using a generated LFQ data set with known values, the accuracy of the soVBGF parameter estimation was evaluated. The results indicate that both optimisation approaches are capable of finding high scoring solutions, yet settings regarding the initial restructuring process for LFQ bin scoring (i.e. "moving average," and the fixing of the asymptotic length parameter (L-infinity) are found to have significant effects on parameter estimation error. An outlook provides context as to the significance of the R-based implementation for further testing and development, as well as the general relevance of the method for data-limited stock assessment.

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Sea Fisheries
Authors: Taylor, M. H. (Ekstern), Mildenberger, T. K. (Intern)
Pages: 330-338
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Main Research Area: Technical/natural sciences
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BFI (2018): BFI-level 1
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
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Scopus rating (2016): CiteScore 1.85 SJR 0.843 SNIP 0.88
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.988 SNIP 1.159 CiteScore 1.91
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.913 SNIP 0.995 CiteScore 1.85
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.737 SNIP 0.807 CiteScore 1.36
I $i$ indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.636 SNIP 0.868 CiteScore 1.32
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.844 SNIP 0.932 CiteScore 1.29
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.847 SNIP 0.808
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.796 SNIP 0.936
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.823 SNIP 0.87
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.813 SNIP 1.255
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.863 SNIP 1.05
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.76 SNIP 0.939
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.418 SNIP 0.674
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.405 SNIP 0.593
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.478 SNIP 0.662
Scopus rating (2001): SJR 0.482 SNIP 0.647
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.414 SNIP 0.68
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.514 SNIP 0.574
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FISHERIES, MANAGEMENT PROCEDURES, EXPERIENCES, PACKAGE, data-limited stock assessment, ELEFAN,
growth model, length-frequency data, von Bertalanffy growth function
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Faster or slower: Has growth of juvenile eastern Baltic cod changed?

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Oceans and Arctic, Section for Ecosystem based Marine Management
Authors: Hüssy, K. (Intern), Radtke, K. (Ekstern), Eero, M. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

FAST TRACK: Industry developed gear solutions under the landing obligation

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aalborg University
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Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2017

Feeding behavior and capture success of turbot Psetta maxima larvae during the transition from upright to tilted swimming position

Aquaculture production of high-quality marine fish larvae might be hampered by poor success in larval initiation of exogenous feeding or the lack of appropriate live feed in their first feeding period. The period of larval metamorphosis may further constrain the successful rearing of flatfish larvae. In order to ascertain changes in feeding during metamorphosis of flatfish, we here compared feeding behavior when larvae of turbot Psetta maxima were either swimming upright or tilted. Using video recordings, we compared the attack rate and prey capture success between flexion (12-13 days-post-hatch, stage 4b-4c) swimming predominantly in upright position and post-flexion (16-17 days-post-hatch, stage 5a-5b) larvae in tilted swimming mode. Both larval groups were fed on copepod nauplii and copepodites. Our results showed a capture success of <50% during the flexion stage, increasing to 73% in the post-flexion stage, and larvae were more successful when feeding on nauplii than when offered copepodite stages. An ontogenetic shift from intermittent to cruise swimming was observed during the metamorphosis concomitant with improved hunting skills. Thus larvae appeared to be able to successfully complete metamorphosis without compromising their feeding ability on copepod prey.

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Oceans and Arctic, Nanyang Technological University, Roskilde University
Authors: Bruno, E. (Intern), Mahjoub, M. S. (Ekstern), Hansen, B. W. (Ekstern), Munk, P. (Intern), Støttrup, J. G. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences

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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
Female nutrition and assisted reproduction in European eel: influences on oogenesis and egg quality
The European eel (Anguilla anguilla) has an enigmatic life-cycle. One of its most unique features is the 5000 to 6000 km separating the growth areas in Europe and North Africa from the spawning grounds in the Sargasso Sea. Even more enigmatic is the fact that naturally matured eels have never been caught and thus, spawning in the wild has never been observed. Because sexual maturation is blocked until the silvering phase and start of spawning migration, eels do not mature spontaneously in captivity and gonad development is induced by the application of exogenous hormones. In female eels, induction of egg production involves a long-term hormonal treatment of salmon or carp pituitary extracts (SPE or CPE) followed by the induction of oocyte maturation and ovulation which includes a SPE primer and a maturation-inducing hormone (MIH), generally 17a, 20β-dihydroxy-4-pregnen-3-one (DHP).
Recent progress in techniques for induction of maturation and fertilization of the eggs has enabled the production of many viable eggs and yolk-sac larvae that are able of exogenous feeding. The present studies have contributed to this progress by addressing some of the challenges commonly associated with the induction of female maturation and egg quality. The main objectives of this PhD study were to improve female response to hormonal treatments and resulting egg quality. These challenges were addressed by working with both cultured and wild female eels, testing different broodstock diets and hormonal treatments, and identifying possible factors associated with egg quality. The results showed that dietary fatty acid composition has a significant influence on ovarian development in response to hormonal treatments. During oocyte maturation and ovulation, the expression of hormone receptors at the time SPE and DHP were administrated differed between high and low egg quality groups. It appears that a mismatch between hormone receptor expression and the administration of SPE and DHP may be determinant for acquisition of oocyte developmental competence. Moreover, lipid analysis of eggs obtained from wild-caught female eels showed that the level of most fatty acids were similar between high and low quality eggs. Additionally, levels of essential fatty acids were considerable different from those reported elsewhere for cultured European female eel. Experiments part of this PhD project resulted in a high number of high quality eggs which enabled us to determine the relation between oocyte stage at the time oocyte maturation and ovulation are induced, and egg quality for the first time. As a result, we presented improved guidelines to induce oocyte maturation and ovulation, based on a lipid droplet-based oocyte maturation scale, which may result in an increase in production of viable European eel eggs. Overall, this PhD project contributed to the development of assisted reproduction procedures by providing new and valuable knowledge about the factors influencing the maturational response of European female eels to hormonal treatments and resulting egg quality.
Fisheries Impact Evaluation Tool (FIT) with Application to Assess the Bottom Fishing Footprint in Western Baltic Sea (ICES Subdivisions 22-24)
Fisher's preferences and trade-offs between management options

Failure to understand the potential responses of fishers to management measures creates a significant risk of revisiting the familiar scenario of perverse and unintended consequences of those measures. This paper reports on a choice experiment survey to evaluate fisher's preferences for various management measures proposed under the EU Common Fisheries Policy (CFP) reform process, but the conclusions have wider relevance as similar measures are used by comparable fleets in fisheries globally. The survey was conducted with fishers involved in mixed pelagic and demersal fisheries in Ireland, pelagic fisheries in Denmark and demersal fisheries in Greece. Fisheries management policies were characterized by five attributes designed both to cover the principal CFP reform proposals and to integrate ecological, social, economic and institutional factors affecting fisher's decisions. The study uses a random utility modelling framework to reveal the preferences of the fishers across the alternative policy attributes. Results show that while there are generally preferences both for healthy stocks and for maintaining the importance of fishing to the local community, strong interfishery preference differences exist. These differences are most notable in relation to a discard ban and to the use of individual transferable fishing rights, favoured in Denmark, but not in Ireland for instance. The strength of these interfishery differences supports the assertion that there are no panaceas in fisheries management and that solutions should be tailored within the context of specific fisheries. Not doing so could create a significant risk of inappropriately managed fisheries that may lead to unsustainable outcomes.
Fishing for MSY: using "pretty good yield" ranges without impairing recruitment

Pretty good yield (PGY) is a sustainable fish yield corresponding to obtaining no less than a specified large percentage of the maximum sustainable yield (MSY). We investigated 19 European fish stocks to test the hypothesis that the 95% PGY yield range is inherently precautionary with respect to impairing recruitment. An FMSY range was calculated for each stock as the range of fishing mortalities (F) that lead to an average catch of at least 95% of MSY in long-term simulations. Further, a precautionary reference point for each stock (FP.05) was defined as the F resulting in a 5% probability of the spawning-stock biomass falling below an agreed biomass limit below which recruitment is impaired (Blim) in long-term simulations. For the majority of the stocks analysed, the upper bound of the FMSY range exceeded the estimated FP.05.

However, larger fish species had higher precautionary limits to fishing mortality, and species with larger asymptotic length were less likely to have FMSY ranges impairing recruitment. Our study shows that fishing at FMSY generally is precautionary with respect to impairing recruitment for highly exploited teleost species in northern European waters, whereas the upper part of the range providing 95% of MSY is not necessarily precautionary for small- and medium-sized teleosts.
Fishing profiles of Danish seiners and bottom trawlers in relation to current EU management regulations

Danish seiners and bottom trawls operate differently and have different catching processes. Both gears belong to the same legislative category in European fisheries, but different management strategies in other countries and criticism by fishers on grouping Danish seiners and trawls together indicate disagreement on current gear classification. This study compared both gears in terms of their fishing characteristics and catches of commercial species based on 16 years of observer data. Danish seining is a specialised fishing method that targeted few species but with higher total catch rates than bottom trawlers. Bottom trawling is a more all-purpose fishing method that targets a larger number of species, and bottom trawlers use larger engines than Danish seiners. A generalised additive mixed model indicated that catch rates of flatfish are generally higher for Danish seiners, and catch rates of roundfish species are higher for trawlers. The results do not directly suggest a separation of the gears in terms of legislation as the quantities of fish below current minimum size were similar, but for example future survival studies may reach different conclusions. Additional factors were found to be important in determining catches of both gears.

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Institute of Marine Research
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Volume: 24
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BFI (2018): BFI-level 1
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Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.85 SJR 0.843 SNIP 0.88
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.988 SNIP 1.159 CiteScore 1.91
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.913 SNIP 0.995 CiteScore 1.85
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.737 SNIP 0.807 CiteScore 1.36
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.636 SNIP 0.868 CiteScore 1.32
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.844 SNIP 0.932 CiteScore 1.29
ISI indexed (2011): ISI indexed yes
Fish size composition in space - A spatially explicit size spectrum model of the Celtic Sea fish community for testing novel management approaches

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Queen's University Belfast
Authors: Höffle, H. (Ekstern), Pedreschi, D. (Ekstern), Bastardie, F. (Intern), Farnsworth, K. (Ekstern), Kraak, S. (Ekstern), Reid, D. (Ekstern)
Publication date: 2017
Event: Poster session presented at ICES Annual Science Conference 2017, Fort Lauderdale, United States.
Main Research Area: Technical/natural sciences

Bibliographical note
ICES CM 2017/F:491
Publication: Research › Poster – Annual report year: 2017

Fiskeredskaber og selektivitet under landingsforpligtelsen - noget for dig?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Feekings, J. P. (Intern)
Pages: 20
Publication date: 2017

Publication information
Pages (from-to): 20
Fiere stenrev giver flere torsk

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Fiskeristyrelsen
Authors: Kristensen, L. (Ekstern), Svendsen, J. C. (Intern), Støttrup, J. G. (Intern)
Publication date: 2017

Publication information
Source/Publisher: Fiskepleje.dk
Main Research Area: Technical/natural sciences
Links:
http://www.fiskepleje.dk/nyheder/nyhed?id=AC981F3F-54D8-4B99-84AF-E7371543B97E
Publication: Communication › Internet publication – Annual report year: 2017

FLEXSELECT: counter-herding device to reduce bycatch in crustacean trawl fisheries

FLEXSELECT is a simple counter-herding device which aims at reducing the bycatch of fish by scaring them away from the trawl path without affecting the catches of the target species. FLEXSELECT was tested in the Norway lobster (Nephrops norvegicus) directed trawl fishery, as this includes bycatch of both roundfish and flatfish. Length-based data were collected for Nephrops, four roundfish species (cod, haddock, whiting and hake) and two flatfish species (plaice and lemon sole) and length-based catch comparisons performed. No significant effect on the target species, Nephrops, was detected, whereas a reduction of 39% (CI: 29-46 %) was obtained for the overall number of fish. Catches of all the six fish species examined were significantly reduced by FLEXSELECT, with the efficiency varying considerably among species and over length classes. No significant diel differences were found for either roundfish or flatfish species. FLEXSELECT prevents bycatch species from interacting with the trawl, thus most likely enhancing their survival and fitness. Moreover, its fast attachment system makes FLEXSELECT a flexible tool, adaptable to different fisheries and catch goals.

General information
State: Accepted/In press
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF Fisheries and Aquaculture
Authors: Melli, V. (Intern), Karlsen, J. D. (Intern), Seekings, J. P. (Intern), Herrmann, B. (Ekstern), Krag, L. A. (Intern)
Publication date: 2017

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
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
Food for thought: pretty good multispecies yield

MSY principles for marine fisheries management reflect a focus on obtaining continued high catches to provide food and livelihoods for humanity, while not compromising ecosystems. However, maintaining healthy stocks to provide the maximum sustainable yield on a single-species basis does not ensure that broader ecosystem, economic, and social objectives are addressed. We investigate how the principles of a “pretty good yield” range of fishing mortalities assumed to provide >95% of the average yield for a single stock can be expanded to a pretty good multispecies yield (PGMY) space.
and further to pretty good multidimensional yield to accommodate situations where the yield from a stock affects the ecosystem, economic and social benefits, or sustainability. We demonstrate in a European example that PGMY is a practical concept. As PGMY provides a safe operating space for management that adheres to the principles of MSY, it allows the consideration of other aspects to be included in operational management advice in both data-rich and data-limited situations. PGMY furthermore provides a way to integrate advice across stocks, avoiding clearly infeasible management combinations, and thereby hopefully increasing confidence in scientific advice.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, CSIRO Oceans and Atmosphere, National Oceanographic and Atmospheric Administration, Ministry for Primary Industries, AZTI-Tecnalia, University of Washington, University of New Brunswick, Marine Institute

Authors: Rindorf, A. (Intern), Dichmont, C. M. (Ekstern), Levin, P. (Ekstern), Mace, P. (Ekstern), Pascoe, S. (Ekstern), Prellezo, R. (Ekstern), Punt, A. (Ekstern), Reid, D. G. (Ekstern), Stephenson, R. (Ekstern), Ulrich, C. (Intern), Vinther, M. (Intern), Worsøe Clausen, L. (Intern)

Pages: 475-486
Publication date: 2017
Main Research Area: Technical/natural sciences

**Publication information**

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Volume: 74
Issue number: 2
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- 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
- Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 1
- Web of Science (2009): Indexed yes
- BFI (2008): BFI-level 2
- Web of Science (2008): Indexed yes
- Web of Science (2007): Indexed yes
- Web of Science (2006): Indexed yes
Fouragerings-strategi hos ådselædende slimål i Kattegat

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Arctic Section
Publication date: 2017
Event: Poster session presented at Dansk Havforskermøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2017

Hvordan påvirker bundtrawlfiskeriet Kattegats bundfauna? En analyse af ændringer i densitet og artsrigdom og en diskussion af potentielle indikatorer

glmmTMB balances speed and flexibility among packages for Zero-inflated Generalized Linear Mixed Modeling

Count data can be analyzed using generalized linear mixed models when observations are correlated in ways that require random effects. However, count data are often zero-inflated, containing more zeros than would be expected from the typical error distributions. We present a new package, glmmTMB, and compare it to other R packages that fit zero-inflated mixed models. The glmmTMB package fits many types of GLMMs and extensions, including models with continuously distributed responses, but here we focus on count responses. glmmTMB is faster than glmmADMB, MCMCglmm, and brms, and more flexible than INLA and mgcv for zero-inflated modeling. One unique feature of glmmTMB (among packages that fit zero-inflated mixed models) is its ability to estimate the Conway-Maxwell-Poisson distribution parameterized by the mean. Overall, its most appealing features for new users may be the combination of speed, flexibility, and its interface's similarity to lme4.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, University of Zurich, International Council for the Exploration of the Sea, University of Bergen, Swiss Federal Institute of Technology, McMaster University
Authors: Brooks, M. E. (Intern), Kristensen, K. (Intern), van Benthem, K. J. (Ekstern), Magnusson, A. (Ekstern), Berg, C. W. (Intern), Nielsen, A. (Intern), Skaug, H. J. (Ekstern), Machler, M. (Ekstern), Bolker, B. M. (Ekstern)
Pages: 378-400
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Publication information
Journal: R Journal
Volume: 9
Issue number: 2
Original language: English
COMPUTER, STATISTICS, MAXWELL-POISSON DISTRIBUTION, COUNT DATA, BAYESIAN-INFERENCE, R PACKAGE, REGRESSION, ECOLOGY, EVOLUTION, ABUNDANCE
Electronic versions:
Publishers version
Source: FindIt
Source-ID: 2396570591
Publication: Research - peer-review › Journal article – Annual report year: 2017
Hvornår er der faglige grunde til rehabilitering af sæler?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
Authors: Alstrup, A. K. O. (Ekstern), Svendsen, J. C. (Intern), Jensen, L. F. (Ekstern)
Pages: 10-12
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication information
Journal: Dyrlægen
Issue number: 3
ISSN (Print): 1903-153X
Original language: Danish
Source: FindIt
Source-ID: 2356062619
Publication: Research › Journal article – Annual report year: 2017

Identification of ICM elements in Danish cormorant management

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Copenhagen, Københavns Universitet
Authors: Andersen, S. F. (Intern), Dinesen, G. E. (Intern), Worsaae, K. (Forskerdatabase), Støttrup, J. G. (Intern)
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

Identifying candidate reflexes for lemon sole (Microstomus kitt)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Wageningen IMARES
Authors: Karlsen, J. D. (Intern), Noack, T. (Intern), Uhlmann, S. (Ekstern), Krag, L. A. (Intern)
Publication: Research › Conference abstract for conference – Annual report year: 2017

If you can't beat them, eat them: using acoustic telemetry to develop an economically viable fishery for the highly invasive round goby (Neogobius melanostomus)

General information
Improving escape panel selectivity in Nephrops directed fisheries by actively stimulating fish behaviour

The efficiency of escape panels inserted in trawls relies on fish actively attempting to escape through them. However, several studies indicate that most fish drift towards the aft end of the trawl, passing the escape panel through which they easily could have escaped, without making contact with it. To increase the efficiency of such panels, the contact probability needs to be improved. In this study, we investigate to what extent the efficiency of escape panels can be improved by actively stimulating the escape behaviour of fish. The performance of two identical panel sections was compared in a twin-trawl system, one with and one without a stimulation device. A new coupled analysis method was used to explicitly quantify the improvements in contact probability and release efficiency for the escape panel. The results demonstrate that by actively stimulating escape behaviour, the contact probability and release efficiency for cod (Gadus morhua) can be significantly improved without effecting the catch of Nephrops (Nephrops norvegicus)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF, Danish Fishermen's Producers' Organization
Authors: Krag, L. A. (Intern), Herrmann, B. (Ekstern), Fekings, J. P. (Intern), Lund, H. S. (Ekstern), Karlsen, J. D. (Intern)
Pages: 486-493
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
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BFI (2018): BFI-level 2
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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
Improving estimates of population status and trend with superensemble models

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Simon Fraser University, Rutgers University, Galway - Mayo Institute of Technology, NOAA, University of California, Santa Barbara, International Council for the Exploration of the Sea, Marine Stewardship Council, European Commission Joint Research Centre Institute, Center for Science and Democracy, Union of Concerned Scientists, Conservation International
Pages: 732-741
Publication date: 2017
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Publication information
Journal: Fish and Fisheries
Volume: 18
Issue number: 4
Improving fisheries science with high resolution commercial fishery data

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Schreiber Plet-Hansen, K. (Intern), Mortensen, L. O. (Intern), Nielsen, J. R. (Intern), Larsen, E. (Intern), Ulrich, C. (Intern)
Publication date: 2017
Event: Abstract from ICES Annual Science Conference 2017, Fort Lauderdale, United States.
Inclusion of ecological, economic, social, and institutional considerations when setting targets and limits for multispecies fisheries: Introduction to the Symposium: ‘Targets and Limits for Long Term Fisheries Management’ Quo Vadimus

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, NOAA, Saint Mary's University, Aalborg University, AZTI Technalia, IMARES, Thünen Institute of Baltic Sea Fisheries, Ministry for Primary Industries, Hellenic Centre for Marine Research, Galway - Mayo Institute of Technology, Imperial College London, University of Washington, Marine Institute, University of St Andrews, IFREMER, University of Kiel
Pages: 453-463
Publication date: 2017
Main Research Area: Technical/natural sciences

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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
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
The relationship between fisheries and marine spatial planning (MSP) is still widely unsettled. While several scientific studies highlight the strong relation between fisheries and MSP, as well as ways in which fisheries could be included in MSP, the actual integration of fisheries into MSP often fails. In this article, we review the state of the art and latest progress in research on various challenges in the integration of fisheries into MSP. The reviewed studies address a wide range of integration challenges, starting with techniques to analyse where fishermen actually fish, assessing the drivers for fishermen’s behaviour, seasonal dynamics and long-term spatial changes of commercial fish species under various anthropogenic pressures along their successive life stages, the effects of spatial competition on fisheries and projections on those spaces that might become important fishing areas in the future, and finally, examining how fisheries could benefit from MSP. This paper gives an overview of the latest developments on concepts, tools, and methods. It becomes apparent that the spatial and temporal dynamics of fish and fisheries, as well as the definition of spatial preferences, remain major challenges, but that an integration of fisheries is already possible today.

**General information**

State: Accepted/In press
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, GEOMAR - Helmholtz Centre for Ocean Research Kiel, Agrocampus Ouest, LEI Wageningen, Thünen Institute of Sea Fisheries, Leibniz-Institute for Baltic Sea Research, IFREMER, Wageningen IMARES, Cefas
Authors: Janssen, H. (Ekstern), Bastardie, F. (Intern), Eero, M. (Intern), Hamon, K. (Ekstern), Hinrichsen, H. H. (Ekstern), Marchal, P. (Ekstern), Nielsen, J. R. (Intern), Pape, O. L. (Ekstern), Schulze, T. (Ekstern), Simons, S. (Ekstern), Teal, L. R. (Ekstern), Tidd, A. (Ekstern)
Publication date: 2017
Main Research Area: Technical/natural sciences
International perceptions of an integrated, multi-sectoral, ecosystem approach to management: Editor’s Choice

The Ecosystem Approach to Management (EAM) has emerged over the past decades, largely to promote biodiversity conservation, and more recently sectoral tradeoffs in the management of marine ecosystems. To ascertain the state of practice of EAM operationalization, a workshop was held, which included a pre-workshop online survey. The survey gauged international participants' perspectives regarding capacity, knowledge, and application of EAM. When asked about the subject, most survey respondents had a general understanding of EAM, and provided a clear definition. Major perceived challenges to EAM objectives by those surveyed included limited knowledge, conflicting interests, insufficient communication, and limited organizational legal frameworks or governance structures. Of those directly involved in an ecosystem approach, the majority responded that processes were in place or developed for application of integrated knowledge toward assessing key issues within their respective sectors (i.e. fisheries, conservation, energy), and that
capacity was generally high. Our results show that most respondents, irrespective of sector or geography, see value in considering an integrated, broader ecosystem approach as they manage their sector. Although many participants were from the North Atlantic region, our results suggest that much of the international community is converging toward continued understanding of broad-scale, integrated approaches to marine resource management.

**General information**

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BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 2.63
Web of Science (2016): Indexed yes
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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
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Web of Science (2008): Indexed yes
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Web of Science (2005): Indexed yes
Web of Science (2004): Indexed yes
Is a single dimension enough to explain fishers' decision-making?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Queen's University Belfast
Authors: Höffle, H. (Ekstern), Pedreschi, D. (Ekstern), Farnsworth, K. (Ekstern), Bastardie, F. (Intern), Kraak, S. (Ekstern), Reid, D. (Ekstern)
Publication date: 2017
Event: Abstract from ICES Annual Science Conference 2017, Fort Lauderdale, United States.
Main Research Area: Technical/natural sciences

Bibliographical note
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Publication: Research › Conference abstract for conference – Annual report year: 2017

Is the osmoregulatory compromise limiting invasive species?
The round goby (Neogobius melanostomus) is a benthic fish native to the brackish waters of the Black and Caspian Seas; however, it has invaded several brackish and freshwater areas in North America and northern Europe. Notably, there are no records of N. melanostomus in high salinity marine habitats and the physiological mechanisms potentially constraining the invasion into this environment are largely unknown. The gills play major roles in gas exchange and ionic regulation and it has been hypothesized that an osmoregulatory compromise impacts performance of each process. The tradeoff of the large gill exchange capacity ideal for gas exchange is greater passive ion fluxes. High ionic waters would result in greater passive ion uptake that would require greater active ion excretion. This osmoregulatory disturbance may interfere with fish invasion by disrupting the regular activity of the gills, thus modifying the usual physiological mechanisms. To examine if the osmoregulatory compromise could constrain the invasion of N. melanostomus into high salinity environments, this study compared Na+/K+ ATPase activity of metabolic phenotypes exposed to 0, 15 and 30 ppt water. Additionally, we examined variation in two important MO2 measures, standard metabolic rate (SMR) and maximum metabolic rate (MMR) when N. melanostomus is exposed to increasing water salinities. Fish with an initially higher MMR (at the control salinity - 0ppt) are likely to be more challenged by environmental stressors than fish with a lower MMR. Our results will enable a better understanding of the physiological mechanisms that may constrain invasive species in the aquatic environment

General information
State: Published
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Lessons learned from practical approaches to reconcile mismatches between biological population structure and stock units of marine fish

Recent advances in the application of stock identification methods have revealed inconsistencies between the spatial structure of biological populations and the definition of stock units used in assessment and management. From a fisheries management perspective, stocks are typically assumed to be discrete units with homogeneous vital rates that can be exploited independently of each other. However, the unit stock assumption is often violated leading to spatial mismatches that can bias stock assessment and impede sustainable fisheries management. The primary ecological concern is the potential for overexploitation of unique spawning components, which can lead to loss of productivity and reduced biodiversity along with destabilization of local and regional stock dynamics. Furthermore, ignoring complex population structure and stock connectivity can lead to misperception of the magnitude of fish productivity, which can translate to suboptimal utilization of the resource. We describe approaches that are currently being applied to improve the assessment and management process for marine fish in situations where complex spatial structure has led to an observed mismatch between the scale of biological populations and spatially-defined stock units. The approaches include: (i) status quo management, (ii) “weakest link” management, (iii) spatial and temporal closures, (iv) stock composition analysis, and (v) alteration of stock boundaries. We highlight case studies in the North Atlantic that illustrate each approach and synthesize the lessons learned from these real-world applications. Alignment of biological and management units requires continual monitoring through the application of stock identification methods in conjunction with responsive management to preserve biocomplexity and the natural stability and resilience of fish species.
Lost in translation? Multi-metric macrobenthos indicators and bottom trawling

The member states of the European Union use multi-metric macrobenthos indicators to monitor the ecological status of their marine waters in relation to the Water Framework and Marine Strategy Framework Directives. The indicators translate the general descriptors of ecological quality in the directives into a single value of ecological status by combining indices of species diversity, species sensitivity and density. Studies and inter-calibration exercises have shown that the indicators respond to chemical pollution and organic enrichment, but little is known about their response to bottom trawling. We use linear mixed effects models to analyze how bottom trawling intensity affects the indicators used in the Danish (Danish Quality Index, DKI) and Swedish (Benthic Quality Index, BQI) environmental monitoring programs in the Kattegat, the sea area between Sweden and Denmark. Using year and station as random variables and trawling intensity, habitat type, salinity and depth as fixed variables we find a significant negative relationship between the BQI indicator and bottom trawling, while the DKI is related significantly to salinity, but not to trawling intensity. Among the indicator components, the species diversity and sensitivity indices used in the DKI are not significantly linked to trawling, and trawling only affects the BQI when species sensitivities are derived from rarefied samples. Because the number of species recorded per sample (species density) is limited by the number of individuals per sample (density), we expect species density and density to be positively correlated. This correlation was confirmed by a simulation model and by statistical analysis of the bottom samples in which log species density was highly significantly related to log density (r = 0.75, df = 144, p
Migration patterns of the Faroe Plateau cod (Gadus morhua, L.) revealed by data storage tags

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Faroe Marine Research Institute, Danish Meteorological Institute, University of the Faroe Islands
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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
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Web of Science (2012): Indexed yes
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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
Moving beyond the MSY concept to reflect multidimensional fisheries management objectives
Maximising the long term average catch of single stock fisheries as prescribed by the globally-legislated MSY objective is unlikely to ensure ecosystem, economic, social and governance sustainability unless an effort is made to explicitly include these considerations. We investigated how objectives to be maximised can be combined with sustainability constraints aiming specifically at one or more of these four sustainability pillars. The study was conducted as a three-year interactive process involving 290 participating science, industry, NGO and management representatives from six different European regions. Economic considerations and inclusive governance were generally preferred as the key objectives to be maximised in complex fisheries, recognising that ecosystem, social and governance constraints are also key aspects of sustainability in all regions. Relative preferences differed
between regions and cases but were similar across a series of workshops, different levels of information provided and the form of elicitation methods used as long as major shifts in context or stakeholder composition did not occur. Maximising inclusiveness in governance, particularly the inclusiveness of affected stakeholders, was highly preferred by participants across the project. This suggests that advice incorporating flexibility in the interpretation of objectives to leave room for meaningful inclusiveness in decision-making processes is likely to be a prerequisite for stakeholder buy-in to management decisions.

**General information**

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Imperial College London, International Council for the Exploration of the Sea, AZTI Technalia, Ministry for Primary Industries, Scottish Pelagic Fishermen’s Association, Instituto Espanol de Oceanografía, Hellenic Centre for Marine Research, University of Kiel, Marine Institute, Wageningen IMARES, Thünen Institute of Sea Fisheries

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- BFI (2016): BFI-level 2
- Scopus rating (2016): CiteScore 2.7 SJR 1.335 SNIP 1.182
- Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 2
- Scopus rating (2015): SJR 1.591 SNIP 1.397 CiteScore 3.07
- Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 2
- Scopus rating (2014): SJR 1.438 SNIP 1.56 CiteScore 3.09
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 1.472 SNIP 1.635 CiteScore 2.71
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 1.339 SNIP 1.495 CiteScore 2.54
- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 1.406 SNIP 1.263 CiteScore 2.07
- ISI indexed (2011): ISI indexed yes
- Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 1.289 SNIP 1.483
- Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 1
- Scopus rating (2009): SJR 0.947 SNIP 1.142
- BFI (2008): BFI-level 1
- Scopus rating (2008): SJR 0.838 SNIP 1.417
- Scopus rating (2007): SJR 0.927 SNIP 1.377
Muligheder ved ændret mindstemål og indførelse af vinduesmål for pighvarre (Scophthalmus maximus)


General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
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New policies may call for new approaches: the case of the Swedish Norway lobster (Nephrops norvegicus) fisheries in the Kattegat and Skagerrak

The European Common Fisheries Policy has in its 2013 reform increased in complexity, such as a call for coherence with the Marine Strategy Framework Directive and a landing obligation, posing new requirements and challenges to managers, scientists and the fishing industry. Therefore, re-evaluations of current practice are important as a basis for management actions. The Swedish fishery for Norway lobster (Nephrops norvegicus) in the Kattegat–Skagerrak area provides an interesting case study of relevance to emerging policies. Sprung from an unbalance in available fish- and Nephrops quotas and an ambition to protect coastal areas, the current fishery has been directed towards three separate fisheries (mixed trawling, directed trawling using a sorting grid and creeling). Studying direct and indirect effects from alternative Swedish quota allocations among gear types is therefore interesting. Accordingly, a screening study was conducted, taking into consideration area-gear interactions in catch rates, to compare the three different fisheries regarding quantified pressures on the target species, the by-catch species, and on the seafloor, as well as to qualitatively discuss social and economic dimensions. In the next step, alternative quota allocations were studied. In Swedish fisheries, we show that creeling offers a substantial reduction of fishing mortality of both undersized Nephrops and fish and a reduced seafloor pressure per landed kilo of Nephrops. Given that the fishing areas in many cases may be interchangeable between gears, allocating a larger quota share to creels in the Swedish fishery would therefore contribute to the integration of fisheries- and environmental management as called for in the new policies.
Participatory boat tracking reveals spatial fishing patterns in an Indonesian artisanal fishery

The Spermonde Archipelago holds one of the largest artisanal fisheries in Indonesia, providing livelihoods for local communities and many other people involved in international trade networks of seafood. High demand and a lack of enforcement of existing fisheries regulations turn into high pressure for the coral reef ecosystem, contributing to its overall degradation. Estimations on the ecological impacts of different levels of fishing pressure, as well as fisheries stock assessments and marine resource management require precise information of the spatial distribution of fishing effort, which involves great uncertainty when only anecdotal information is considered. We explored the feasibility of applying participatory boat tracking to complement fisheries data during the NW monsoon season 2014-2015. We conducted interviews, measured catch landings and distributed GPS data loggers among hook and line fishermen to identify fishing grounds by gear-dependent patterns of boat movement. Most of the fishing activities involved two gears (octopus bait and trolling line for live groupers) and three fishing grounds. The mass of catch landings was dominated by Octopoda (CPUE=10.1 kg boatday-1) while the most diverse group was the fish family Serranidae, with Plectropomus leopardus being the main target species. In conclusion, boat tracking combined with interviews and catch surveys has proven a useful tool to reduce uncertainty in information on spatial resource use, while allowing a high level of participation by fishermen.
Pelagic habitat: exploring the concept of good environmental status

Marine environmental legislation is increasingly expressing a need to consider the quality of pelagic habitats. This paper uses the European Union marine strategy framework to explore the concept of good environmental status (GES) of pelagic habitat with the aim to build a wider understanding of the issue. Pelagic ecosystems have static, persistent and ephemeral features, with manageable human activities primarily impacting the persistent features. The paper explores defining the meaning of "good", setting boundaries to assess pelagic habitat and the challenges of considering habitat biodiversity in a moving medium. It concludes that for pelagic habitats to be in GES and able to provide goods and services to humans, three conditions should be met: (i) all species present under current environmental conditions should be able to find the pelagic habitats essential to close their life cycles; (ii) biogeochemical regulation is maintained at normal levels; (iii) critical physical dynamics and movements of biota and water masses at multiple scales are not obstructed. Reference points for acceptable levels of each condition and how these may change over time in line with prevailing oceanographic conditions, should be discussed by knowledge brokers, managers and stakeholders. Managers should think about a habitat hydrography rather than a habitat geography. Setting the bounds of the habitats requires a consideration of dimension, scale and gradients. It is likely that to deal with the challenges caused by a dynamic environment and the relevance of differing spatial and temporal scales, we will need to integrate multidisciplinary empirical data sets with spatial and temporal models to assess and monitor progress towards, or displacement from GES of the pelagic habitat.

General information

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Pighvarrers vandring i Roskilde Fjord

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Freshwater Fisheries Ecology
Authors: Svendsen, J. C. (Intern), Støttrup, J. G. (Intern), Flavio, H. (Ekstern), Christoffersen, M. (Intern), Aarestrup, K. (Intern)
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Potential for cumulative effects of human stressors on fish, sea birds and marine mammals in Arctic waters

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, NIVA Denmark, Water Research, Università degli Studi della Tuscia, Aarhus University, Greenland Institute of Natural Resources, Stanford University
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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
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Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.067 SNIP 1.257 CiteScore 2.28
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.323 SNIP 1.439 CiteScore 2.64
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.256 SNIP 1.419 CiteScore 2.52
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Practical steps toward integrating economic, social and institutional elements in fisheries policy and management

While international agreements and legislation call for incorporation of four pillars of sustainability, the social (including cultural), economic and institutional aspects (the 'human dimension') have been relatively neglected to date. Three key impediments have been identified: a relative lack of explicit social, economic and institutional objectives; a general lack of process (frameworks, governance) for routine integration of all four pillars of sustainability; and a bias towards biological considerations. Practical integration requires a 'systems' approach with explicit consideration of strategic and operational aspects of management; multidisciplinary or transdisciplinary evaluations; practical objectives for the four pillars of sustainability; appropriate participation; and a governance system that is able to integrate these diverse considerations in management. We challenge all involved in fisheries to immediately take five practical steps toward integrating ecological, economic, social and institutional aspects: (1) Adopt the perspective of the fishery as a 'system' with interacting natural, human and management elements; (2) Be aware of both strategic and operational aspects of fisheries assessment and management; (3) Articulate overarching objectives that incorporate all four pillars of sustainability; (4) Encourage appropriate (and diverse) disciplinary participation in all aspects of research, evaluation and management; and (5) Encourage development of (or emulate) participatory governance.

General information

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of New Brunswick, Australian National University, Saint Mary's University, Cathy Dichmont Consulting, Wageningen IMARES, CSIRO, Fisheries and Oceans Canada, Aalborg University
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Web of Science (2015): Indexed yes
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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
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BFI (2010): BFI-level 1
Web of Science (2010): Indexed yes
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Predicting the population-level impact of mitigating harbor porpoise bycatch with pingers and time-area fishing closures

Unintentional mortality of higher trophic-level species in commercial fisheries (bycatch) represents a major conservation concern as it may influence the long-term persistence of populations. An increasingly common strategy to mitigate bycatch of harbor porpoises (Phocoena phocoena), a small and protected marine top predator, involves the use of pingers (acoustic alarms that emit underwater noise) and time-area fishing closures. Although these mitigation measures can reduce harbor porpoise bycatch in gillnet fisheries considerably, inference about the long-term population-level consequences is currently lacking. We developed a spatially explicit individual-based simulation model (IBM) with the aim to evaluate the effectiveness of these two bycatch mitigation measures. We quantified both the direct positive effects (i.e., reduced bycatch) and any indirect negative effects (i.e., reduced foraging efficiency) on the population size using the inner Danish waters as a biological system. The model incorporated empirical data on gillnet fishing effort and noise avoidance behavior by free-ranging harbor porpoises exposed to randomized high-frequency (20- to 160-kHz) pinger signals. The IBM simulations revealed a synergistic relationship between the implementation of time-area fishing closures and pinger deployment. Time-area fishing closures reduced bycatch rates substantially but not completely. In contrast, widespread pinger deployment resulted in total mitigation of bycatch but frequent and recurrent noise avoidance behavior in high-quality foraging habitat negatively affected individual survival and the total population size. When both bycatch mitigation measures were implemented simultaneously, the negative impact of pinger noise-induced sub-lethal behavioral effects on the population was largely eliminated with a positive effect on the population size that was larger than when the mitigation measures were used independently. Our study highlights that conservationists and policy makers need to consider and balance both the direct and indirect effects of harbor porpoise bycatch mitigation measures before enforcing their widespread implementation. Individual-based simulation models, such as the one presented here, offer an efficient and dynamic framework to evaluate the impact of human activities on the long-term survival of marine populations and can serve as a basis to design adaptive management strategies that satisfy both ecological and socioeconomic demands on marine ecosystems.

General information
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Productivity and recovery of forage fish under climate change and fishing: North Sea sandeel as a case study
Forage fish occupy a central position in marine food-webs worldwide by mediating the transfer of energy and organic matter from lower to higher trophic levels. The lesser sandeel (Ammodytes marinus) is one of the ecologically and
economically most important forage fish species in the North-east Atlantic, acting as a key prey for predatory fish and sea birds, as well as supporting a large commercial fishery. In this case study, we investigate the underlying factors affecting recruitment and how these in turn affect productivity of the North Sea sandeel using long-term data and modelling. Our results demonstrate how sandeel productivity in the central North Sea (Dogger Bank) depends on a combination of external and internal regulatory factors, including fishing and climate effects, as well as density dependence and food availability of the preferred zooplankton prey (Calanus finmarchicus and Temora longicornis). Furthermore, our model scenarios suggest that while fishing largely contributed to the abrupt stock decline during the late 1990s and the following period of low biomass, a complete recovery of the stock to the highly productive levels of the early 1980s would only be possible through changes in the surrounding ecosystem, involving lower temperatures and improved feeding conditions. To that end, we stress the need for ecosystem-based management accounting for multiple internal and external factors occurring within the broader context of the ecosystem in which forage fish species, such as sandeel, play an important and integral part.
Quantifying predation on Baltic cod early life stages
Predation on cod (Gadus morhua) eggs by sprat (Sprattus sprattus) and herring (Clupea harengus) is known to be one of the processes influencing reproductive success of the eastern Baltic cod and has been reported to have contributed to lack of recovery of the stock in the 1990s. This study quantifies the predation on cod eggs in the Bornholm Basin, the major spawning area of cod in the central Baltic Sea, in the 1990s in comparison with the second half of the 2000s. The analyses involve estimating daily consumption rates of predator populations, which are then compared with corresponding daily egg production rates. As a methodological advancement compared with earlier studies, spatially resolved information on predator distribution and abundance is utilized in quantifying predator stock size. This resulted in more realistic consumption estimates in relation to overall egg production compared with earlier studies that consistently overestimated predation pressure by clupeids. Our results suggest a generally lower predation pressure on cod eggs in the mid- to late 2000s, due to a combination of reduced predator abundance and lower daily rations by individual predators.
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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
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ISI indexed (2013): ISI indexed yes
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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

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Reconciling agriculture and stream restoration in Europe: A review relating to the EU Water Framework Directive

Agriculture is widespread across the EU and has caused considerable impacts on freshwater ecosystems. To revert the degradation caused to streams and rivers, research and restoration efforts have been developed to recover ecosystem functions and services, with the European Water Framework Directive (WFD) playing a significant role in strengthening the progress.

Analysing recent peer-reviewed European literature (2009–2016), this review explores 1) the conflicts and difficulties faced when restoring agriculturally impacted streams, 2) the aspects relevant to effectively reconcile agricultural land uses and healthy riverine ecosystems and 3) the effects and potential shortcomings of the first WFD management cycle.

Our analysis reveals significant progress in restoration efforts, but it also demonstrates an urgent need for a higher number and detail of restoration projects reported in the peer-reviewed literature. The first WFD cycle ended in 2015 without reaching the goal of good ecological status in many European water-bodies. Addressing limitations reported in recent papers, including difficulties in stakeholder integration and importance of small headwater streams, is crucial. Analysing recent developments on stakeholder engagement through structured participatory processes will likely reduce perception discrepancies and increase stakeholder interest during the next WFD planning cycle.

Despite an overall dominance of nutrient-related research, studies are spreading across many important topics (e.g. stakeholder management, land use conflicts, climate change effects), which may play an important role in guiding future policy. Our recommendations are important for the second WFD cycle because they 1) help secure the development and dissemination of science-based restoration strategies and 2) provide guidance for future research needs.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Porto
Authors: Flavio, H. (Ekstern), Ferreira, P. (Ekstern), Formigo, N. (Ekstern), Svendsen, J. C. (Intern)
Pages: 378-395
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Main Research Area: Technical/natural sciences

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Scopus rating (2016): CiteScore 5.08 SJR 1.621 SNIP 1.849
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.674 SNIP 1.642 CiteScore 4.33
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.635 SNIP 1.847 CiteScore 4.2
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.527 SNIP 1.759 CiteScore 3.73
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.773 SNIP 1.811 CiteScore 3.7
ISI indexed (2012): ISI indexed yes
Reducing discards without reducing profit: Free gear choice in a Danish result-based management trial

The 2013 Common Fisheries Policy introduced a landing obligation on a range of species. This is changing the fundamental principles on which EU fisheries management is based, with more focus on the full accountability of all catches (a move towards catch quota management) and less accountability on the means used to obtain these catches (a move towards results-based management). To investigate the potentials and challenges that these paradigm shifts give rise to, a 6-months ‘unrestricted gear’ trial was performed in Denmark in 2015. Twelve trawlers of different size, rigging, fishing area and target species were challenged to test their own solutions to reduce unwanted bycatch and/or choke species, while maintaining their profitability. Fully documented fishery (FDF) was required, including electronic monitoring, self-estimation of discards and haul-by-haul catch documentation. Fishers’ participation in the trial was partly incentivized through the allocation of additional quota. Fishers used twinned standard and test gears whenever possible, or switched gear sequentially otherwise. The participating fishers tested different options depending on their fishery and the type of issues they faced individually, and adjusted their test fishery over time through incremental small steps. A total of 1497 hauls were analysed for landings, discards and discard-ratio (discard to catch ratio), along with species composition and temporal trends. Nine vessels reduced discard ratio in the test fishery, one showed no difference between test and control fishery, while two vessels displayed an increase in discard ratio. The catch compositions were also significantly different, with fewer predicted “choke species” occurring in the test fisheries and a more valuable size composition. Ultimately, despite smaller landings in multiple vessels, no vessel showed reduction in value-per-unit-effort (VPUE) and one Baltic vessel significantly increased the VPUE. No temporal trends in discard ratio were noted. This trial showed that relaxing technical regulations has a potential to provide some flexibility to cope with the landing obligation, where unwanted catches could be reduced to some extent without negative effects on economic viability. Some practical implementation challenges were nevertheless encountered, which are discussed in the perspective of implementing results-based management at full scale.
Registrering af fangster i de danske kystområder med standardredskaber. Nøglefiskerrapport 2014-2016

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Section for Oceans and Arctic
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Publication: Research › Report – Annual report year: 2017

REKREA - Evaluating Survey Methods for Danish Marine Recreational Fisheries

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Freshwater Fisheries Ecology, Section for Ecosystem based Marine Management, Institute Management
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Event: Poster session presented at World Recreational Fishing Conference 2017, Victoria, Canada.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2017

REKREA - Evaluating Survey Methods for Danish Marine Recreational Fisheries

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Freshwater Fisheries Ecology, Section for Ecosystem based Marine Management, Institute Management
Publication date: 2017
Event: Poster session presented at Danfish International Fisheries Exhibition 2017, Aalborg, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2017
Remote electronic monitoring and the landing obligation – some insights into fishers’ and fishery inspectors’ opinions

The European fisheries management is currently undergoing a fundamental change in the handling of catches of commercial fisheries with the implementation of the 2013 Common Fisheries Policy. One of the main objectives of the policy is to end the practice of discarding in the EU by 2019. However, for such changes to be successful, it is vital to ensure stakeholders acceptance, and it is prudent to consider possible means to verify compliance with the new regulation. Remote Electronic Monitoring (REM) with Closed-Circuit Television (CCTV) has been tested in a variety of fisheries worldwide for different purposes and is currently considered as one possible tool to ensure compliance with a European ban on discards. This study focuses on Danish fishery inspectors and on fishers with REM experience, whose opinions are well known. Their views on the landing obligation and on the use of REM were investigated using interviews and questionnaires, and contrasted to some fishers without REM experience. 80% of fishery inspectors and 58% of REM-experienced fishers expressed positive views on REM. 9 out of 10 interviewed fishers without REM experience were against REM. Participation in a REM trial has not led to antipathy towards REM. Fishery inspectors saw on-board observers, at-sea control and REM as the three best solutions to control the landing obligation but shared the general belief that the landing obligation cannot be enforced properly and will be difficult for fishers to comply with. The strengths and weaknesses of REM in this context are discussed.

General information
State: Published
Organisations: Section for Marine Living Resources, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Aalborg University, Ministry of Food, Agriculture and Fisheries
Authors: Schreiber Plet-Hansen, K. (Intern), Qvist Eliasen, S. (Ekstern), Mortensen, L. O. (Intern), Bergsson, H. (Ekstern), Olesen, H. J. (Intern), Ulrich, C. (Intern)
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Journal: Marine Policy
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Ratings:
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Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 2.7 SJR 1.335 SNIP 1.182
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.591 SNIP 1.397 CiteScore 3.07
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.438 SNIP 1.56 CiteScore 3.09
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.472 SNIP 1.635 CiteScore 2.71
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.339 SNIP 1.495 CiteScore 2.54
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.406 SNIP 1.263 CiteScore 2.07
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.289 SNIP 1.483
Respirometry increases cortisol levels in rainbow trout Oncorhynchus mykiss: implications for measurements of metabolic rate

This study aimed to assess the extent to which chasing, handling and confining Oncorhynchus mykiss to a small respirometry chamber during respirometric experiments is stressful and affects metabolic measurements. The study observed increased cortisol levels in animals tested using a chase protocol and subsequent intermittent-flow respirometry, suggesting that this procedural treatment may stress animals.
Restoration of a boulder reef in temperate waters: Strategy, methodology and lessons learnt

Anthropogenic impacts on marine habitats are a global problem, particularly in coastal areas. While boulder reefs in temperate waters hold high biomass and biodiversity, and may be unable to recover from anthropogenic stressors without restoration efforts, little is known about how to restore and conserve this important marine habitat. Limited knowledge is a serious impediment to projects aimed at restoring boulder reefs that have been degraded or removed by substrate extraction. In 2008, a boulder reef was restored in Kattegat, the transitional waters between the North Sea and the Baltic Sea, using differently sized boulders. The restored reef covered approximately 27,600 m² seafloor and included 100,712 tons of boulders added at depths ranging between 4 and 11 m. This paper describes methodology and lessons learned...
during the restoration project. Before the restoration, geological and geotechnical surveys confirmed that the sea bed could support added boulders, and high resolution bathymetric surveys provided input for the design of the reef, particularly for numerical modelling of the hydrographic and sediment transport conditions. Numerical modelling was used to derive hydrographic design conditions for boulder placements and further, to ensure that the restored reef would not affect the sea bed morphology and hydrographic conditions at a local harbour and at a protected habitat, both situated in the vicinity of the restoration area. Data on the physical structure of the restored boulder reef, collected in 2009, demonstrated that cavernous structures and shallow reef areas were restored. Moreover, data collected in 2012 confirmed the stability of the restored reef. Finally, results highlighted the importance of stakeholder mapping at the outset, appropriate timing of stakeholder involvement and ongoing consideration of stakeholder perceptions. Charting strategy and introducing a checklist for marine restoration projects, this paper outlines important considerations and methodology needed to ensure that restoration of temperate reef structures meet the objectives, without having undesirable effects on existing hydrographic and morphological conditions, including nearby coastal areas and protected marine habitats.

General information
State: Published
Authors: Støttrup, J. G. (Intern), Dahl, K. (Ekstern), Niemann, S. (Ekstern), Stenberg, C. (Intern), Reker, J. (Ekstern), Stamphøj, E. M. (Ekstern), Göke, C. (Ekstern), Svendsen, J. C. (Intern)
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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 1.053 SNIP 1.522 CiteScore 3.45
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.085 SNIP 1.485 CiteScore 3.09
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.181 SNIP 1.655 CiteScore 3.03
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.225 SNIP 2.108 CiteScore 3.55
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.791 SNIP 2.111 CiteScore 3.48
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.697 SNIP 1.851 CiteScore 3.6
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.222 SNIP 1.531
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.452 SNIP 2.127
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.104 SNIP 1.537
Sustainable management of coastal systems requires an iterative process using a multidisciplinary approach that integrates the three pillars of sustainable development: environmental protection, social progress and economic growth. The Systems Approach Framework (SAF) provides a structure for an Integrated Coastal Management (ICM) process with an effective science-policy interface that embraces the challenge of simulating complex systems and encapsulates citizen involvement from the onset. We analysed the findings of 16 re-analyses studies undertaken in eight Baltic Sea countries to test how well SAF elements had been applied in practice within ICM processes. The results revealed the main ICM driver was ecology or economy. Several ICM elements as defined by the SAF are already standard within the Baltic Sea region. However, in many cases, the omission of stakeholder and institutional mapping as instructed by the SAF led to an unbalanced participation of stakeholders, or in some cases, lack of involvement of stakeholders at the start of the process. Most of the ICM processes failed to include an integrated, cross-sectorial, ecological-socio-economic assessment. This extends from the lack of system thinking when defining the Policy Issue for the problem and when developing the conceptual model, which often leads to one-sectorial solutions, which may not be sustainable. Furthermore, the duration of some of the ICM processes was prolonged due to disagreement and opposition early in the process and/or lack of manager experiences in conducting a stakeholder participatory process. Finally, due to its stringent structure the SAF was found to be a suitable quality assurance for sustainable ICM processes.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Gillgren and Associates, Leibniz-Institute for Baltic Sea Research
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.23 SJR 0.887 SNIP 1.123
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.783 SNIP 1.002 CiteScore 1.92
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.883 SNIP 1.306 CiteScore 2.05
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Scavenging strategies of hagfish in the Kattegat

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Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2017

Shifts in North Sea forage fish productivity and potential fisheries yield
1. Forage fish populations support large scale fisheries and are key components of marine ecosystems across the world, linking secondary production to higher trophic levels. While climate-induced changes in the North Sea zooplankton community are described and documented in literature, the associated bottom-up effects and consequences for fisheries remain largely unidentified.

2. We investigated the temporal development in forage fish productivity and the associated influence on fisheries yield of herring, sprat, Norway pout and sandeel in the North Sea. Using principal component analysis, we analysed 40 years of recruitment success and growth proxies to reveal changes in productivity and patterns of synchronicity across stocks (i.e. functional complementarity). The relationship between forage fish production and Calanus finmarchicus (an indicator of climate change) was also analysed. We used a population model to demonstrate how observed shifts in productivity affected total forage fish biomass and fisheries yield.

3. The productivity of North Sea forage fish changed around 1993 from a higher average productivity to lower average productivity. During the higher productivity period, stocks displayed a covariance structure indicative of functional complementarity. Calanus finmarchicus was positively correlated to forage fish recruitment, however, for growth, the direction of the response differed between species and time periods. Maximum sustainable yield (MSY) and the associated fishing mortality (Fmsy) decreased by 33%–68% and 26%–64%, respectively, between the higher and lower
productivity periods. The results demonstrate that fisheries reference points for short-lived planktivorous species are highly dynamic and respond rapidly to changes in system productivity. Furthermore, from an ecosystem-based fisheries management perspective, a link between functional complementarity and productivity, indicates that ecosystem resilience may decline with productivity. Based on this, we advise that system productivity, perhaps monitored as forage fish growth, becomes an integral part of management reference points; in both single species and ecosystem contexts. However, to retain social license of biological advice when fish catch opportunities are reduced, it is crucial that shifts in productivity are thoroughly documented and made apparent to managers and stakeholders.

**General information**

State: Accepted/In press
Authors: Worsøe Clausen, L. (Intern), Rindorf, A. (Intern), van Deurs, M. (Intern), Dickey-Collas, M. (Intern), Hintzen, N. T. (Ekstern)
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- Web of Science (2018): Indexed yes
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- Web of Science (2017): Indexed Yes
- BFI (2016): BFI-level 2
- Scopus rating (2016): CiteScore 5.5 SJR 2.869 SNIP 2.008
- Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 2
- Scopus rating (2015): SJR 3.242 SNIP 1.96 CiteScore 5.38
- BFI (2014): BFI-level 2
- Scopus rating (2014): SJR 2.998 SNIP 2.171 CiteScore 5.25
- Web of Science (2014): Indexed yes
- BFI (2013): BFI-level 2
- Scopus rating (2013): SJR 3.031 SNIP 2.225 CiteScore 5.45
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 2
- Scopus rating (2012): SJR 3.122 SNIP 2.089 CiteScore 5.18
- ISI indexed (2012): ISI indexed yes
- BFI (2011): BFI-level 2
- Scopus rating (2011): SJR 3.665 SNIP 2.294 CiteScore 5.23
- ISI indexed (2011): ISI indexed yes
- BFI (2010): BFI-level 2
- Scopus rating (2010): SJR 3.091 SNIP 2.014
- BFI (2009): BFI-level 2
- Scopus rating (2009): SJR 3.22 SNIP 2.112
- BFI (2008): BFI-level 2
- Scopus rating (2008): SJR 3.08 SNIP 2.252
- Web of Science (2008): Indexed yes
- Scopus rating (2007): SJR 3.494 SNIP 2.592
- Web of Science (2007): Indexed yes
- Scopus rating (2006): SJR 3.095 SNIP 2.385
- Web of Science (2006): Indexed yes
- Scopus rating (2005): SJR 3.124 SNIP 2.257
- Scopus rating (2004): SJR 2.709 SNIP 2.134
Skraemmeliner giver renere jomfruhummerfangst

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Melli, V. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern), Feekings, J. P. (Intern)
Pages: 9-10
Publication date: 2017

Publication information
Pages (from-to): 9-10
Newspaper: Fiskeri Tidende
Volume: 24
No.: 47
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ISI indexed (2012): ISI indexed no
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Main Research Area: Technical/natural sciences
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Sortmundet kutling: Invasionen fra Sortehavet fortsætter

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management
Authors: Ramkær, K. (Ekstern), van Deurs, M. (Intern), Christoffersen, M. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences

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Journal: Fisk & Fri
Issue number: 6
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Original language: Danish
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Sortmundet kutling (Neogobius melanostomus) spreder sig på bekostning af hjemmehørende danske arter

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University Hospital
Authors: Alstrup, A. K. O. (Ekstern), Jensen, L. F. (Ekstern), Svendsen, J. C. (Intern)
Pages: 6-11
Publication date: 2017
Spatial planning for aquaculture: the Georeferenced Interactions Database (GRID)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, National Research Council of Italy, Hellenic Centre for Marine Research
Publication date: 2017
Event: Poster session presented at EAS Aquaculture Europe 2017, Dubrovnik, Croatia.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2017

Spatial Planning for Fisheries in the Adriatic Sea, – the ECOAST project

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, National Research Council of Italy
Authors: Grati, F. (Ekstern), Bolognini, L. (Ekstern), Bastardie, F. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

Spatial planning for fisheries in the Northern Adriatic: working toward viable and sustainable fishing
Given the great overfishing of the demersal resources in the Northern Adriatic Sea (geographical sub-area [GSA] 17), along with the fishing pressure in marine habitats, evidence strongly supports the need to evaluate appropriate management approaches. Several fishing activities operate simultaneously in the area, and the need to minimize conflicts among them is also a social concern. We applied a spatially and temporally explicit fish and fisheries model to assess the impact of a suite of spatial plans suggested by practitioners that could reduce the pressure on the four demersal stocks of high commercial interest in the GSA 17 and that could promote space sharing between mutually exclusive activities. We found that excluding trawlers from some areas has lowered the effective fishing effort, resulting in some economic losses but providing benefit to the set netters. Not every simulated fishing vessel is impacted in the same way because some fishing communities experienced different economic opportunities, particularly when a 6-nautical mile buffer zone from the coast was implemented in the vicinity of important fishing grounds. Along this buffer zone, the four stocks were only slightly benefiting from the protection of the area and from fewer discards. In contrast, assuming a change in the ability of the population to disperse led to a large effect: Some fish became accessible in the coastal waters, therefore increasing the landings for rangelimited fishers, but the discard rate of fish also increased, greatly impairing the long-term biomass levels. Our evaluation, however, confirmed that no effort is displaced onto vulnerable benthic habitats and to grounds not suitable for the continued operation of fishing. We conclude that the tested spatial management is helpful, but not sufficient to ensure sustainable fishing in the area, and therefore, additional management measures should be taken. Our test platform investigates the interaction between fish and fisheries at a fine geographical scale and simulates data for varying fishing methods and from different harbor communities in a unified framework. We contribute to the development of effective science-based inputs to facilitate policy improvement and better governance while evaluating trade-offs in fisheries management and marine spatial planning

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, National Research Council of Italy, University of Bologna, Studiofuga
Stable isotopes reveal the effect of trawl fisheries on the diet of commercially exploited species

Bottom trawling can change food availability for benthivorous demersal species by (i) changing benthic prey composition through physical seabed impacts and (ii) by removing overall benthic consumer biomass increasing the net availability of benthic prey for remaining individuals. Thus trawling may both negatively and positively influence the quantity and quality of food available. Using δ13C and δ15N we investigated potential diet changes of three commercially exploited species across trawling gradients in the Kattegat (plaice, dab and Norway lobster (Nephrops)) and the Irish Sea (Nephrops). In the Kattegat, trawling affected primarily the biomass of benthic consumers, lowering competition. Nephrops showed significant positive relationships for δ13C and a domed relationship for δ15N with trawling. In the Irish Sea, intense trawling had a negative effect on benthic prey. δ13C and δ15N thus showed the inverse relationships to those observed in the Kattegat. Plaice from the Kattegat, showed a significant relationship with trawling intensity for δ13C, but not for δ15N. No relationship was found for dab. Changes of δ13C and δ15N correlated with changes in condition of species. The results show that the removal of demersal competitors and benthos by trawling can change the diets of commercial species, ultimately affecting their body condition.
Stress and recovery from trawl capture of Norway lobster (Nephrops norvegicus) and potential for live storage

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquaculture, Section for Ecosystem based Marine Management, Section for Marine Living Resources, STMI
Authors: Skov, P. V. (Intern), Methling, C. (Intern), Larsen, B. K. (Intern), Unmack, C. P. (Ekstern), Karlsen, J. D. (Intern), Behrens, J. (Intern)
Publication date: 2017
Event: Abstract from Dansk Havforskmøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

The footprint of bottom trawling in European waters: distribution, intensity, and seabed integrity

Mapping trawling pressure on the benthic habitats is needed as background to support an ecosystem approach to fisheries management. The extent and intensity of bottom trawling on the European continental shelf (0-1000 m) was analysed from logbook statistics and vessel monitoring system data for 2010-2012 at a grid cell resolution of 1 x 1 min longitude and latitude. Trawling intensity profiles with seabed impact at the surface and subsurface level are presented for 14 management areas in the North-east Atlantic, Baltic Sea and Mediterranean Sea. The footprint of the management areas ranged between 53-99% and 6-94% for the depth zone from 0 to 200 m (Shallow) and from 201 to 1000 m (Deep), respectively. The footprint was estimated as the total area of all grid cells that were trawled fully or partially. Excluding the untrawled proportions reduced the footprint estimates to 28-85% and 2-77%. Largest footprints per unit landings were observed off Portugal and in the Mediterranean Sea. Mean trawling intensity ranged between 0.5 and 8.5 times per year, but was less in the Deep zone with a maximum intensity of 6.4. Highest intensities were recorded in the Skagerrak-Kattegat, Iberian Portuguese area, Tyrrenhian Sea and Adriatic Sea. Bottom trawling was highly aggregated. For the Shallow zone the seabed area where 90% of the effort occurred comprised between 17% and 63% (median 36%) of the management area. Footprints were high over a broad range of soft sediment habitats. Using the longevity distribution of the untrawled infaunal community, the seabed integrity was estimated as the proportion of the biomass of benthic taxa where the trawling interval at the subsurface level exceeds their life span. Seabed integrity was low (< 0.1) in large parts of the European continental shelves, although smaller pockets of seabed with higher integrity values occur. The methods
developed here integrate official fishing effort statistics and industry-based gear information to provide high-resolution pressure maps and indicators, which greatly improve the basis for assessing and managing benthic pressure from bottom trawling. Further they provide quantitative estimates of trawling impact on a continuous scale by which managers can steer.

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The importance of live-feed traps - farming marine fish species
This article analyses the challenges of different live-feed regimes for the rearing of marine finfish larvae and discusses the potential alternative live feeds to avert a future live-feed trap. Live feeds are indispensable for the successful rearing of larvae of most marine fish species. Brine shrimps (Artemia) and rotifers comprise the live feeds of choice in marine aquaculture today. However, their nutritional composition is deficient in especially essential fatty acids, and enrichment with fish oil is needed. Fish oil is considered a limited resource owing to its origin in fully exploited wild fish stocks. Moreover, fluctuations of the natural population of Artemia will, most likely, influence future availability and prices. This emphasizes the need for optimal exploitation of available live-feed resources and development of new sustainable alternatives, such as copepods. An array of solutions to these problems are presented to avoid a future live-feed trap and to reduce dependence on limited resources that influence future production possibilities, species diversification, price volatility and productivity in the aquaculture sector.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Copenhagen, Roskilde University
Authors: Nielsen, R. (Ekstern), Nielsen, M. (Ekstern), Abate, T. G. (Ekstern), Hansen, B. W. (Ekstern), Jepsen, P. M. (Ekstern), Nielsen, S. L. (Ekstern), Støttrup, J. G. (Intern), Buchmann, K. (Intern)
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The Portuguese man-of-war: Gone with the wind

The Portuguese man-of-war (Physalia physalis) is a siphonophore that lives at the air–water interface of the sea. The wind is the main mechanism controlling its drift. In August 2010, a significant number of individuals of this species arrived at the Basque coast (southeastern Bay of Biscay), causing a great socio-economic impact. Here we investigate the most likely region of origin and routes of these individuals using the Sediment, Oil spill and Fish Tracking model (SOFT). This model was run backwards in time using only the wind drag velocity (i.e., the wind velocity multiplied by a wind drag coefficient) to estimate the drift of these Portuguese man-of-war for one year and taking into account that the final destination was the Basque coast. The wind data were obtained with the Weather Research and Forecasting model (WRF). Six different simulations were carried out with SOFT using the following wind drag coefficients: 0.02, 0.025, 0.03, 0.035, 0.04 and 0.045. The simulation period covered from the end of August 2010 to the beginning of August 2009. After the first eight months of simulation (i.e., at the beginning of January 2010), the virtual Portuguese man-of-war used in SOFT were located near or on the northwest and southwest coasts of France and England, respectively, and in the English Channel, the southern Celtic Sea and the northwestern Bay of Biscay. However, at the end of the simulation period (i.e., at the beginning of August 2009), most of these Portuguese man-of-war were located between the central part of the Bay of Biscay (∼5° W) and the open North Atlantic Ocean (∼35° W), depending on the wind drag coefficient. From these results, we conclude that the region of origin of the Portuguese man-of-war arriving at the Basque coast in August 2010 was probably located in the northern part of the North Atlantic Subtropical Gyre. This conclusion is in agreement with the general wind-driven circulation in the North Atlantic Ocean.
Towards ecosystem-based management: Identifying operational food-web indicators for marine ecosystems

Modern approaches to Ecosystem-Based Management and sustainable use of marine resources must account for the myriad pressures (interspecies, human and environmental) affecting marine ecosystems. The network of feeding interactions between co-existing species and populations (food webs) are an important aspect of all marine ecosystems and biodiversity. Here we describe and discuss a process to evaluate the selection of operational food-web indicators for use in evaluating marine ecosystem status. This process brought together experts in food-web ecology, marine ecology, and resource management, to identify available indicators that can be used to inform marine management. Standard evaluation criteria (availability and quality of data, conceptual basis, communicability, relevancy to management) were implemented to identify practical food-web indicators ready for operational use and indicators that hold promise for future use in policy and management. The major attributes of the final suite of operational food-web indicators were structure and functioning. Indicators that represent resilience of the marine ecosystem were less developed. Over 60 potential food-web indicators were evaluated and the final selection of operational food-web indicators includes: the primary production required to sustain a fishery, the productivity of seabirds (or charismatic megafauna), zooplankton indicators, primary productivity, integrated trophic indicators, and the biomass of trophic guilds. More efforts should be made to develop thresholds-based reference points for achieving Good Environmental Status. There is also a need for international collaborations to develop indicators that will facilitate management in marine ecosystems used by multiple countries.
I. (Ekstern), Patricio, J. (Ekstern), Palialexis, A. (Ekstern), Tett, P. (Ekstern), Johansen, G. O. (Ekstern), Houle, J. (Ekstern), Rindorf, A. (Intern)

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Scopus rating (2012): CiteScore 2.35
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TropFishR: an R package for fisheries analysis with length-frequency data

1. The R package TropFishR is a new analysis toolbox compiling single-species stock assessment methods specifically designed for data-limited fisheries analysis using length-frequency data.
2. It includes methods for (i) estimating biological stock characteristics such as growth and mortality parameters, (ii) exploring technical aspects of the fisheries (e.g. exploitation rate and selectivity characteristics), (iii) assessing size and composition of a fish stock by means of virtual population analysis (VPA), and (iv) assessing stock status with yield prediction and production models.
3. This paper introduces the package and demonstrates the functionality of a selection of its core methods.
4. TropFishR modernises traditional stock assessment methods by easing application and development and by combining it with advanced statistical approaches.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Johann Heinrich von Thünen-Institute, Leibniz Centre for Tropical Marine Research
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Scopus rating (2016): CiteScore 7.28 SJR 4.733 SNIP 2.621
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Scopus rating (2015): SJR 5.382 SNIP 2.842 CiteScore 7.61
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 4.112 SNIP 2.452 CiteScore 6.29
Web of Science (2014): Indexed yes
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Scopus rating (2013): SJR 3.011 SNIP 2.427 CiteScore 5.34
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Trophic interactions in the Baltic Sea: Clupeid predation on cod early life stages

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Trophic Interactions in the Baltic Sea: Clupeid predation on cod early life stages

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Authors: Neumann, V. (Intern), Köster, F. (Intern), Eero, M. (Intern), Schaber, M. (Ekstern)
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Trophic Interactions in the Baltic Sea: Predation on cod eggs by clupeids

Cod (Gadus morhua), sprat (Sprattus sprattus) and herring (Clupea harengus) are key species of the upper trophic levels in the Baltic Sea ecosystem and are strongly interlinked: The piscivore cod is the main predator on the planktivores sprat and herring, which feed, amongst others, on cod eggs. Egg predation by sprat and herring has earlier been suggested as one of the factors limiting cod recruitment success in the Baltic Sea in the 1990s. Since then, changes have taken place in cod recruitment as well as in the ecological factors potentially influencing egg predation. The overall aim of this thesis is to elucidate possible changes in predation pressure on cod early life stages in the 2000s compared to the 1990s, as well as to enhance our understanding of the processes impacting on egg predation and its implications for cod recruitment. The investigations of this thesis are based on extensive datasets on stomach contents of sprat and herring, ambient hydrographic conditions, ichthyoplankton distribution and abundance as well as predator distribution and abundance from hydroacoustic data for the 1990s and 2004-2008. Changes in diet composition of sprat and herring were investigated, including temporal and spatial variability in egg predation. The changes were driven by ambient hydrographic conditions, cod egg abundance, predator-prey overlap as well as abundance of alternative prey (Paper I). Next, cod egg consumption by herring and sprat was quantified and compared with revised estimates from the 1990s to elucidate potential changes in predation mortality of cod eggs (Paper II). A major methodological focus in this investigation was related to resolving the spatial distribution of sprat and herring to obtain realistic estimates of predator abundances in the area overlapping with cod eggs. As a next step, predation pressure was quantified separately for egg development stages, both for cod and sprat (Paper III). Furthermore, ichthyoplankton prey selection by clupeids was investigated, with specific focus of predation on different fish egg species and development stages, to improve our understanding of the mechanisms underlying egg predation. Finally, the results on predation pressure on cod eggs were reviewed in the context of other processes acting on early life stage survival and influencing cod recruitment in the Baltic Sea (Paper IV). The results showed that diet composition of both sprat and herring in terms of major taxonomic groups was generally similar in the 1990s and 2000s. Although higher proportions of cod eggs occurred in the diet of the 2000s, the overall quantities of cod eggs in the diet were generally lower in the 2000s compared to the 1990s (Paper I). This suggests reduced predation on cod eggs in latter period, which was further confirmed in quantitative analyses of predation mortality on cod eggs (Paper II). The lower predation pressure on cod eggs in the 2000s was related to a combination of reduced predator abundance and lower daily rations by individual predators. Reduced predation pressure was identified as one of the factors contributing to relatively higher year-classes of cod recruitment in the 2000s (Paper IV). Predation was found to affect mainly eggs at older development stages, both for cod and sprat (Paper III). Furthermore, those eggs which have survived two out of three critical development phases in the often detrimental hydrographic conditions in and below the permanent halocline (Paper III). This suggests a higher impact of predation on cod recruitment than formerly thought. In contrast, investigations on sprat egg mortality (Paper III) found that consumption rates of sprat eggs at all development stages relative to production rates were considerably lower compared to cod, suggesting egg predation to be of a lesser importance for sprat recruitment. The results of this thesis provide new knowledge on clupeid foraging, including identifying processes and mechanisms behind fish egg consumption in the central Baltic. Further, the thesis contributes improved methodology for quantifying cod and sprat egg predation by egg development stages. Both in combination can be considered as a major advancement in this field of research, as predation pressure on early life stages is generally extremely difficult to quantify and comparable studies are scarce. Hence, the thesis provides useful ecological and methodological input to other ecosystems and investigations, where predation on early life stages is an important factor in...
Unplanned ecological engineering

Fisheries can double the production of protein and revenue by abandoning current single-species management. This provocative prediction is the implication of the work in PNAS by Szuwalski et al. (1). Using the East China Sea as a case, they show how an indiscriminate fishery can support unexpectedly large catches by removing predators from the ecosystem. Such ecosystem engineering stands in stark contrast to reigning management paradigms that do not allow fishing down predators to increase the productivity of their prey.

The theoretical support for such a feat of ecosystem engineering is well developed (2, 3). Trusting the Chinese catch statistics, Szuwalski et al. (1) provide empirical evidence that theory may be turned into practice. But their work is more than “just another fisheries paper;” it underscores highly controversial issues about the unavoidable trade-offs in managing fisheries and ecosystems. If we narrowly consider food security, maximizing fisheries catch from the ecosystem is a “no-brainer,” but from a conservation point of view, the loss of biodiversity in the East China Sea may seem like Aquacalypse come true (4). Can we really double fisheries’ production by turning the oceans into mega-scale mariculture operations? Is it what we want?
Variation that can be expected when using particle tracking models in connectivity studies

A suite of ocean circulation and Lagrangian models were compared to determine inter-model uncertainty and variation. Absolute results (positions, temperatures, etc.) varied between models, but trends were comparable. More plaice than sole larvae reached a marine protected area although released in the same area but at different times. About 10% of all herring larvae released in the southern North Sea were located in a wind-park area when becoming juvenile.
Abundance of specific mRNA transcripts impacts hatching success in European eel, Anguilla anguilla L.

Maternal mRNA governs early embryonic development in fish and variation in abundance of maternal transcripts may contribute to variation in embryonic survival and hatch success in European eel, Anguilla anguilla. Previous studies have shown that quantities of the maternal gene products β-tubulin, insulin-like growth factor 2 (igf2), nucleoplasmin (npm2), prohibitin 2 (phb2), phosphatidylinositol glycan biosynthesis class F protein 5 (pigf5), and carnitine O-palmitoyltransferase liver isoform-like 1 (cpt1) are associated with embryonic developmental competence in other teleosts. Here, the relations between relative mRNA abundance of these genes in eggs and/or embryos and egg quality, was studied and analyzed. We compared egg quality of the two groups: i) batches with hatching and ii) batches with no hatching. Results showed no significant differences in relative mRNA abundance between the hatch and no hatching groups for any of the selected genes at 0, 2.5, and 5 HPF. However, at 30 HPF the hatch group showed significantly higher abundance of cpt1a, cpt1b, β-tubulin, phb2, and pigf5 transcripts than the no hatch group. Therefore, these results indicate that up-regulation of the transcription
of these genes in European eel after the mid-blastula transition, may be needed to sustain embryonic development and hatching success.

**General information**

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Organisations: Section for Ecosystem based Marine Management, National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, IFREMER
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- Scopus rating (2011): SJR 0.858 SNIP 1.048 CiteScore 2.2
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- Scopus rating (2010): SJR 0.836 SNIP 1.041
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- Scopus rating (2009): SJR 0.794 SNIP 0.944
- Web of Science (2009): Indexed yes
- BFI (2008): BFI-level 1
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- Web of Science (2008): Indexed yes
- Scopus rating (2007): SJR 0.639 SNIP 0.893
- Web of Science (2007): Indexed yes
- Scopus rating (2006): SJR 0.62 SNIP 0.892
- Web of Science (2006): Indexed yes
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- Web of Science (2005): Indexed yes
- Scopus rating (2004): SJR 0.756 SNIP 1.02
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A comparative review of fisheries management experiences in the European Union and in other countries worldwide: Iceland, Australia, and New Zealand

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Scopus rating (2014): SJR 3.462 SNIP 3.327 CiteScore 7.13
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 3.488 SNIP 3.12 CiteScore 6.19
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BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.565 SNIP 2.852 CiteScore 6.14
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 4.025 SNIP 2.854 CiteScore 6.2
Adult lifetime reproductive value in fish depends on size and fecundity type

In a stable population, the adult lifetime reproductive value must be balanced against early life survival. Although delaying maturity may increase fecundity, it also reduces survival. Larger size at maturity therefore not only allows for higher fecundity, but requires it. Using simple arguments from life history, we derive a direct proportionality relationship between the adult lifetime reproductive value and weight at maturation and find that this relationship is consistent with empirical evidence from 28 stocks and species of bony fish from temperate–boreal environments. However, the expected proportionality falls off if mortality increases to include fishing. Furthermore, we find that the fecundity type (determinate or indeterminate) affects the predicted adult reproductive value, which is significantly (10-fold) higher for an indeterminate spawner than for a determinate spawner of the same weight. These differences may relate to trade-offs in the adult life history traits and (or) to seasonality in the spawning environment, with subsequent consequences for early life stage survivorship.

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Scopus rating (2016): CiteScore 2.56 SJR 1.322 SNIP 1.163
Web of Science (2016): Indexed yes
Analysis of trophic interactions reveals highly plastic response to climate change in a tri-trophic High-Arctic ecosystem

As a response to current climate changes, individual species have changed various biological traits, illustrating an inherent phenotypic plasticity. However, as species are embedded in an ecological network characterised by multiple consumer-resource interactions, ecological mismatches are likely to arise when interacting species do not respond homogeneously. The approach of biological networks analysis calls for the use of structural equation modelling (SEM), a multidimensional analytical setup that has proven particularly useful for analysing multiple interactions across trophic levels. Here we apply
SEM to a long-term dataset from a High-Arctic ecosystem to analyse how phenological responses across three trophic levels are coupled to snowmelt patterns and how changes may cascade through consumer-resource interactions. Specifically, the model included the effect of snowmelt on a High-Arctic tri-trophic system of flowers, insects and waders (Charadriiformes), with latent factors representing phenology (timing of life history events) and performance (abundance or reproduction success) for each trophic level. The effects derived from the model demonstrated that the time of snowmelt directly affected plant and arthropod phenology as well as the performance of all included trophic levels. Additionally, timing of snowmelt appeared to indirectly influence wader phenology as well as plant, arthropod and wader performance through effects on adjacent trophic levels and lagged effects. The results from the tri-trophic community presented here emphasise that effects of climate on species in consumer-resource systems may propagate through trophic levels.
An assessment of the Norwegian Deep/Skagerrak shrimp stock using the Stock Synthesis statistical framework

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Swedish University of Agricultural Sciences, Institute of Marine Research
Authors: Bergenius, M. (Ekstern), Cardinale, M. (Ekstern), Eigaard, O. R. (Intern), Søvik, G. (Ekstern), Ulmestrand, M. (Ekstern)
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An important step towards accurate estimation of diet composition and consumption rates for the harbor porpoise (Phocoena phocoena)

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, University of Veterinary Medicine Hannover
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Institute of Marine Research
Authors: Krafft, B. A. (Ekstern), Skaret, G. (Ekstern), Krag, L. A. (Intern), Rustand, T. (Ekstern), Pedersen, R. (Ekstern)
Number of pages: 22
Publication date: 2016

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Original language: English

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Number: 20
Main Research Area: Technical/natural sciences
Publication: Research › Report – Annual report year: 2016
Aquaculture and feeding ecology: Feeding behaviour in turbot larvae

The period of first feeding, characterized by the shift from internal (yolk-sac) to external food sources, is considered particularly critical for the survival of marine fish, but the underlying causes are still unknown. The larval stage, characterized by high mortality rates, is particularly challenging for larval rearing. After the start of exogenous feeding, another intense and likely critical period of change occurs in the early life stages of fish. This stage is the metamorphosis, during which the larvae transform organs and body morphology to become juveniles. Compared to other teleosts, larvae of flatfishes undergo a particularly evident and dramatic metamorphosis, because flatfishes completely reprogram their body to move from the pelagic habitat, in the water column, to the benthic habitat, on the sea floor. Due to the complex morphological and physiological changes, in aquaculture metamorphosis in flatfish species is often unsuccessful, resulting in different types of abnormal development.

The objective of this thesis was to analyse the feeding behaviour of the flatfish species turbot (Psetta maxima L.) larvae during the two crucial life periods, 1) first feeding and 2) metamorphosis. To analyse whether these two periods are critical for the correct development and survival of turbot, feeding behaviours of larvae during the period of first feeding and during the first stages of metamorphosis was studied using video recordings. This provided qualitative and quantitative descriptions of behavioural parameters, including modal action patterns (e.g. Pause, S-shape, and Attack), attack rate, capture success rate, and swimming speeds of predator and prey. The feeding behaviour of turbot larvae could also be influenced by prey swimming behaviours. To test the effect of two common types of copepod swimming behaviours, turbot larvae were exposed to two species of copepod nauplii. The results presented in this thesis indicate that neither the period of first feeding nor the period of transition from an upright to a tilted swimming position seem to be critical for turbot larvae. First feeding and metamorphosis rather represent periods of adjustments to new morphological and physiological conditions, such as the depletion of yolk-sac during first feeding, and the migration of one eye when metamorphosis starts. Moreover, the behaviour of prey appears to have limited or no influence on larval turbot capture success.

This thesis is part of a large international project aimed at improving the rearing techniques of high value fish species larvae fed with calanoid copepods, their natural prey, to achieve high levels of survival and quality. In fact, fish aquaculture is becoming increasingly important as source of food. However, several bottlenecks during the larval stage still affect its production efficiency. The larvae of turbot were chosen as a model species because turbot is a highly prized flatfish species, which is particularly difficult to rear.

Are FMSY ranges a promising or a dangerous option?

General information
State: Published
Assessment of mortality of Antarctic krill (Euphausia superba) escaping from a trawl

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Krafft, B. A. (Ekstern), Krag, L. A. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2016

Assumptions behind size-based ecosystem models are realistic: Comment
A recent publication about balanced harvesting (Froese et al., ICES Journal of Marine Science; doi:10.1093/icesjms/fsv122) contains several erroneous statements about size-spectrum models. We refute the statements by showing that the assumptions pertaining to size-spectrum models discussed by Froese et al. are realistic and consistent. We further show that the assumption about density-dependence being described by a stock recruitment relationship is responsible for determining whether a peak in the cohort biomass of a population occurs late or early in life. Finally, we argue that there is indeed a constructive role for a wide suite of ecosystem models to evaluate fishing strategies in an ecosystem context

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Ecosystem based Marine Management, University of Tasmania, Commonwealth Scientific and Industrial Research Organisation, Wageningen IMARES
Authors: Andersen, K. H. (Intern), Blanchard, J. L. (Ekstern), Fulton, E. A. (Ekstern), Gislason, H. (Intern), Jacobsen, N. S. (Intern), van Kooten, T. (Ekstern)
Pages: 1651-1655
Publication date: 2016
Main Research Area: Technical/natural sciences

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Journal: ICES Journal of Marine Science
Volume: 73
Issue number: 6
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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
A trans-Atlantic examination of haddock Melanogrammus aeglefinus food habits

The food habits of Melanogrammus aeglefinus were explored and contrasted across multiple north-eastern and north-western Atlantic Ocean ecosystems, using databases that span multiple decades. The results show that among all ecosystems, echinoderms are a consistent part of M. aeglefinus diet, but patterns emerge regarding where and when M. aeglefinus primarily eat fishes v. echinoderms. Melanogrammus aeglefinus does not regularly exhibit the increase in piscivory with ontogeny that other gadoids often show, and in several ecosystems there is a lower occurrence of piscivory. There is an apparent inverse relationship between the consumption of fishes and echinoderms in M. aeglefinus over time, where certain years show high levels of one prey item and low levels of the other. This apparent binary choice can be viewed as part of a gradient of prey options, contingent upon a suite of factors external to M. aeglefinus dynamics. The energetic consequences of this prey choice are discussed, noting that in some instances it may not be a choice at all.

General information

State: Published

Authors: Tam, J. (Ekstern), Link, J. (Ekstern), Large, S. (Ekstern), Bogstad, B. (Ekstern), Bundy, A. (Ekstern), Cook, A. (Ekstern), Dingør, G. (Ekstern), Dolgov, A. (Ekstern), Howell, D. (Ekstern), Kempf, A. (Ekstern), Pinnegar, J. (Ekstern), Rindorf, A. (Intern), Schückel, S. (Ekstern), Sell, A. F. (Ekstern), Smith, B. (Ekstern)

Pages: 2203-2218
Publication date: 2016
Main Research Area: Technical/natural sciences
Bell-shaped size selection in a bottom trawl: A case study for Nephrops directed fishery with reduced catches of cod

Monotonous size selection curves have traditionally been sufficient to describe the size selection in the aft end of a bottom trawl. Such modelling is a good approximation when the size selective system consists of a single selective device. However, in some fisheries the demands for species and size selectivity have motivated the development of selective systems in trawl fisheries that utilize more than one selective device simultaneously. An example can be found in the Swedish demersal trawl fishery targeting Norway lobster (Nephrops norvegicus), which simultaneously aims at avoiding catches of Atlantic cod (Gadus morhua). In this fishery, the selective system consists of a Nordmøre type sorting grid followed by a size selective square mesh codend. The size selection curve for this system has a characteristic bell-shaped curvature, which cannot be sufficiently described by a monotonous selection curve. An approach that can handle a bell shaped curvature is to use a more flexible empirical size selection model. However, such models primarily use a curve fitting procedure, and do not allow the possibility to investigate the contribution of the individual parts of the selection system. Therefore, we choose to use a structural based model that directly models the contributions of the individual selectivity devices to the overall performance of the system. We demonstrate that this approach can appropriately describe the experimental size selection data for both Nephrops and cod in a system composed of a sorting grid followed by a size selective codend. Furthermore, this approach provides a direct quantification of the selective processes of the individual parts of the system to the overall size selection in the fishing gear. In addition, we demonstrate how this approach can provide fisheries managers with a new tool when trying to develop more sustainable fisheries through improving fishing gear size and species selectivity.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Swedish University of Agricultural Sciences, SINTEF Fisheries and Aquaculture
Authors: Lövgren, J. (Ekstern), Herrmann, B. (Ekstern), Seekings, J. P. (Intern)
Pages: 26-35
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 184
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
Best practice for restoration of stone reefs in Denmark (codes of conduct)
This report includes recommendations for all phases of a boulder reef restoration project. The document includes an initial identification of relevant objectives for restoration, public involvement and identifies possible sources of relevant historic information as well as risks to be considered. A set of specific biological and environmental objectives that can influence the choice of design of the new reef structure is also presented. The report also includes a set of recommendations for the construction phase, requirements for safety navigation when the restoration work is finalized and presents suggestions for monitoring and management efforts.

General information
State: Published
Authors: Dahl, K. (Ekstern), Støttrup, J. G. (Intern), Stenberg, C. (Intern), Berggren, U. C. (Ekstern), Jensen, J. H. (Ekstern)
Number of pages: 33
Publication date: 2016

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Publisher: Aarhus University
Original language: English
Series: Technical Report from DCE – Danish Centre for Environment and Energy
Number: 91
ISSN: 2245-019X
Main Research Area: Technical/natural sciences
Electronic versions:
Links:
http://dce2.au.dk/pub/TR91.pdf
Publication: Research › Report – Annual report year: 2016

Biological introduction risks from shipping in a warming Arctic

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Tromsø University Museum, UiT The Arctic University of Norway, Fledevign Research Station, Danish Meteorological Institute, Commonwealth Scientific and Industrial Research Organisation, Russian Academy of Sciences, Polish Academy of Sciences, University of Fribourg
Authors: Ware, C. (Ekstern), Berge, J. (Ekstern), Jelmert, A. (Ekstern), Olsen, S. M. (Ekstern), Pellissier, L. (Ekstern), Wisz, M. (Intern), Kriticos, D. (Ekstern), Semenov, G. (Ekstern), Kwaśniewski, S. (Ekstern), Alsos, I. G. (Ekstern)
Pages: 340-349
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Applied Ecology
Volume: 53
Issue number: 2
ISSN (Print): 0021-8901
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
Web of Science (2016): Indexed yes
Scopus rating (2016): CiteScore 5.5 SJR 2.869 SNIP 2.008
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 3.242 SNIP 1.96 CiteScore 5.38
BFI (2014): BFI-level 2
Bonanza – Den dag Sundet kogte over

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisk & Fri
Issue number: 6
ISSN (Print): 0108-2000
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Bottom trawling affects fish condition through changes in the ratio of prey availability to density of competitors

1. Bottom-trawl fisheries are widespread and cause mortality of benthic invertebrates, which in turn may lead to a decrease in the availability of prey for target fish species. Exploitation also reduces the abundance of the fish species themselves. Modelling studies have shown that bottom trawling could lead to both increases and decreases in fish production, but so far empirical evidence to test these ideas has been very limited. We hypothesize that the effect of bottom trawling on the food intake and condition of fish depends on how the ratio of prey to consumers changes with increasing fishing pressure. 2. We assessed the impact of bottom trawling on the food availability, condition and stomach contents of three flatfishes and the Norway lobster in an area in the Kattegat that is characterized by a steep commercial bottom-trawling gradient due to the establishment of an area closed to all fisheries, but otherwise has homogeneous environmental conditions. 3. For plaice, prey biomass initially decreased at a slower rate with trawling than the biomass of fish, and as a result, the amount of food available per plaice increased before decreasing at trawling frequencies >5 times year 1. This pattern was mirrored in both the condition and stomach contents of plaice and for long-rough dab. 4. No effect of trawling on dab prey and condition was found. Conversely, the condition of the main target species – Norway lobster – increased as its biomass decreased with increased trawling intensities. 5. Together, these results support the idea that when the abundance of the prey declines in response to exploitation, the ratio of the prey to consumer biomass will determine whether exploitation will result in an increase or a decrease in the food intake and condition of the predator. 6. Synthesis and applications. Our study indicates that fish production may be maximized by keeping bottom-trawling intensities relatively low, although this may negatively affect the economically more important Nephrops fishery. The effects of bottom trawls may be mitigated by switching to gears, which affect prey availability to a lesser extent, such as pots or creels.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Swedish University of Agricultural Sciences, Bangor University, Instituto Español de Oceanografía, University of Wales Bangor Menai Bridge
Authors: Hiddink, J. G. (Ekstern), Moranta, J. (Ekstern), Balestrini, S. (Ekstern), Sciberras, M. (Ekstern), Cendrier, M. (Ekstern), Bowyer, R. (Ekstern), Kaiser, M. J. (Ekstern), Sköld, M. (Ekstern), Jonsson, P. (Ekstern), Bastardie, F. (Intern), Hinz, H. (Ekstern)
Pages: 1500-1510
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Applied Ecology
Volume: 53
Issue number: Special Feature
ISSN (Print): 0021-8901
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 5.5 SJR 2.669 SNIP 2.008
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 3.242 SNIP 1.96 CiteScore 5.38
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.998 SNIP 2.171 CiteScore 5.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 3.031 SNIP 2.225 CiteScore 5.45
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.122 SNIP 2.089 CiteScore 5.18
ISI indexed (2012): ISI indexed yes
Can rectangular mesh codends improve size selectivity in Mediterranean multispecies trawl fisheries?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF, Çukurova University Fisheries Faculty, Ege University
Authors: Gökçe, G. (Ekstern), Herrmann, B. (Ekstern), Ozbilgin, H. (Ekstern), Saygu, I. (Ekstern), Kalecik , E. (Ekstern), Demir, O. (Ekstern), Tokaç, A. (Ekstern), Krag, L. A. (Intern)
Publication date: 2016
Event: Abstract from World Fisheries Congress, Busan, Korea, Republic of.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2016

Characteristic sizes of life in the oceans - from bacteria to whales

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life, Section for Ecosystem based Marine Management
Pages: 217-241
Publication date: 2016
Conference: International Workshop on Trait-based approaches to Ocean Life, Copenhagen, Denmark, 26/08/2013 - 26/08/2013
Main Research Area: Technical/natural sciences
Clupeid consumption of cod eggs: Does it affect recent recruitment of Baltic cod?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Institute Management
Authors: Neumann, V. (Intern), Schaber, M. (Ekstern), Böttcher, U. (Ekstern), Eero, M. (Intern), Köster, F. (Intern)
Publication date: 2016
Event: Abstract from 40th Annual Larval Fish Conference, Solomons, United States.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2016

Co-location of passive gear fisheries in offshore wind farms in the German EEZ of the North Sea: A first socio-economic scoping

Monotonous size selection curves have traditionally been sufficient to describe the size selection in the aft end of a bottom trawl. Such modelling is a good approximation when the size selective system consists of a single selective device. However, in some fisheries the demands for species and size selectivity have motivated the development of selective systems in trawl fisheries that utilize more than one selective device simultaneously. An example can be found in the Swedish demersal trawl fishery targeting Norway lobster (Nephrops norvegicus), which simultaneously aims at avoiding catches of Atlantic cod (Gadus morhua). In this fishery, the selective system consists of a Nordmøre type sorting grid followed by a size selective square mesh codend. The size selection curve for this system has a characteristic bell-shaped curvature, which cannot be sufficiently described by a monotonous selection curve. An approach that can handle a bell shaped curvature is to use a more flexible empirical size selection model. However, such models primarily use a curve fitting procedure, and do not allow the possibility to investigate the contribution of the individual parts of the selection system. Therefore, we choose to use a structural-based model that directly models the contributions of the individual selectivity devices to the overall performance of the system. We demonstrate that this approach can appropriately describe the experimental size selection data for both Nephrops and cod in a system composed of a sorting grid followed by a size selective codend. Furthermore, this approach provides a direct quantification of the selective processes of the individual parts of the system to the overall size selection in the fishing gear. In addition, we demonstrate how this approach can provide fisheries managers with a new tool when trying to develop more sustainable fisheries through improving fishing gear size and species selectivity.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Sea Fisheries, Thünen Institute of Fisheries Ecology, Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research (AWI), Alfred Wegener Institute
Authors: Stelzenmüller, V. (Ekstern), Diekmann, R. (Ekstern), Bastardie, F. (Intern), Schulze, T. (Ekstern), Berkenhagen, J. (Ekstern), Kloppmann, M. (Ekstern), Krause, G. (Ekstern), Pogoda, B. (Ekstern), Buck, B. (Ekstern), Kraus, G. (Ekstern)
Connectivity of larval cod in the transition area between North Sea and Baltic Sea and potential implications for fisheries management

Connectivity of pelagic, early life stages via transport by ocean currents may affect survival chances of offspring, recruitment success, and mixing of stocks across management units. Based on drift model studies, transport patterns of particles representing exogenously feeding cod larvae in the transition area between North Sea and Baltic were investigated to (i) determine long-term trends and variability in advective transport of larvae from spawning grounds to juvenile nursery areas, (ii) estimate the degree of exchange between different management areas, and (iii) compare the results with spatial distributions of juvenile cod. The transport of particles showed considerable intra- and interannual variability, but also some general patterns of retention within and dispersion to different management areas. Good spatial overlap of particle end positions, representing potential juvenile settlement areas, with observed distributions of juveniles in bottom trawl surveys suggests that the drift simulations provide reasonable estimates of early life stage connectivity between cod populations in the investigated areas. High exchange rates of particles between management areas of up to ca. 70% suggest that cod populations in the investigated areas are demographically correlated. Results are discussed in relation to their relevance for stock structure, fish stock assessment, and management.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, GEOMAR - Helmholtz Centre for Ocean Research Kiel
Authors: Huwer, B. (Intern), Hinrichsen, H. (Ekstern), Hüssy, K. (Intern), Eero, M. (Intern)
Pages: 1815-1824
Publication date: 2016
Main Research Area: Technical/natural sciences

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Volume: 73
Issue number: 7
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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
Conservation physiology of marine fishes: state of the art and prospects for policy

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Centre for Marine Biodiversity Exploitation and Conservation, University of Gothenburg, Université de Bretagne Occidentale, Carleton University, Longline Environment Ltd., University of Antwerp, University of Algarve, Ruder Boskovic Institute, Glasgow Caledonian University, University of Oslo, Consiglio Nazionale delle Ricerche, Aristotle University of Thessaloniki, University of Manchester, Royal Netherlands Institute for Sea Research - NIOZ, University of Exeter, University of Bergen, Ministere des Peches et des Oceans, Université Montpellier II, University of Hamburg, University of Murcia, Wageningen IMARES, University of Copenhagen, Aarhus University, University of Porto, Cefas
Pages: 1-20
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Conservation Physiology
Volume: 4
ISSN (Print): 2051-1434
Ratings:
Web of Science (2018): Indexed yes
Web of Science (2017): Indexed Yes
Scopus rating (2016): CiteScore 1.66 SJR 0.648 SNIP 0.501
Web of Science (2016): Indexed yes
Scopus rating (2015): SJR 0.123 SNIP 0.01
Scopus rating (2014): SJR 0.109 SNIP 0
Original language: English
Electronic versions:
Cormorant predation of the highly endangered North Sea houting in river Vidaa, Denmark

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Freshwater Fisheries Ecology, Section for Ecosystem based Marine Management, Institut National des Sciences Appliquées de Lyon, Aalborg University, Fisheries and Maritime Museum
Authors: Jensen, L. F. (Ekstern), Rognon, P. C. B. (Ekstern), Aarestrup, K. (Intern), Thomsen, S. N. (Ekstern), Hertz, M. (Ekstern), Svendsen, J. C. (Intern)
Publication date: 2016
Event: Poster session presented at Den nationale temadag om dansk vildtfordkning med emnet: Forskningsbaseret forvaltning af fugle og pattedyr – med fokus på "konfliktarter", Århus, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions:
Snæbel poster
Publication: Research › Poster – Annual report year: 2016

Danish seine – Ecosystem effects of fishing (gear performance trials)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Thünen Institute of Baltic Sea Fisheries
Number of pages: 1
Publication date: 2016
Main Research Area: Technical/natural sciences
Electronic versions:
Danish_seine.pdf
Source: FindIt
Source-ID: 2350466414
Publication: Research › Poster – Annual report year: 2017

Danmark er nu Europamester i økologisk regnbueørred

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Copenhagen, Dansk Akvakultur
Authors: Larsen, E. (Intern), Nielsen, M. (Ekstern), Larsen, V. J. (Ekstern)
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Økologi & Erhverv
Issue number: 580
ISSN (Print): 1904-1586
Ratings:
ISI indexed (2013): ISI indexed no
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ISI indexed (2011): ISI indexed no
Original language: Danish
Links:
http://okologi.dk/oekologi-og-erhverv/nyheder/2016/01/oekologi-forskning-oekologi-erhverv-nr-580
Publication: Communication › Journal article – Annual report year: 2016
Density and climate influence seasonal population dynamics in an Arctic ungulate

The locally migratory behavior of the high arctic muskox (Ovibos moschatus) is a central component of the breeding and winter survival strategies applied to cope with the highly seasonal arctic climate. However, altered climate regimes affecting plant growth are likely to affect local migration dynamics of the muskox. In this study, we apply long-term local-scale data on the seasonal distribution of muskoxen in the Zackenberg Valley, Northeast Greenland, to assess the degree of climatic influence on local seasonal muskox dynamics. Specifically, we analyze how seasonal climate (temperature, snow cover), forage availability (length of growth season), and the number of adult females available per male (operational sex ratio) influence changes in the seasonal density dependence, abundance, and immigration rate of muskoxen into the valley.

The results suggested summer temperature as the major controlling factor in the seasonal, local-scale migration of muskoxen at Zackenberg. Specifically, higher summer temperatures, defined as the cumulative average daily positive degrees in June, July, and August, resulted in decreased density dependence and, consequently, increase in the seasonal abundance of muskox in the valley. Additionally, a longer growth season was found to increase the seasonal abundance of muskox in the Zackenberg Valley. In contrast, changes in spring snow cover displayed no direct relation to the seasonal immigration rate. Our study suggests that access to high-quality forage is important for the short-term, local scale population dynamics of muskoxen in Northeast Greenland.
Density-dependent changes in effective area occupied for sea-bottom-associated marine fishes

The spatial distribution of marine fishes can change for many reasons, including density-dependent distributional shifts. Previous studies show mixed support for either the proportional-density model (PDM; no relationship between abundance and area occupied, supported by ideal-free distribution theory) or the basin model (BM; positive abundance–area relationship, supported by density-dependent habitat selection theory). The BM implies that fishes move towards preferred habitat as the population declines. We estimate the average relationship using bottom trawl data for 92 fish species from six marine regions, to determine whether the BM or PDM provides a better description for sea-bottom-associated fishes. We fit a spatio-temporal model and estimate changes in effective area occupied and abundance, and combine results to estimate the average abundance–area relationship as well as variability among taxa and regions. The average relationship is weak but significant (0.6% increase in area for a 10% increase in abundance), whereas only a small proportion of species–region combinations show a negative relationship (i.e., shrinking area when abundance increases). Approximately one-third of combinations (34.6%) are predicted to increase in area more than 1% for every 10% increase in abundance. We therefore infer that population density generally changes faster than effective area occupied during abundance changes. Gadiformes have the strongest estimated relationship (average 1.0% area increase for every 10% abundance increase) followed by Pleuronectiformes and Scorpaeniformes, and the Eastern Bering Sea shows a strong relationship between abundance and area occupied relative to other regions. We conclude that the BM explains a small but important portion of spatial dynamics for sea-bottom-associated fishes, and that many individual
populations merit cautious management during population declines, because a compressed range may increase the efficiency of harvest.
Development of a broodstock diet to improve developmental competence of embryos in European eel, *Anguilla anguilla*

We examined the effect of dietary arachidonic acid (ARA) and eicosapentaenoic acid (EPA) on the production of embryos and hatched larvae in the European eel, *Anguilla anguilla*. Two diets with high and intermediate levels of ARA and low and intermediate levels of EPA (Feed 1: ARA 1.9%, EPA 4.2%; Feed 2: ARA 1.2%, EPA 5.1% of total fatty acids) were tested against a commercial diet (DE: ARA: 0.5%, EPA: 8.2% of total fatty acids). After 24 weeks of feeding, ARA levels in the muscles and ovaries increased to 0.9% and 1.3% of total fatty acids, respectively, in Feed 1 and were significantly higher than in Feed 2 and DE. Female broodstock was not fed during hormonal treatment to induce vitellogenesis and ovulation. EPA levels in females fed the test diets decreased in the both muscle and ovary and were significantly lower in eggs from females fed Feed 1. The highest percentage of stripped females, producing viable eggs and larvae, were those females fed the highest dietary ARA levels (Feed 1). The level of lipid peroxidation products in eggs was similar among treatment, indicating that the lowest dietary levels of vitamin C and vitamin E were sufficient. In the unfertilized eggs, ARA levels were also highest (1.1% of total fatty acids) in the diet with highest ARA levels (Feed 1).
Diets supplemented with seaweed affect metabolic rate, innate immune, and antioxidant responses, but not individual growth rate in European seabass (Dicentrarchus labrax)

This study investigated the effects of seaweed dietary supplementation on measures of fish performance including aerobic metabolism, digestive enzymes activity, innate immune status, oxidative damage, and growth rate using European seabass (Dicentrarchus labrax). Fish were fed for 49 days with three different diets: a control diet (CTRL), a Gracilaria-supplemented diet (GR7.5), and a mixed diet (Mix) composed of Gracilaria, Fucus, and Ulva genera representatives. All diets were isoenergetic (22 kJ g−1 adjusted for dry matter (DM)), isoproteic (47 %DM), and isolipidic (18 %DM) and tested in triplicate groups of 20 fish (initial body weight 25.5 ± 4.1 g). Final results showed similar growth rates and digestive activities between diets. Maximum and standard metabolic rates and aerobic metabolic scope revealed comparable results for the three diets. In contrast, fish fed with GR7.5 exhibited elevated routine metabolic rate (190.7 mg O₂ kg⁻¹ h⁻¹). Fish fed with the GR7.5 and Mix diets had lower alternative complement pathway (ACH50) (62.5 and 63 units mL⁻¹ respectively) than CTRL (84 units mL⁻¹) GR7.5 increased lipid peroxidation and cholinesterase levels, as well as glutathione s-transferase activity. Mix diet increased glutathione reductase activity when compared to CTRL. Collectively, our findings suggest that dietary seaweed supplementation may alter seabass metabolic rate, innate immune, and antioxidant responses without compromising growth parameters
Differences in density-dependence drive dual offspring size strategies in fish

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Centre for Ocean Life
Does one glove fit all? A review of Remote Electronic Monitoring as a documentation tool

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas
Authors: Mortensen, L. O. (Intern), Schreiber Plet-Hansen, K. (Intern), Bailey, N. (Ekstern), Catchpole, T. (Ekstern), Dolder, P. J. (Ekstern), van Helmond, E. (Ekstern), Kempf, A. (Ekstern), Needle, C. L. (Ekstern), Oesterwind, D. (Ekstern), Poos, J. J. (Ekstern), Zimmermann, C. (Ekstern), Ulrich, C. (Intern)
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Ecosystem indicators in the context of fisheries management: example of cod in the Baltic Sea

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Institute Management
Authors: Eero, M. (Intern), Casini, M. (Ekstern), Hüsey, K. (Intern), Köster, F. (Intern), MacKenzie, B. (Intern), Neuenfeldt, S. (Intern), Tomkiewicz, J. (Intern)
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Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2016

Emergence of a new predator in the North Sea: evaluation of potential trophic impacts focused on hake, saithe, and Norway pout

During the last 15 years, northern European hake (Merluccius merluccius) has increased in abundance, and its spatial distribution has expanded in the North Sea region in correlation with temperature. In a context of global warming, this spatial shift could impact local trophic interactions: direct impacts may affect forage fish through modified predator-prey interactions, and indirect impacts may materialize through competition with other resident predators. For instance, North Sea saithe (Pollachius virens) spatial overlap with hake has increased while saithe spawning-stock biomass has decreased recently notwithstanding a sustainable exploitation. In this context, we investigated the range of potential impacts resulting from most recent hake emergence in the North Sea, with a particular focus on saithe. We carried out a multispecies assessment of North Sea saithe, using the Stochastic MultiSpecies (SMS) model. In addition to top-down processes already implemented in SMS, we built in the model bottom-up processes, relating Norway pout (Trisopterus esmarkii) abundance and saithe weight-at-age. We simulated the effects, on all North Sea species being considered but focusing on Norway pout and saithe, of combining different hake abundance trends scenarios with the inclusion of bottom-up processes in SMS. North Sea saithe F-MSY was then evaluated in a multispecies context and contrasted with single-species value. The different scenarios tested revealed a negative impact of hake emergence on saithe biomass, resulting from an increase of predation pressure on Norway pout. These results confirm the competition assumption between saithe and hake in the North Sea and might partially explain the most recent decrease of saithe biomass. This study also highlighted that taking into account bottom-up processes in the stock assessment had a limited effect on the estimation of saithe FMSY which was consistent with single-species value.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, IFREMER, Thünen Institute of Sea Fisheries
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Environmental DNA from seawater samples correlate with trawl catches of Subarctic, deepwater fishes

Remote polar and deepwater fish faunas are under pressure from ongoing climate change and increasing fishing effort. However, these fish communities are difficult to monitor for logistic and financial reasons. Currently, monitoring of marine fishes largely relies on invasive techniques such as bottom trawling, and on official reporting of global catches, which can be unreliable. Thus, there is need for alternative and non-invasive techniques for qualitative and quantitative oceanic fish surveys. Here we report environmental DNA (eDNA) metabarcoding of seawater samples from continental slope depths in Southwest Greenland. We collected seawater samples at depths of 188-918 m and compared seawater eDNA to catch data from trawling. We used Illumina sequencing of PCR products to demonstrate that eDNA reads show equivalence to fishing catch data obtained from trawling. Twenty-six families were found with both trawling and eDNA, while three families were found only with eDNA and two families were found only with trawling. Key commercial fish species for Greenland were the most abundant species in both eDNA reads and biomass catch, and interpolation of eDNA abundances between sampling sites showed good correspondence with catch sizes. Environmental DNA sequence reads from the fish assemblages correlated with biomass and abundance data obtained from trawling. Interestingly, the Greenland shark (Somniosus microcephalus) showed high abundance of eDNA reads despite only a single specimen being caught, demonstrating the relevance of the eDNA approach for large species that can probably avoid bottom trawls in most cases. Quantitative detection of marine fish using eDNA remains to be tested further to ascertain whether this technique is able to yield credible results for routine application in fisheries. Nevertheless, our study demonstrates that eDNA reads can be used as a qualitative and quantitative proxy for marine fish assemblages in deepwater oceanic habitats. This relates directly to applied fisheries as well as to monitoring effects of ongoing climate change on marine biodiversity-especially in polar ecosystems.
Er du interesseret i fisk og fiskeri?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Escape panels in trawls – a consistent management tool?

Reducing discards of unwanted sizes and species which have a low survival rate is one of the major challenges in fisheries worldwide today. Numerous devices and fishing gears aiming at improving both species and size selectivity have been developed and implemented by various fisheries. Selective gears are often developed in collaboration between scientists and fishers. Part of the development is a controlled scientific test documenting the selectivity effect. In this study, we compared two versions of a mandatory escape panel that were introduced into the mixed species fishery in the Skagerrak in 2013: the version implemented in the legislation (pre-implementation version) and the version the industry was using one year after its implementation, the post-implementation version (post-version). The post-version went through some simple adjustments that resulted in a panel section with a larger vertical distance between the upper panel (escape panel) and the bottom panel compared to the pre-version. Both designs are legal and considered identical. The results of this study showed significantly higher catches (lower selectivity) for the post-version for all five species examined; cod (Gadus morhua), saithe (Pollachius virens), haddock (Melanogrammus aeglefinus), plaice (Pleuronectes platessa) and Norway lobster (Nephrops norvegicus). Thus the modification by fishers of certain gear properties not specified in the legislation can significantly influence the efficiency of an escape panel. We discuss to what extent catch quotas instead of the former landings quotas could provide the economic incentives for fishers to actively use selective gear designs more optimally and thereby play an active role in the management of fisheries.
Estimating seabed pressure from demersal trawls, seines, and dredges based on gear design and dimensions

This study assesses the seabed pressure of towed fishing gears and models the physical impact (area and depth of seabed penetration) from trip-based information of vessel size, gear type, and catch. Traditionally fishing pressures are calculated top-down by making use of large-scale statistics such as logbook data. Here, we take a different approach starting from the gear itself (design and dimensions) to estimate the physical interactions with the seabed at the level of the individual fishing operation. We defined 14 distinct towed gear groups in European waters (eight otter trawl groups, three beam trawl groups, two demersal seine groups, and one dredge group), for which we established gear “footprints.” The footprint of a gear is defined as the relative contribution from individual larger gear components, such as trawl doors, sweeps, and groundgear, to the total area and severity of the gear's impact. An industry-based survey covering 13 countries provided the basis for estimating the relative impact-area contributions from individual gear components, whereas sediment penetration was estimated based on a literature review. For each gear group, a vessel size–gear size relationship was estimated to enable the prediction of gear footprint area and sediment penetration from vessel size. Application of these relationships with average vessel sizes and towing speeds provided hourly swept-area estimates by métier. Scottish seining has the largest overall gear footprint of ∼1.6 km² h⁻¹ of which 0.08 km² has an impact at the subsurface level (sediment penetration ≥ 2 cm). Beam trawling for flatfish ranks low when comparing overall footprint size/hour but ranks substantially higher when comparing only impact at the subsurface level (0.19 km²h⁻¹). These results have substantial implications for the definition, estimation, and monitoring of fishing pressure indicators, which are discussed in the context of an ecosystem approach to fisheries management.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Institute of Marine Research, Swedish University of Agricultural Sciences, Marine Scotland Science, Marine Institute, National Research Council of Italy, Hellenic Centre for Marine Research, Central Fisheries Research Institute, Wageningen IMARES, IFREMER, Institute for Agricultural and Fisheries Research
Evaluation of otolith shape as a tool for stock discrimination in marine fishes using Baltic Sea cod as a case study

In the Western Baltic Sea two genetically distinct cod stocks "Eastern Baltic cod" and "Western Baltic cod" occur with considerable mixing of stocks. In this study we evaluated the applicability of otolith shape analysis for classification of individuals caught in the mixed stock cod fishery, using SNP (single-nucleotide polymorphism) based genetic assignment of otolith shape baselines. We further developed a management aimed approach for mixed stock assignment by robust stochastic baseline selection and posterior bias correction by individual reassignment of the least likely classifications into the alternate stock. Classification criteria selected by Monte Carlo runs of Linear Discriminant Analysis were captured by otolith area and 20 Elliptic Fourier Descriptors of primarily low frequency harmonics. Classification success was considerably lower when using a baseline of spawning individuals only, compared to the better spatial coverage of a combined baseline also including genotyped individuals from the mixed stock area. Furthermore, the inclusion of genotyped individuals balanced the baseline size composition and to a large extent removed a strong size related bias in classification success. These results demonstrate the interplay of environmental, ontogenetic and genetic influences on otolith shape, which complicates the application of otolith shape for stock discrimination in mixed-stock scenarios. Rigorous genetic validation and further studies on the temporal dynamics of shape formation are necessary.

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Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Marine Living Resources, Section for Ecosystem based Marine Management
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Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
Expanding the concept of sustainable seafood using Life Cycle Assessment

Fisheries management and sustainability assessment of fisheries more generally have recently expanded their scope from single-species stock assessment to ecosystem-based approaches, aiming to incorporate economic, social and local environmental impacts, while still excluding global-scale environmental impacts. In parallel, Life Cycle Assessment (LCA) has emerged as a widely used and recommended framework to assess environmental impacts of products, including globalscale impacts. For over a decade, LCA has been applied to seafood supply chains, leading to new insights into the environmental impact of seafood products. We present insights from seafood LCA research with particular focus on evaluating fisheries management, which strongly influences the environmental impact of seafood products. Further, we suggest tangible ways in which LCA could be taken up in management. By identifying trade-offs, LCA can be a useful decision support tool and avoids problem shifting from one concern (or activity) to another. The integrated, product-based and quantitative perspective brought by LCA could complement existing tools. One example is to follow up fuel use of fishing, as the production and combustion of fuel used dominates overall results for various types of environmental impacts of seafood products, and is also often linked to biological impacts of fishing. Reducing the fuel use of fisheries is therefore effective to reduce overall impacts. Allocating fishing rights based on environmental performance could likewise facilitate the transition to low-impact fisheries. Taking these steps in an open dialogue between fishers, managers, industry, NGOs and consumers would enable more targeted progress towards sustainable fisheries.

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF, University of Tasmania, SP Technical Research Institute of Sweden, Chalmers University of Technology, Pontificia
Explaining the catch efficiency of different cod pots using underwater video to observe cod entry and exit behaviour

Cod pots are considered seal-safe fishing gear and are proposed as a solution to mitigate the ongoing seal-fisheries conflict in the Baltic Sea. This study examined various factors which could affect the entry and exit behaviour of cod in relation to cod pots. Statistical modelling was used to determine which of these factors most affected the pots’ catch per unit effort (CPUE). Two fishing trials were conducted off the coast of Bornholm, Denmark, using six pot types with different design features, equipped with underwater camera systems to record the behaviour of the cod in relation to the pots. Four pot types were floating pots with one entrance and two were bottom standing with three entrances. Different pot types showed significantly different CPUEs and the pot type was an explanatory factor for entry and exit rates for both trials. In trial 1 artificial light was used for filming and results showed an increase in entry rates during the night time, suggesting that lights attract fish to the pot when the dark surroundings make the effect of the light more noticeable. Exit rates in trial 1 increased with an increasing number of fish in the pot while they decreased with soak time. In trial 2, when no artificial light was used, a saturation effect was found in that the probability of cod entering the pot lessened as the number of cod already in the pot increased. However, the exit rates in trial 2 also decreased with increasing number of fish in the pot. The study offers greater depth to the understanding of CPUE results by examining fish behaviour around the pots and not just the raw catch data. This in turn contributes to the ongoing search for the most favourable pot designs.

Exploring methods for predicting multiple pressures on ecosystem recovery: A case study on marine eutrophication and fisheries

Efforts to attain good environmental status in the marine realm require decisions which cannot be done without knowledge of effects of different management measures. Given the wide diversity of marine ecosystems, multitude of pressures affecting it and the still poor understanding on linkages between those, there are likely no models available to give all the required answers. Hence, several separate approaches can be used in parallel to give support for management measures. We tested three completely different methods - a spatial impact index, a food web model and a Bayesian expert method. We found that a large uncertainty existed regarding the ecosystem response to the management scenarios, and that the three different modelling approaches complemented each other. The models indicated that in order to reach an improved overall state of the ecosystem nutrient reductions are the more effective of the two management
variables explored, and that cumulative effects of the management of nutrient inputs and fishing mortality are likely to exist.

**General information**

*State:* Published  
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Scopus rating (2010): SJR 1.352 SNIP 1.312  
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Web of Science (2006): Indexed yes  
Scopus rating (2005): SJR 0.922 SNIP 1.28  
Scopus rating (2004): SJR 0.975 SNIP 1.246  
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Scopus rating (2003): SJR 1.285 SNIP 1.397  
Web of Science (2003): Indexed yes  
Scopus rating (2002): SJR 1.102 SNIP 1.195
Fishing impact and environmental status in European seas: A diagnosis from stock assessments and ecosystem indicators

Stock-based and ecosystem-based indicators are used to provide a new diagnosis of the fishing impact and environmental status of European seas. In the seven European marine ecosystems covering the Baltic and the North-east Atlantic, (i) trends in landings since 1950 were examined; (ii) syntheses of the status and trends in fish stocks were consolidated at the ecosystem level; and (iii) trends in ecosystem indicators based on landings and surveys were analysed. We show that yields began to decrease everywhere (except in the Baltic) from the mid-1970s, as a result of the over-exploitation of some major stocks. Fishermen adapted by increasing fishing effort and exploiting a wider part of the ecosystems. This was insufficient to compensate for the decrease in abundance of many stocks, and total landings have halved over the last 30 years. The highest fishing impact took place in the late 1990s, with a clear decrease in stock-based and ecosystem indicators. In particular, trophic-based indicators exhibited a continuous decreasing trend in almost all ecosystems. Over the past decade, a decrease in fishing pressure has been observed, the mean fishing mortality rate of assessed stocks being almost halved in all the considered ecosystems, but no clear recovery in the biomass and ecosystem indicators is yet apparent. In addition, the mean recruitment index was shown to decrease by around 50% in all ecosystems (except the Baltic). We conclude that building this kind of diagnosis is a key step on the path to implementing an ecosystem approach to fisheries management. © 2014 John Wiley & Sons Ltd.
Fiskeri efter søstjerner i Limfjorden. Fagligt grundlag for en forvaltningsplan

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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Ecosystem based Marine Management, Section for Monitoring and Data
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Fiskeriet fra Thorupstrand. Forvaltning af kvoter samt redskaber, både og fiskepladser: The Fishery from Thorupstrand. Management, gear, boats and fishing grounds

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Authors: Hoffmann, E. (Intern)
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Flere sortmundede kutlinger ved de danske kyster

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Forecasting the spawning distribution of blue whiting (Micromesistius poutassou)

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Authors: Miesner, A. K. (Intern), Payne, M. (Intern)
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Functional morphology, biology and sexual strategy of the circumboreal, adventitious crypt-building, Crenella decussata (Bivalvia: Mytiloidea: Crenellidae)
The anatomy of Crenella decussata (Mytiloidea) is described. Individuals of this circumboreal species occupy granular crypts composed of sand grains held in place by mucus. The swollen basal region of the tubule is occupied by an individual, which connects to the sediment surface by two posterior tubes accommodating the inhalant and exhalant streams. There is reduction in musculature and, most importantly, anterior foreshortening of the outer ctenidial demibranchs and loss of the labial palps. This creates an anterior space in the mantle for the initial brooding of fertilized ova by females to the prodissoconch stage. Subsequently, these larvae are transferred to the exhalant tube of the crypt wherein they attach by a single fine byssal thread and are further brooded until the crawl-away juvenile stage is attained. Experimental studies of larval behaviour suggest that parental pheromones sustain the female/offspring bond. Newly hatched individuals responded to parental exhalant water by actively attaching themselves using a byssal thread. This response persisted for 28 days, but not after 55 days when, we suggest, the pheromonal response ceases and offspring are developed sufficiently to take up life in their own nests. Offspring retrieved from parental crypts and fed continuously reached an average shell length of 500 mm after 7.5 months. Brooded offspring thus appear to rely on embryonal energy resources until post-metamorphosis, after which suspension feeding becomes essential for further growth and development before the parental crypt is vacated.
Grains of sand, a sunken treasure?

Has eutrophication promoted forage fish production in the Baltic Sea?

Reducing anthropogenic nutrient inputs is a major policy goal for restoring good environmental status of coastal marine ecosystems. However, it is unclear to what extent reducing nutrients would also lower fish production and fisheries yields. Empirical examples of changes in nutrient loads and concurrent fish production can provide useful insights to this question. In this paper, we investigate to what extent a multi-fold increase in nutrient loads from the 1950s to 1980s enhanced forage fish production in the Baltic Sea. We use monitoring data on fish stock dynamics covering the period of the nutrient increase, combined with nutrient concentrations from a 3-dimensional coupled physical-biogeochemical ocean model. The results suggest that nutrient enrichment enhanced the biomass level of forage fish by up to 50 % in some years and areas due to increased body weight of fish. However, the trends in fish biomasses were generally decoupled from changes in nutrient concentrations.
Hypoxia increases the risk of egg predation in a nest-guarding fish
For fish with parental care, a nest should meet both the oxygenation needs of the eggs and help protect them against predators. While a small nest opening facilitates the latter, it impedes the former and vice versa. We investigated how the presence of potential egg predators in the form of shore crabs Carcinus maenas affects nest building, egg fanning, defensive displays and filial cannibalism of egg-guarding male sand gobies Pomatoschistus minutus under two levels of dissolved oxygen. In the high oxygen treatment, males retained their nest opening size in the presence of crabs, while males in low oxygen built large nest openings both in the absence and presence of crabs, despite the fact that crabs were more likely to successfully intrude into nests with large entrances. Males in low oxygen also fanned more. In the presence of crabs males increased their defensive displays, but while males in high oxygen reduced fanning, males in low oxygen did not. Filial cannibalism was unaffected by treatment. Sand gobies thus prioritize egg ventilation over the protection afforded by small nest openings under hypoxia and adopt defensive behaviour to avert predator attention, even though this does not fully offset the threat from the egg predators.

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Gothenburg
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Identification of high-risk areas for harbour porpoise Phocoena phocoena bycatch using remote electronic monitoring and satellite telemetry data
The bycatch of harbour porpoise Phocoena phocoena is an issue of major concern for fisheries management and for porpoise conservation. We used high-resolution spatial and temporal data on porpoise abundance and fishing effort from the Danish Skagerrak Sea to identify areas with potentially higher and lower risk of porpoise bycatch. From May 2010 to April 2011, 4 commercial gillnet vessels were equipped with remote electronic monitoring (REM) systems. The REM system recorded time, GPS position and closed-circuit television (CCTV) footage of all gillnet hauls. REM data were used to identify fishing grounds, quantify fishing effort and document harbour porpoise bycatch. Movement data from 66 harbour porpoises equipped with satellite transmitters from 1997 to 2012 were used to model population density. A simple model was constructed to investigate the relationship between the response (number of individuals caught) and porpoise density and fishing effort described by net soak time, net string length and target species. Results showed that a model including both porpoise density and fishing effort data predicted bycatch better than models containing only one factor. We therefore conclude that porpoise telemetry or REM data allow for identification of areas of potential high and low bycatch risk, and better predictions are obtained when combining the 2 sources of data. The final model can thus be used as a tool to identify areas of bycatch risk.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Monitoring and Data, Aarhus University, University of St Andrews
The Kattegat in the inner Danish waters has been trawled for at least 80 yr, but so far only few attempts have been made to quantify the trawl effort, its spatial distribution and its potential ecological impact on the benthic fauna. GIS-analyses of VMS-data from trawling in the Kattegat by both Danish (2005-2009) and Swedish (2007-2009) vessels show that 95% of all trawling occurs below 22 m depth. Most activity takes place on homogeneous benthic habitats with muddy sediment at depths below the halocline and with almost the same salinity across the entire area. Furthermore, the estimate of trawled area demonstrated that the habitats are nearly 100% impacted, and frequencies of trawling beneath 100 m depth can reach 20 events per year. Multivariate analysis of community composition could not discriminate between lightly trawled and heavily trawled areas. However, a strong habitat selectivity of the trawl activity and inter-correlation between trawl activity and depth-related community structures complicated interpretation of the results. Species with biological traits previously categorized as sensitive to physical disturbance showed higher abundance in areas with low trawl activity compared to areas with higher activity. Thus, the Kattegat has been impacted to an extent where areas with reference conditions for certain habitats below 22 m no longer exist. Consequently, it is unknown how the benthic communities would have appeared without trawl disturbance and, thus, difficult to determine the impact of continued disturbance.
Impact of biotic interactions on biodiversity varies across a landscape

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Helsinki, University of Pretoria, Finnish Environment Institute
Authors: Mod, H. K. (Ekstern), Heikkinen, R. K. (Ekstern), le Roux, P. C. (Ekstern), Wisz, M. S. (Intern), Luoto, M. (Ekstern)
Pages: 2412–2423
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Biogeography
Volume: 43
Issue number: 12
ISSN (Print): 0305-0270
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 4.35
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.33
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.58
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.54
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4.42
BFI (2011): BFI-level 2
Individual Stress Level Analyses (ISLA) communicate impact of spatial management options on national or local fisheries communities to decision makers.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Sea Fisheries
Authors: Schulze, T. (Ekstern), Hamon, K. (Ekstern), Schulte, K. (Ekstern), Bastardie, F. (Intern), Hintzen, N. (Ekstern)
Publication date: 2016
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Bibliographical note
ICES CM 2016/ L:114
Publication: Research › Conference abstract for conference – Annual report year: 2017

Industry-led fishing gear selectivity improvements. How can we increase flexibility and ownership over the gears used whole ensuring an effective introduction of the new EU Common Fisheries Policy?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Fishermen's Producers' Organization, Aalborg University
Publication date: 2016
Event: Abstract from ICES-FAO Working Group on Fishing Technology and Fish Behaviour, Mérida, Mexico.
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Bibliographical note
ICES CM 2016/SSGIEOM:22
Publication: Research › Conference abstract for conference – Annual report year: 2016

Influence of twin and multi-rig trawl systems on CPUE in the Danish Norway lobster (Nephrops norvegicus) fishery
One of the most effective ways to alter catch and length compositions in trawls is to adjust the meshsize or add selective devices such as sorting grids and selective netting panels. These changes are often introduced into the fishery in a top-down manner whereby fishermen are forced to comply with spe-cific legislation. However, fishermen have also introduced gear modifications that have contributed to improving species selectivity in trawls. One of the simplest and most effective modifications that came from industry was the development and introduction of twin and multi-rig trawls. Here we analyse catchrates of four target species, Norway lobster (Nephrops norvegicus), cod (Gadus morhua), plaice (Pleuronectes platessa) and haddock (Melanogrammus aeglefinus), to try and understand how the use of multi-rig trawlshave altered catch rates within the Danish demersal trawl fishery over the last 16 years (1997–2012). Results showed that catch rates of Nephrops in multi-rig trawls were significantly higher (1.89–2.03) than those in single trawls. For cod, haddock and plaice there was no significant effect of gear type. Theresults are discussed in relation to the Common Fisheries Policy reform and the increasing importance of industry introduced gear modifications.
Interactive effects of dietary composition and hormonal treatment on reproductive development of cultured female European eel, Anguilla anguilla

Farmed female eels were fed two experimental diets with similar proximate composition but different n-3 polyunsaturated fatty acid (PUFA) levels. Both diets had similar levels of arachidonic acid (ARA), while levels of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in one diet were approximately 4.5 and 2.6 times higher compared to the other diet, respectively. After the feeding period, each diet group was divided into two and each half received one of two hormonal treatments using salmon pituitary extract (SPE) for 13 weeks: i) a constant hormone dose of 18.75mg SPE/kg initial body weight (BW) and ii) a variable hormone dosage that increased from 12.5mg SPE/kg initial BW to 25mg SPE/kg initial BW. Results showed a significant interaction between diets and hormonal treatments on gonadosomatic index (GSI), indicating that the effect of broodstock diets on ovarian development depends on both nutritional status and hormonal regime. Females fed with higher levels of n-3 series PUFAs and stimulated with the constant hormonal treatment reached higher GSIs than those receiving the variable hormonal treatment. However, when females were fed lower levels of n-3 series PUFAs there was no difference in the effect of hormonal treatments on GSI. We also found that, independent of hormonal treatment, the diet with higher levels of n-3 series PUFAs led to the most advanced stages of oocyte development, such as germinal vesicle migration. Concentration of sex steroids (E2, T, and 11-KT) in the plasma did not differ between diets and hormonal treatments, but was significantly correlated with ovarian developmental stage. In conclusion, increasing dietary levels of n-3 PUFAs seemed to promote oocyte growth, leading to a more rapid progression of ovarian development in European eel subjected to hormonal treatment.
Scopus rating (2014): SJR 0.814 SNIP 1.277 CiteScore 1.87
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.851 SNIP 1.426 CiteScore 1.83
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.74 SNIP 1.404 CiteScore 1.94
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.964 SNIP 1.416 CiteScore 1.88
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.82 SNIP 1.27
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.745 SNIP 1.079
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.692 SNIP 1.134
Scopus rating (2007): SJR 0.76 SNIP 1.456
Scopus rating (2006): SJR 0.761 SNIP 1.49
Scopus rating (2005): SJR 0.74 SNIP 1.291
Scopus rating (2004): SJR 0.627 SNIP 1.134
Scopus rating (2003): SJR 0.648 SNIP 1.262
Scopus rating (2002): SJR 0.61 SNIP 1.276
Scopus rating (2001): SJR 0.445 SNIP 0.911
Scopus rating (2000): SJR 0.461 SNIP 0.863
Scopus rating (1999): SJR 0.511 SNIP 0.829
Original language: English
Assisted reproduction, Dietary fatty acids, Ovarian development, Sex steroids
DOIs:
10.1016/j.anireprosci.2016.05.007
Source: FindIt
Source-ID: 2304583565
Publication: Research - peer-review › Journal article – Annual report year: 2016

Kæmpelaks til dansker

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisk & Fri
Issue number: 8
ISSN (Print): 0108-2000
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: Danish
Publication: Communication › Journal article – Annual report year: 2016

Konflikt mellem skarv og den udryddelsestruede snæbel

General information
Konflikt mellem skarv og kystnære fisk i Danmark

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Publication: Research › Poster – Annual report year: 2016

Kortlægning af fiskenes levesteder i den danske del af Øresund: Rapport til Miljø- og Fødevareministeriet

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, University of Copenhagen
Authors: Sørensen, T. K. (Intern), Egekvist, J. (Intern), Brown, E. J. (Intern), Hansen, F. I. (Intern), Carl, H. (Ekstern), Möller, P. R. (Ekstern), Dinesen, G. E. (Intern), Vinther, M. (Intern), Støtrup, J. (Intern)
Number of pages: 104
Publication date: 2016

Publication information
Publisher: Miljø- og Fødevareministeriet
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Links:
http://naturstyrelsen.dk/media/179105/fiskehabitater-oeresund-dtu-aqua-opdateret-2016.pdf

Relations
Press / Media items:
Tilstandsrapport fra havbunden
Publication: Research › Report – Annual report year: 2016

Laksens liv

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Fisheries and Maritime Museum
Authors: Jensen, L. F. (Ekstern), Svendsen, J. C. (Intern)
Number of pages: 95
Publication date: 2016
Marin fiskepleje – Forskning i fiskenes levesteder

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern), Støttrup, J. G. (Intern), Svendsen, J. C. (Intern)
Publication date: 2016
Event: Poster session presented at Naturmødet, Hirtshals, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2016

Marin Fiskepleje – Hvad er fiskepleje?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern), Støttrup, J. G. (Intern), Svendsen, J. C. (Intern)
Publication date: 2016
Event: Poster session presented at Folkemødet 2016, Allinge, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2016

Methods for the study of marine biodiversity

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Pages: 129-163
Modelling the effects of dietary methionine level and form on postprandial plasma essential amino acid profiles in rainbow trout (Oncorhynchus mykiss)

Aquafeed formulation is susceptible to affect amino acid (AA) availability for metabolic functions. Statistical models were applied to quantify the effect of dietary methionine level (from 6.01 to 16.17 g kg\textsuperscript{-1} dry matter) and form (free, coated or bound) on postprandial concentrations of plasma essential amino acid (EAA) in rainbow trout. Twelve diets were formulated with pea and soya protein concentrate or fish meal as the main protein ingredients and were supplemented or not with increasing amount of either crystalline or agar-coated methionine. Fish were acclimatized to one of the 12 diets for 6 weeks before postprandial plasma sampling (six sampling points up to 36 h, seven fish each time), further analysed for EAA content. Using generalized additive models, we show that (i) dietary methionine level and form explained 74\% postprandial methionine plasma variations and that (ii) the methionine dietary form and plasma concentrations significantly affected the plasma concentrations of the other EAAs. Finally, linear model revealed a positive relationship (R\textsuperscript{2} > 0.9) between plasma concentrations of the three branched-chain AAs under the present experimental conditions. The results obtained add new information on the dietary effects on EAAs in the plasma availability and the interactions between them.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquaculture, Section for Ecosystem based Marine Management, BioMar A/S
Authors: Rolland, M. (Intern), Fearings, J. P. (Intern), Dalsgaard, A. J. T. (Intern), Holm, J. (Ekstern), Skov, P. V. (Intern)
Pages: 1185–1201
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Aquaculture Nutrition
Volume: 22
Issue number: 6
Myfish: Maximising yield of fisheries while balancing ecosystem, economic and social concerns: Legacy booklet

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Hellenic Centre for Marine Research, AquaMarine Advisers, University of Copenhagen
Authors: Rindorf, A. (Intern), Worsøe Clausen, L. (Intern), Garcia, D. (Ekstern), Hintzen, N. T. (Ekstern), Kempf, A. (Ekstern), Maravelias, C. (Ekstern), Mumford, J. (Ekstern), Murua, H. (Ekstern), Prellezo, R. (Ekstern), Quetglas, A.
North Sea herring: Longer term perspective on management science behind the boom, collapse and recovery of the North Sea herring fishery

General information
State: Published
Authors: Dickey-Collas, M. (Intern)
Pages: 365-408
Publication date: 2016

Host publication information
Title of host publication: Management Science in Fisheries: An Introduction to Simulation-Based Methods
Place of publication: London
Publisher: Routledge
Editors: Edwards, C. T., Dankel, D. J.
ISBN (Print): 978-1138806801
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Book chapter – Annual report year: 2016

Nyt projekt styrker udvikling af redskaber

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Feekings, J. P. (Intern)
Publication date: 2016

Publication information
Source/Publisher: Fiskeritidende.dk
Main Research Area: Technical/natural sciences
Links:
http://fiskeritidende.dk/nyt-projekt-styrker-udvikling-af-redskaber/ (Link to article)
Publication: Communication › Internet publication – Annual report year: 2016

Optimizing data collection processes for industry collected gear selectivity data

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF
Authors: Malta, T. A. M. D. V. (Intern), Feekings, J. P. (Intern), Herrmann, B. (Ekstern), Krag, L. A. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences
Electronic versions:
Partitioning the metabolic scope: the importance of anaerobic metabolism and implications for the oxygen- and capacity-limited thermal tolerance (OCLTT) hypothesis

Ongoing climate change is predicted to affect the distribution and abundance of aquatic ectotherms owing to increasing constraints on organismal physiology, in particular involving the metabolic scope (MS) available for performance and fitness. The oxygen- and capacity-limited thermal tolerance (OCLTT) hypothesis prescribes MS as an overarching benchmark for fitness-related performance and assumes that any anaerobic contribution within the MS is insignificant. The MS is typically derived from respirometry by subtracting standard metabolic rate from the maximal metabolic rate; however, the methodology rarely accounts for anaerobic metabolism within the MS. Using gilthead sea bream (Sparus aurata) and Trinidadian guppy (Poecilia reticulata), this study tested for trade-offs (i) between aerobic and anaerobic components of locomotor performance; and (ii) between the corresponding components of the MS. Data collection involved measuring oxygen consumption rate at increasing swimming speeds, using the gait transition from steady to unsteady (burst-assisted) swimming to detect the onset of anaerobic metabolism. Results provided evidence of the locomotor performance trade-off, but only in S. aurata. In contrast, both species revealed significant negative correlations between aerobic and anaerobic components of the MS, indicating a trade-off where both components of the MS cannot be optimized simultaneously. Importantly, the fraction of the MS influenced by anaerobic metabolism was on average 24.3 and 26.1% in S. aurata and P. reticulata, respectively. These data highlight the importance of taking anaerobic metabolism into account when assessing effects of environmental variation on the MS, because the fraction where anaerobic metabolism occurs is a poor indicator of sustainable aerobic performance. Our results suggest that without accounting for anaerobic metabolism within the MS, studies involving the OCLTT hypothesis could overestimate the metabolic scope available for sustainable activities and the ability of individuals and species to cope with climate change.
Past climate-driven range shifts and population genetic diversity in arctic plants

High intra-specific genetic diversity is necessary for species adaptation to novel environments under climate change, but species tracking suitable conditions are losing alleles through successive founder events during range shift. Here, we investigated the relationship between range shift since the Last Glacial Maximum (LGM) and extant population genetic diversity across multiple plant species to understand variability in species responses.

General information

State: Published

Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University Centre in Svalbard, UiT The Arctic University of Norway, University of Fribourg, University of Innsbruck, University of Salzburg, Norwegian Institute for Nature Research, University of Lausanne, ETH Zurich, Aarhus University, University of Oslo, Tromsø University Museum, University of Helsinki


Pages: 461–470
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: Journal of Biogeography
Volume: 43
Issue number: 3
ISSN (Print): 0305-0270

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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 3.5
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 3.3
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.58
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.54
Phenotypic differences between the sexes in the sexually plastic mangrove rivulus fish (Kryptolebias marmoratus)

To maximize reproductive success, many animal species have evolved functional sex change. Theory predicts that transitions between sexes should occur when the fitness payoff of the current sex is exceeded by the fitness payoff of the opposite sex. We examined phenotypic differences between the sexes in a sex-changing vertebrate, the mangrove rivulus fish (Kryptolebias marmoratus), to elucidate potential factors that might drive the ‘decision’ to switch sex. Rivulus populations consist of self-fertilizing hermaphrodites and males. Hermaphrodites transition into males under certain environmental conditions, affording us the opportunity to generate 40 hermaphrodite–male pairs where, within a pair, individuals possessed identical genotypes despite being different sexes. We quantified steroid hormone levels, behavior (aggression and risk taking), metabolism and morphology (organ masses). We found that hermaphrodites were more aggressive and risk averse, and had higher maximum metabolic rates and larger gonadosomatic indices. Males had higher steroid hormone levels and showed correlations among hormones that hermaphrodites lacked. Males also had greater total mass and somatic body mass and possessed considerable fat stores. Our findings suggest that there are major differences between the sexes in energy allocation, with hermaphrodites exhibiting elevated maximum metabolic rates, and showing evidence of favoring investments in reproductive tissues over somatic growth. Our study serves as the foundation for future research investigating how environmental challenges affect both physiology and reproductive investment and, ultimately, how these changes dictate the transition between sexes.
Phenotypic variation in metabolism and morphology correlating with animal swimming activity in the wild: relevance for the OCLTT (oxygen- and capacity-limitation of thermal tolerance), allocation and performance models

Ongoing climate change is affecting animal physiology in many parts of the world. Using metabolism, the oxygen- and capacity-limitation of thermal tolerance (OCLTT) hypothesis provides a tool to predict the responses of ectothermic animals to variation in temperature, oxygen availability and pH in the aquatic environment. The hypothesis remains controversial, however, and has been questioned in several studies. A positive relationship between aerobic metabolic scope and animal activity would be consistent with the OCLTT but has rarely been tested. Moreover, the performance model and the allocation model predict positive and negative relationships, respectively, between standard metabolic rate and activity. Finally, animal activity could be affected by individual morphology because of covariation with cost of transport. Therefore, we hypothesized that individual variation in activity is correlated with variation in metabolism and morphology. To test this prediction, we captured 23 wild European perch (Perca fluviatilis) in a lake, tagged them with telemetry transmitters, measured standard and maximal metabolic rates, aerobic metabolic scope and fineness ratio and returned the fish to the lake to quantify individual in situ activity levels. Metabolic rates were measured using intermittent flow respirometry, whereas the activity assay involved high-resolution telemetry providing positions every 30 s over 12 days. We found no correlation between individual metabolic traits and activity, whereas individual fineness ratio correlated with activity. Independent of body length, and consistent with physics theory, slender fish maintained faster mean and maximal swimming speeds, but this variation did not result in a larger area (in square metres) explored per 24 h. Testing assumptions and predictions of recent conceptual models, our study indicates that individual metabolism is not a strong determinant of animal activity, in contrast to individual morphology, which is correlated with in situ activity patterns

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Freshwater Fisheries Ecology, Institute Management, Section for Ecosystem based Marine Management, University of Porto
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Conservation Physiology
Volume: 4
Issue number: 1
Article number: cov055
ISSN (Print): 2051-1434
Ratings:
Web of Science (2018): Indexed yes
Web of Science (2017): Indexed Yes
Scopus rating (2016): CiteScore 1.66 SJR 0.648 SNIP 0.501
Web of Science (2016): Indexed yes
Scopus rating (2015): SJR 0.123 SNIP 0.01
Scopus rating (2014): SJR 0.109 SNIP 0
Original language: English
Electronic versions:
Publishers_version
DOIs:
10.1093/conphys/cov055
Source: FindIt
Source-ID: 2290373073
Publication: Research - peer-review › Journal article – Annual report year: 2016

Quantifying the escape mortality of trawl caught Antarctic krill (Euphausia superba)
Antarctic krill (Euphausia superba) is an abundant fishery resource, the harvest levels of which are expected to increase. However, many of the length classes of krill can escape through commonly used commercial trawl mesh sizes. A vital component of the overall management of a fishery is to estimate the total fishing mortality and quantify the mortality rate of individuals that escape from fishing gear. The methods for determining fishing mortality in krill are still poorly developed. We used a covered codend sampling technique followed by onboard observations made in holding tanks to monitor mortality rates of escaped krill. Haul duration, hydrological conditions, maximum fishing depth and catch composition all had no significant effect on mortality of krill escaping 16 mm mesh size nets, nor was any further mortality associated with the holding tank conditions. A non-parametric Kaplan-Meier analysis was used to model the relationship between mortality rates of escapees and time. There was a weak tendency, though not significant, for smaller individuals to suffer higher mortality than larger individuals. The mortality of krill escaping the trawl nets in our study was 4.4 ± 4.4%, suggesting that krill are fairly tolerant of the capture-and-escape process in trawls.
Quantifying trawl caught escape mortality of Antarctic krill (Euphausia superba).

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Institute of Marine Research, Olympic Seafood AS, SINTEF
Authors: Krafft, B. A. (Ekstern), Krag, L. A. (Intern), Engås, A. (Ekstern), Nordrum, S. (Ekstern), Bruheim, I. (Ekstern), Herrmann, B. (Ekstern)
Number of pages: 32
Publication date: 2016

Recent trends in the abundance of plaice Pleuronectes platessa and cod Gadus morhua in shallow coastal waters of the Northeastern Atlantic continental shelf – a review
Shallow, near-shore water habitats on the continental shelf of the Northeast Atlantic have been productive fishing areas in the past. Here, we review the present knowledge about (i) recent trends in the abundance of plaice and cod in these habitats and (ii) hypotheses regarding the factors responsible for any trends. At present, only a few studies exist on the trends of abundance of plaice or cod, namely from the Bay of Biscay, the North Sea and the Skagerrak/Kattegat. They suggest a declining abundance in coastal, shallow areas and – at least for plaice – a latitudinal gradient with an erosion of the southern distribution boundary in the Bay of Biscay and deepening of stocks in the North Sea. In contrast, no trend in shallow water abundance of plaice similar to a decline in deep-water stocks during the 1970s and their slow recovery during the 2000s is apparent in the Skagerrak/Kattegat. Although shallow habitats fundamentally differ from deeper areas by the prevalence of juvenile stages, the declining trends coincide with decreasing abundance/landings and spatial stock relocations in the deeper areas. Whether this indicates a common trend pointing at connectivity between shallow and deep water remains open. Fundamental differences exist in the suggested causes of the trends in different geographical areas. High fishing pressure together with low local recruitment apparently prevents the recovery of overexploited plaice and cod stocks in the Skagerrak/Kattegat. In contrast, the responses of juveniles and adult fish to increasing seawater temperature are the main hypotheses for changes in distribution and abundance of both fish species in the North Sea/Bay of Biscay. However, temperature alone cannot explain the observed decline of fish in coastal areas, and the causes may be more complex, involving nutrient loading, primary productivity or food availability, although at present, knowledge of these factors is insufficient.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Baltic Sea Research Institute
Authors: Dutz, J. (Ekstern), Støttrup, J. G. (Intern), Stenberg, C. (Intern), Munk, P. (Intern)
Pages: 785-796
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Marine Biology Research
Volume: 12
Issue number: 8
ISSN (Print): 1745-1000
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 1.26 SJR 0.638 SNIP 0.725
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.8 SNIP 0.835 CiteScore 1.45
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.674 SNIP 0.872 CiteScore 1.34
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.571 SNIP 0.66 CiteScore 1.09
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.672 SNIP 0.737 CiteScore 1.27
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.606 SNIP 0.681 CiteScore 1.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.577 SNIP 0.664
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.555 SNIP 0.72
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.515 SNIP 0.519
Scopus rating (2007): SJR 0.576 SNIP 0.755
Scopus rating (2006): SJR 0.378 SNIP 0.536
Web of Science (2006): Indexed yes
Web of Science (2005): Indexed yes
Original language: English
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Publishers version
DOIs:
10.1080/17451000.2016.1210806
Publication: Research - peer-review › Review – Annual report year: 2016

Same stock, different management: quantifying the sustainability of three shrimp fisheries in the Skagerrak from a product perspective
The northern shrimp (Pandalus borealis L.) stock in the Skagerrak is shared by Sweden, Norway, and Denmark. Although the fishery is regulated by an annual agreement between the EU and Norway, there are also national regulations as well as differences in fleet composition and shrimp markets.
In early 2014, the World Wildlife Fund gave all Skagerrak shrimp a red light in their seafood consumer guide, which led to an extensive debate, especially in Sweden, about the sustainability of this fishery. The aim of this study was to quantify a set of indicators that together give a broad picture of the sustainability of the three fisheries to provide an objective basis for a discussion on needed measures. The different indicators concerned environmental, economic or social aspects of sustainability and were quantified per tonne of shrimp landed by each country in 2012. The Danish fishery was most efficient in terms of environmental and economic indicators, while the Swedish fishery provided most employment per tonne of shrimp landed. Fuel use in all fisheries was high, also when compared with other shrimp fisheries. Interesting patterns emerged, with smaller vessels being more fuel efficient than larger ones in Sweden and Norway, with the opposite trend in Denmark. The study also demonstrated major
data gaps and differences between the countries in how data are collected and made available. Various improvement options in the areas data collection and publication, allocation of quotas and enforcement of regulations resulted. Product-oriented studies could be useful to follow-up performance of fisheries over time and to identify how to best utilize the Skagerrak shrimp stock. This could involve evaluating novel solutions in terms of technology and management, based on current and future scenarios aiming to maximize societal benefits generated from this limited resource, at minimized environmental impacts.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SP Technical Research Institute of Sweden, Swedish University of Agricultural Sciences, SINTEF, Institute of Marine Research
Authors: Ziegler, F. S. (Ekstern), Hornborg, S. (Ekstern), Valentinsson, D. (Ekstern), Hognes, E. S. (Ekstern), Sovik, G. (Ekstern), Eigaard, O. R. (Intern)
Pages: 1806-1814
Publication date: 2016
Main Research Area: Technical/natural sciences

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Web of Science (2018): Indexed yes
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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
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Web of Science (2008): Indexed yes
Web of Science (2007): Indexed yes
Samfunds- og sektørøkonomisk analyse af vandmiljøindsatsen i Landdistriktsprogrammet (LDP) og Fiskeriprogrammet (EHFF)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Institute Management, Section for Freshwater Fisheries Ecology, Section for Ecosystem based Marine Management, Aarhus University, University of Copenhagen
Authors: Hasler, B. (Ekstern), Dubgaard, A. (Forskerdatabase), Eberhardt, J. M. (Ekstern), Koed, A. (Intern), Martinsen, L. (Forskerdatabase), Nielsen, J. (Intern), Støttrup, J. G. (Intern), Wisz, M. (Intern)
Number of pages: 104
Publication date: 2016

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Publisher: Aarhus Universitet, DCE – National Center for Miljø og Energi
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Original language: Danish
Series: Videnskabelig rapport fra DCE - Nationalt Center for Miljø og Energi
Number: 214
Main Research Area: Technical/natural sciences
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Links:
Publication: Research › Report – Annual report year: 2016

Skarv, sæl og fremmede fisk på Folkemødet

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2016

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Source/Publisher: Fiskepleje.dk
Main Research Area: Technical/natural sciences
Links:
http://www.fiskepleje.dk/Nyheder/Nyhed?id=56AD16E0-3217-41D9-81FE-7AB86335FCF0
Publication: Communication › Internet publication – Annual report year: 2016

Snæblens tilbagegang i Anthropocæn

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University Hospital
Spatial differences in growth of lesser sandeel in the North Sea

Lesser sandeel, Ammodytes marinus, is a key prey to a variety of North Sea predators, including species such as single load seabirds which are highly sensitive to prey size and condition. Whilst differences in weight at age across the North Sea have been investigated previously, the scale and cause of this variation as well as the potential link to spatial differences in predator performance remains unknown. This study presents an analysis of spatial patterns in length and condition of the lesser sandeel in the North Sea and the relationship of these with physical and biological factors. Both mean length at age and condition was higher on warmer, deeper and central/north eastern fishing grounds. Sandeel in the water column exhibited large changes in condition over the season, having an initially low condition following spring emergence rising to a pronounced peak by June. Weight at age varied considerably both spatially and temporally, resulting in 4 fold and 1.9 fold variations in the number of sandeels required to obtain a specific weight, respectively. Hence, the value of sandeel as prey to single load predators varies considerably with values in central and northeastern North Sea being substantially higher than in northwestern and southern areas.
Aquatic Science, Ecology, Evolution, Behavior and Systematics, Condition, Length, Lesser sandeel, Spatial differences, Temperature, lesser sandeel, length, condition, temperature, spatial differences

Original language: English

Aquatic Science, Ecology, Evolution, Behavior and Systematics, Condition, Length, Lesser sandeel, Spatial differences, Temperature, lesser sandeel, length, condition, temperature, spatial differences

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10.1016/j.jembe.2016.02.007

Source: FindIt

Source-ID: 2298648993

Publication: Research - peer-review › Journal article – Annual report year: 2016
Spatial ecology of blue shark and shortfin mako in southern Peru: local abundance, habitat preferences and implications for conservation

While global declines of pelagic shark populations have been recognized for several years, conservation efforts remain hampered by a poor understanding of the spatial distribution and ecology. Two species of conservation concern are the blue shark Prionace glauca and the shortfin mako shark Isurus oxyrinchus. To improve management of the species, this study examined their local abundance patterns, habitat preferences, and distribution in the Southeast Pacific. Catch per unit effort (CPUE) data from an artisanal fishery in Peru were used to identify geographic hotspots and model abundance estimates as a function of environmental variables including the El Niño Southern Oscillation (ENSO). A 10-year data series revealed declining annual landings since 2011, despite no changes in management structures. Significant aggregations of both species were found in the southwestern part of Peruvian waters (74–76°W; 17–19°S) with both locations targeted by major fishing efforts. P. glauca CPUE increased during La Niña conditions, and CPUE of both species declined when water depths exceeded 1000 m. Correlations with lunar illumination and chlorophyll-a were revealed in P. glauca and I. oxyrinchus, respectively. Modeling explained 57 to 61% of the deviance, indicating that other factors not included in the present study might account for unexplained variance in CPUE (e.g. thermocline, location of marine fronts, dissolved oxygen, and gear characteristics). Given the importance of the examined area to shark fisheries and the exploitation of multiple species of conservation concern, the information presented here can be used to inform management strategies designed to limit the depletion of pelagic sharks.
Species interactions in the western Baltic Sea: With focus on the ecological role of whiting

The food web of the upper trophic levels in marine ecosystems is often complex, encompassing multiple biological interactions. One species may serve as prey, predator and competitor at the same time, and the interactions are likely to change with the ontogenetic development from juvenile to adult. Disentangling food web dynamics is important for both ecologists and conservationists involved with management. Multispecies assessment models and ecosystem-based trophic models are becoming increasingly used as tools to investigate and assess biological interactions and predation impacts of key species in the food web. Furthermore, the models can be used to evaluate effects of anthropogenic activities such as fishing, eutrophication and pollution from land-based activities and shipping. Despite the growing awareness of the strength of these models to describe food web dynamics and ecosystem functioning, implementation of the models in strategic management advice for commercially important fish stocks and protected marine mammals is not common practice. This is due to the lack of sufficient information about species interactions including knowledge about the diet, food intake and growth dynamics. This thesis investigates the ecological role of whiting in the western Baltic Sea. The ecosystem is more brackish than for example the North Sea and the species diversity of the upper trophic levels is lower and the food web simpler. The main piscivorous fish species are whiting and cod, while herring and sprat are the predominant forage fishes. The growth dynamics and feeding ecology of whiting in the western Baltic Sea has not previously been investigated, despite the fact that it is an important species both in the commercial fishery and in the food web of the North Sea. Due to differences in hydrography, species diversity and fishing pressure, the ecological role of whiting in the Baltic Sea is likely to differ considerably from that of its conspecific in the North Sea. The western Baltic Sea also provides a habitat for protected marine mammals, including the harbour porpoise, the grey seal and the harbour seal, which potentially prey on and compete for food with whiting. Here, the growth dynamics and feeding ecology of whiting in the western Baltic Sea is investigated and discussed in an ecosystem context. Furthermore, the diet of the harbour porpoise is examined and the interactions between whiting, cod and porpoises are discussed. Describing the fish population dynamics and biological interactions of the main species at the higher trophic levels in the western Baltic Sea is an important step towards a broader regional understanding of the ecosystem dynamics. The information can be used to inform single species and multispecies assessment models for fish and ecosystem-based trophic models, and, thus, potentially improve management advice for fish stocks and protected marine mammals in the western Baltic Sea.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Ross, S. D. (Intern), Nielsen, J. R. (Intern), Gislason, H. (Intern), Andersen, N. G. (Intern)
Number of pages: 180
Publication date: 2016

Publication information
Publisher: DTU aqua. National Institute of Aquatic Resources
Original language: English
Main Research Area: Technical/natural sciences
Publication: Research › Ph.D. thesis – Annual report year: 2016

Testing reproductive allometry in fish

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Olsson, K. H. (Intern), Gislason, H. (Intern)
Pages: 1466-1473
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Testing the effect of soak time on catch damage in a coastal gillnetter and the consequences on processed fish quality

This study aims at testing how to improve catch quality aboard a coastal gillnetter by looking at an easily controllable parameter known to have an effect on the degree of fish damage, soak time, and investigating if the registered damages on whole fish have an effect on processed products such as fillets. Plaice (Pleuronectes platessa) was captured with
commercial gillnets soaked for 12 and 24 hours. Damages were assessed using semi-quantitative indices of individual fish condition gathered in a Catch-damage-index for onboard fish and a Processed fish-damage-index for whole, skinned and filleted plaice processed at a land-based factory. Cumulative link mixed modelling allowed the estimation of the size of effects. Damage in fish was significantly more likely for longer soak times but effects were comparable to those of fish length and between-sets, making a change in soak time not so substantial for improving plaice quality in coastal gillnetting. Damage in fish was significantly more likely for whole than filleted fish, but there was substantial heterogeneity among fish. Severe damage in whole fish may not matter in filleted fish whereas some damage may only be visible at the fillet level.
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.

**General information**

State: Published

Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Marine Ecology and Oceanography

Authors: Ross, S. D. (Intern), Gislason, H. (Intern), Andersen, N. G. (Intern), Lewy, P. (Intern), Nielsen, J. R. (Intern)

Pages: 1965-1988

Publication date: 2016

Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 1

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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
The discard ban and its impact on the MSY objective on fisheries-the North Sea

North Sea fisheries are characterised by numerous biological and technical interactions, which create difficulties in identifying MSY targets and achieving those for all stocks simultaneously. The landing obligation may reinforce these issues, as ‘choke’ effects might be triggered by the least productive stocks. A flexible management approach can help achieve the multiple objectives, but this requires trade-offs to be made. The ecological benefits of reducing fishing mortality are likely larger than those from the landing obligation itself

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Ulrich, C. (Intern)
Pages: 9-81
The effect of Pseudo-nitzschia seriata on grazing and fecundity of Calanus finmarchicus and Calanus glacialis

This study investigates whether feeding on the domoic acid (DA)-producing diatom Pseudo-nitzschia seriata affects the faecal pellet (FP) production (proxy for grazing) and fecundity of Calanus finmarchicus and Calanus glacialis. Female copepods were fed a saturating concentration of food (400 mg C L⁻¹) in two combinations (i) natural phytoplankton spiked with 50% P. seriata and (ii) only the non-toxic phytoplankton community. The copepods ingested DA, as illustrated by DA accumulation in their FPs, and transferred a share of DA to their eggs and body tissue. DA was mainly excreted through FPs in both species. Compared with C. finmarchicus, C. glacialis accumulated substantially more DA in its body tissue. For both species, egg production and hatching success were unaffected by grazing on the toxic diatom. This suggests that feeding on DA-containing P. seriata does not affect copepod fecundity, despite increasing DA concentrations of P. seriata during the experiment.
The importance of habitat structure for the distribution and behaviour of demersal fish

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Novo Nordisk A/S, Aarhus University
Authors: Kristensen, L. D. (Intern), Støttrup, J. G. (Intern), Stenberg, C. (Ekstern), Grønkjær, P. (Ekstern)
Number of pages: 109
Publication date: 2016

Publication information
Publisher: Technical University of Denmark. National Institute of Aquatic Resources
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
Towards a framework for the quantitative assessment of trawling impact on the seabed and benthic ecosystem

A framework to assess the impact of mobile fishing gear on the seabed and benthic ecosystem is presented. The framework that can be used at regional and local scales provides indicators for both trawling pressure and ecological impact. It builds on high-resolution maps of trawling intensity and considers the physical effects of trawl gears on the seabed, on marine taxa, and on the functioning of the benthic ecosystem. Within the framework, a reductionist approach is applied that breaks down a fishing gear into its components, and a number of biological traits are chosen to determine either the vulnerability of the benthos to the impact of that gear component, or to provide a proxy for their ecological role. The approach considers gear elements, such as otter boards, twin trawl clump, and groundrope, and sweeps that herd the fish. The physical impact of these elements on the seabed, comprising scraping of the seabed, sediment mobilization, and penetration, is a function of the mass, size, and speed of the individual component. The impact of the elements on the benthic community is quantified using a biological-trait approach that considers the vulnerability of the benthic community to trawl impact (e.g. sediment position, morphology), the recovery rate (e.g. longevity, maturation age, reproductive characteristics, dispersal), and their ecological role. The framework is explored to compare the indicators for pressure and ecological impact of bottom trawling in three main seabed habitat types in the North Sea. Preliminary results show that the Sublittoral mud (EUNIS A5.3) is affected the most due to the combined effect of intensive fishing and large proportions of long-lived taxa.

General information
Udbredelse, tæthed og mulig udnyttelse af sortmundet kutling i Danmark

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences

Uncovering governance mechanisms surrounding harbour porpoise conservation in the Danish Skagerrak Sea

The harbour porpoise (Phocoena phocoena) is the focus of a range of conservation efforts and policies, including the Habitats Directive, aimed at reducing the bycatch of non-target species in gillnet fisheries. This paper describes the governance process and analyses the governance mechanisms and conflicts surrounding ongoing fisheries management planning with a focus on two Natura 2000 sites in the Danish part of the Skagerrak Sea designated to protect harbour porpoises. Responsibility for developing fisheries management for Natura 2000 sites is solely the remit of the fisheries agency, including mechanisms related to stakeholder involvement. This approach fuels the efficiency of the decision making process, while full transparency and/or co-decision becomes less of a given within a ministry for an economic sector compared with the environment ministry. In relation to porpoises, conflicts are driven mainly by the economy and the varying perceptions of the bycatch issue, with great differences between government, NGO's and fishers. Interviews with fishers and fishing effort data reveal intra-sectoral conflicts pertaining to the incompatibility of active trawling and passive gillnetting in the areas. The paper questions the overall approach to managing the harbour porpoise bycatch issue in light of Natura 2000 and discusses the role of science and its high level of influence in this planning process

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Sørensen, T. K. (Intern), Kindt-Larsen, L. (Intern)
Pages: 318-324
Publication date: 2016
Main Research Area: Technical/natural sciences
Understanding and predicting size selection in diamond-mesh cod ends for danish seining: A study based on sea trials and computer simulations

Danish seining is an important fishing method used to harvest demersal species. Knowledge about the size selectivity of different demersal species with this type of fishing gear is therefore of importance for managing the exploitation of marine resources. However, there are only limited data on size selection in cod ends in this fishery. Sea trials were therefore carried out to collect size selectivity data for Atlantic Cod Gadus morhua, Haddock Melanogrammus aeglefinus, and Witch Flounder Glyptocephalus cynoglossus for a diamond-mesh cod end. For all three species, the data were best described by a double logistic selection curve, implying that two different size selection processes occur in the cod end. The double selection process could be explained by an additional selection process occurring through slack meshes. The results imply that the escapement of 46% and 34% of the larger Atlantic Cod and Haddock (those above 48 cm), respectively, would be through wide-open or slack meshes. Since these mesh states are only likely to be present in the latest stage of the fishing process (e.g., when the cod end is near the surface), a large fraction of the bigger fish probably escaped near the surface, which might influence their likelihood of survival. Furthermore, based on the models established for explaining the experimental size selection, we were able to predict the effect of changing the mesh size on cod end size selection in the Danish seine fishery.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF Fisheries and Aquaculture
Authors: Herrmann, B. (Ekstern), Krag, L. A. (Intern), Feekings, J. P. (Intern), Noack, T. (Intern)
Pages: 277-291
Publication date: 2016
Main Research Area: Technical/natural sciences

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Journal: Marine and Coastal Fisheries
Volume: 8
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Web of Science (2017): Indexed Yes
Scopus rating (2016): SJR 0.613 SNIP 0.718 CiteScore 1.22
Web of Science (2016): Indexed yes
Scopus rating (2015): SJR 0.836 SNIP 1.139 CiteScore 1.52
Scopus rating (2014): SJR 1.339 SNIP 1.594 CiteScore 2.45
Scopus rating (2013): SJR 1.242 SNIP 1.211 CiteScore 1.93
ISI indexed (2013): ISI indexed yes
Scopus rating (2012): SJR 0.992 SNIP 1.039 CiteScore 1.6
ISI indexed (2012): ISI indexed no
Scopus rating (2011): SJR 0.729 SNIP 1.016
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
Scopus rating (2010): SJR 0.405 SNIP 1.1
Web of Science (2010): Indexed yes
Original language: English
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DOIs:
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Source-ID: 2306165861
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Understanding and predicting the size selectivity in Mediterranean trawl codends based on fish morphology

General information
State: Published
Understanding the processes behind fish stock dynamics: Where are we?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Ege University, SINTEF, Çukurova University Fisheries Faculty
Authors: Tokaç, A. (Ekstern), Herrmann, B. (Ekstern), Gökçe, G. (Ekstern), Krag, L. A. (Intern)
Publication date: 2016
Event: Abstract from World Fisheries Congress, Busan, Korea, Republic of.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2016

Understanding the size selectivity of red mullet (Mullus barbatus) in Mediterranean trawl codends: A study based on fish morphology

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Ege University, SINTEF, Çukurova University Fisheries Faculty
Authors: Köster, F. (Intern), Eero, M. (Intern), Sørensen, H. (Intern), Huwer, B. (Intern), Sørensen, S. R. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

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Journal: Fisheries Research
Volume: 174
ISSN (Print): 0165-7836
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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
Using alternative biological information in stock assessment: condition-corrected natural mortality of Eastern Baltic cod

The inclusion of biological and ecological aspects in the assessment of fish population status is one of the bases for an ecosystem-based fisheries management. During the past two decades the Eastern Baltic cod has experienced a drastic reduction in growth and body condition that may have affected its survival. We used results from published experimental literature linking cod condition to starvation and mortality, to estimate the annual proportion of cod close to the lethal condition level in the Eastern Baltic cod stock. Thereafter we applied these results to adjust the natural mortality (M) assumed in the analytical stock assessment model. The results in terms of Spawning Stock Biomass (SSB), Fishing mortality (F) and Recruitment (R) in the final year from the stock assessment using M values adjusted for low condition were up to 40% different compared with the assessment assuming a constant M = 0.2. This method could be used for adjusting natural mortalities for other cod stocks where changes in condition are observed.

**General information**

**State:** Published
**Organisations:** National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Swedish University of Agricultural Sciences
**Authors:** Casini, M. (Ekstern), Eero, M. (Intern), Carlshamre, S. (Ekstern), Lövgren, J. (Ekstern)
**Pages:** 2625-2631
**Publication date:** 2016
**Main Research Area:** Technical/natural sciences

**Publication information**
Using fish behaviour to separate fish from Nephrops in a horizontally divided codend in the mixed trawl fishery

**General information**
- **State**: Published
- **Organisations**: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF Fisheries and Aquaculture, Danish Fishermen's Producers' Organization
- **Authors**: Karlsen, J. D. (Intern), Krag, L. A. (Intern), Herrmann, B. (Ekstern), Lund, H. S. (Ekstern)
- **Publication date**: 2016
- **Event**: Abstract from ICES-FAO Working Group on Fishing Technology and Fish Behaviour , Mérida, Mexico.
- **Main Research Area**: Technical/natural sciences

Validation of state-space models using Template Model Builder

**General information**
- **State**: Published
- **Organisations**: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management
- **Authors**: Thygesen, U. H. (Intern), Albertsen, C. M. (Intern), Berg, C. W. (Intern), Kristensen, K. (Intern), Nielsen, A. (Intern), Pedersen, M. W. (Intern)
- **Publication date**: 2016
- **Event**: Abstract from International Statistical Ecology Conference, Seattle, United States.
- **Main Research Area**: Technical/natural sciences

Variability and connectivity of plaice populations from the Eastern North Sea to the Baltic Sea, part II. Biological evidence of population mixing

A multi-disciplinary study was conducted to clarify stock identity and connectivity patterns in the populations of European plaice (Pleuronectes platessa) in the Skagerrak-Kattegat transition area between the Eastern North Sea and the Baltic Sea. Five independent biological studies were carried out in parallel. Genetic markers suggested the existence of different genetic populations in the transition area. Growth backcalculation with otoliths resulted in significant although limited differences in growth rates between North Sea and Skagerrak, indicating weak differentiation or important mixing. Hydrogeographical drift modelling suggested that some North Sea juveniles could settle along the coast line of the Skagerrak and the Kattegat. Tagging data suggested that both juveniles and adult fish from the North Sea perform feeding migrations into Skagerrak in summer/autumn. Finally, survey data suggested that Skagerrak also belongs to the area distribution of North Sea plaice. The outcomes of the individual studies were then combined into an overall synthesis. The existence of some resident components was evidenced, but it was also demonstrated that North Sea plaice migrate for feeding into Skagerrak and might constitute a large share of the catches in this area. The mixing of different populations within a management area has implications for stock assessment and management. Choice must be made to either lump or split the populations, and the feasibility and constraints of both options are discussed. The outcomes of this work have directly influenced the management decisions in 2015.

**General information**
- **State**: Published
- **Organisations**: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, BGI-Shenzhen
- **Authors**: Ulrich, C. (Intern), Hansen, J. H. (Intern), Boje, J. (Intern), Christensen, A. (Intern), Hüsey, K. (Intern), Sun, H. (Ekstern), Worsøe Clausen, L. (Intern)
- **Pages**: 13-23
- **Publication date**: 2016
- **Main Research Area**: Technical/natural sciences

**Publication information**
- **Journal**: Journal of Sea Research
- **Volume**: 120
- **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
What attracts Baltic sea grey seals to seal-safe cod pots and when do they attempt to attack fish in the pots?

Seals and fishermen share the role of top consumers in the Baltic Sea, leading to inevitable competition. One aspect of this is that fishermen use fishing gear to catch fish and seals raid these fishing gear. The fisheries lose out in terms of fish
catches and also bear the significant costs of damage to the gear. Researchers have been active for some years in developing ‘sealsafe’ fishing gear, which will be unattractive to seals and resistant to attacks. This study investigated the presence of grey seals (Halichoerus grypus) around cod pots and their attempts to take fish from them. Baited and camera-equipped cod pots of three designs including three netting types were set out close to a seal haul-out site east of the island of Gotland in the Baltic Sea. The behaviour of visiting seals filmed with underwater cameras was observed and analysed using a generalized linear model (GLM). As well as the cod pot characteristics, the variables used for modelling included the time of day, whether bait fish were alive or dead, and the quantity of fish in each pot. It was found that the most important cod pot-characteristic for both seal presence and ‘attack behaviour’ was the design of the cod pot. The design which attracted the most seal presence and the most fish-attacking behaviour had loose netting around the upper chamber, in contrast to the other two designs which had tightly stretched mesh. Neither mesh size nor material showed any correlation with seal presence or attack behaviour. It was also found that the most important overall factor for predicting attack behaviour was the time of day. There was individual variation in seal behaviour. The behaviour was categorized into eleven groups, of which ‘investigation’ was the most commonly observed. Most attack behaviours were targeted towards moving fish and no attacks occurred on dead fish. These results could suggest that seals are visiting cod pots because of curiosity and not primarily because of hunger.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Swedish University of Agricultural Sciences
Authors: Stavenow, J. (Ekstern), Ljungberg, P. (Ekstern), Kindt-Larsen, L. (Intern), Lunneryd, S. G. (Ekstern), Königson, S. (Ekstern)
Pages: 91-107
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Ocean Technology
Volume: 11
Issue number: 4
ISSN (Print): 1718-3200
Ratings:
Scopus rating (2016): CiteScore 0.13 SNIP 0.445 SJR 0.121
Scopus rating (2015): CiteScore 0.22 SNIP 0.604 SJR 0.153
Scopus rating (2014): CiteScore 0.13 SNIP 0.479 SJR 0.126
Scopus rating (2013): CiteScore 0.11 SNIP 0.408 SJR 0.117
Scopus rating (2012): CiteScore 0.07 SNIP 0.076 SJR 0.112
Scopus rating (2011): CiteScore 0.09 SNIP 0.246 SJR 0.105
Scopus rating (2010): SNIP 0.278 SJR 0.108
Original language: English
Behaviour, Behavioural ecology, Halichoerus grypus, Seal depredation, Seal-fishery conflict mitigation
Electronic versions:
Publishers version
Links:
http://www.thejot.net/?page_id=837&show_article_preview=825
Links:
http://www.scopus.com/inward/record.url?scp=85030095561&partnerID=8YFLogxK (Link to publication in Scopus)
Source: Scopus
Source-ID: 85030095561
Publication: Research - peer-review › Journal article – Annual report year: 2017

What is the impact on fish recruitment of anthropogenic physical and structural habitat change in shallow nearshore areas in temperate systems? A systematic review protocol

Background: Shallow nearshore marine ecosystems are changing at an increasing rate due to a range of human activities such as urbanisation and commercial development. The growing numbers of constructions and other physical and structural alterations of the shoreline often take place in nursery and spawning habitats of many fish and other aquatic species. Several coastal fish populations have seen marked declines in abundance and diversity during the past two decades. A systematic review on the topic would clarify if anthropogenic physical and structural changes of near-shore areas have effects on fish recruitment and which these effects are. Methods: The review will examine how various physical and structural anthropogenic changes of nearshore fish habitats affect fish recruitment. Relevant studies include small- and large-scale field studies in marine and brackish systems or large lakes in temperate regions of the Northern and Southern hemispheres. Relevant studies may be based on comparisons between undisturbed and disturbed areas, before and after disturbance, or both. Relevant outcomes include measures of recruitment defined as abundance of juveniles of nearshore fish communities. Searches will be made for peer-reviewed and grey literature in English, Dutch,
Danish, Finnish, German, Swedish and Spanish. All fish species and species groups will be considered in this review. Included relevant studies will be subject to a critical appraisal that will assess study validity. From relevant included studies, we will extract information on study characteristics, measured outcomes, exposure, comparators, effect modifiers and critical appraisal. Data synthesis will contain narrative and summary findings of each included study of sufficient quality. Meta-analysis may be possible in cases where studies report similar types of outcomes.

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Stockholm Environment Institute, Uppsala University, Umeå University, University of Bologna, University of Groningen, Cornell University
Authors: MacUra, B. (Ekstern), Lönnstedt, O. (Ekstern), Byström, P. (Ekstern), Airoldi, L. (Ekstern), Eriksson, B. (Ekstern), Rudstam, L. (Ekstern), Støttrup, J. G. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Environmental Evidence
Volume: 5
Issue number: 1
Article number: 61
ISSN (Print): 2047-2382
Ratings:
Scopus rating (2016): CiteScore 2.5 SJR 1.24 SNIP 0.865
Scopus rating (2015): SNIP 1.036 SJR 1.301 CiteScore 2.46
Scopus rating (2014): SNIP 0.9 SJR 0.851
Scopus rating (2013): SNIP 0.225 SJR 0.207
ISI indexed (2013): ISI indexed no
Scopus rating (2012): SJR 0.122 SNIP 0
Original language: English
Electronic versions:
s13750_016_0061_z.pdf
DOIs:
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Publication: Research - peer-review › Journal article – Annual report year: 2016

120.000 fjordskrubber til Limfjorden

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Pages: 21
Publication date: 2015
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Danske Fritidsfiskere
Issue number: 5
ISSN (Print): 1904-5387
Original language: Danish
Publication: Communication › Journal article – Annual report year: 2015

127.000 skrubber udsat i Limfjorden i 2015

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2015

**Publication information**
Source/Publisher: Fiskepleje.dk
Accounting for socio-economic constraints to define the path to sustainability: European examples

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Wageningen IMARES
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Publication: Communication › Internet publication – Annual report year: 2015

Achieving Mixed-fisheries and multispecies MSY in the North Sea demersal fisheries

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas, Marine Scotland Science
Authors: Ulrich, C. (Intern), Dolder, P. J. (Ekstern), Jardim, E. (Ekstern), Holmes, S. J. (Ekstern), Kempf, A. (Ekstern), Mortensen, L. O. (Intern), Poos, J. J. (Ekstern), Rindorf, A. (Intern), Vermard, Y. (Ekstern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Adfærd hos torsk på et kunstigt stenrev i et baglokale på den Blå Planet

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management, Centre for Ocean Life, Den Blå Planet, Aarhus University, DHI Denmark
Authors: Deurs, M. V. (Intern), Stenberg, C. (Intern), Mariani, P. (Intern), Mohn, C. (Ekstern), Mandviwalla, X. (Ekstern), Hansen, F. T. (Ekstern), Gravlund, P. (Ekstern), Stettrup, J. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Adult and offspring size in the ocean over 17 orders of magnitude follows two life history strategies
Explaining variability in offspring vs. adult size among groups is a necessary step to determine the evolutionary and environmental constraints shaping variability in life history strategies. This is of particular interest for life in the ocean where a diversity of offspring development strategies is observed along with variability in physical and biological forcing factors in space and time. We compiled adult and offspring size for 407 pelagic marine species covering more than 17 orders of magnitude in body mass including Cephalopoda, Cnidaria, Crustaceans, Ctenophora, Elasmobranchii, Mammalia, Sagittoidea, and Teleost. We find marine life following one of two distinct strategies, with offspring size being either proportional to adult size (e.g., Crustaceans, Elasmobranchii, and Mammalia) or invariant with adult size (e.g., Cephalopoda, Cnidaria, Sagittoidea, Teleosts, and possibly Ctenophora). We discuss where these two strategies occur and how these patterns (along with the relative size of the offspring) may be shaped by physical and biological constraints in the organism's environment. This adaptive environment along with the evolutionary history of the different groups shape observed life history strategies and possible group-specific responses to changing environmental conditions (e.g., production and distribution).
Ændringer i habitatkvalitet for rødspætteyngel i kystområder langs Nordsøen

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Støttrup, J. (Intern), Kodama, M. (Intern), Stedmon, C. (Intern), Munk, P. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

A framework for managing fisheries with multiple economic, ecosystem and social objectives

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Wageningen IMARES, AquaMarine Advisers
Authors: Mumford, J. (Ekstern), Rindorf, A. (Intern), Reid, D. (Ekstern), Rossberg, A. (Ekstern), Röckmann, C. (Ekstern), Kempf, A. (Ekstern), Tserpes, G. (Ekstern), Maravelias, C. (Ekstern), Hopkins, C. C. (Ekstern), Hadjimichael, M. (Forskerdatabase)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Links:
Publication: Research › Conference abstract for conference – Annual report year: 2015

Aggregation and attachment responses of blue mussels, Mytilus edulis—impact of substrate composition, time scale and source of mussel seed
Survival after transplantation of mussel seeds is crucial for the production output of blue mussels (Mytilus edulis L.) in bottom cultures. Hence, an understanding of the interactions between bed formation, habitat structure and performance of mussel seed of different origins can contribute to an optimization of the production. The effect of substrate composition and timing of formation of a mussel bed in relation to aggregation and attachment of mussels were investigated with mussel seeds obtained from two different sources: mussel seed dredged from a natural mussel bed and mussel seed collected from a suspended long line culture. The mussels were applied to experimental units of complex and smooth substrate on the sea bed. Data on aggregation (day 0, day 1 and day 2), attachment strength (day 2 and 30), loss (day 2 and 30) and growth (day 0–30) of mussels were collected during the experiment. The results showed that complex substrate indeed had a stabilizing effect on the mussel structure resulting in less aggregation and increased attachment strength. The 3D matrix forming a mussel bed was achieved faster on complex substrate, and led to reduced mortality of transplanted mussels. Despite significantly lower specific growth rates on the complex substrate, the total biomass of mussels was significantly higher on complex substrate compared to on smooth substrate due to the higher survival of mussels. Furthermore, suspended mussels aggregated more and faster and had a stronger and more rapid attachment as compared to bottom mussels. Consequently, it was concluded that when transplanting mussels, seeding with substrate increases surface complexity on the seabed and increases survival of the mussels

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Roskilde University, University of Southern Denmark
Authors: Christensen, H. T. (Intern), Dolmer, P. (Intern), Hansen, B. W. (Ekstern), Holmer, M. (Ekstern), Kristensen, L. (Intern), Poulsen, L. K. (Intern), Stenberg, C. (Intern), Albertsen, C. M. (Intern), Støttrup, J. (Intern)
An integrated end-to-end modeling framework for testing ecosystem-wide effects of human-induced pressures in the Baltic Sea

We present an integrated end-to-end modeling framework that enables whole-of ecosystem climate, eutrophication, and spatial management scenario exploration in the Baltic Sea. The framework is built around the Baltic implementation of the spatially-explicit end-to-end ATLANTIS model, linked to the high-resolution coupled physical-biological model HBM-ERGOM and the fisheries bio-economic FishRent model. We investigate ecosystem-wide responses to changes in human-induced pressures by simulating several eutrophication scenarios that are relevant to existing Baltic Sea management plans (e.g. EU BSAP, EU CFP). We further present the structure and calibration of the Baltic ATLANTIS model and the operational linkage to the other models. Using the results of eutrophication scenarios, and focusing on the relative changes in fish and fishery production, we discuss the robustness of the model linking with respect to the underlying assumptions, strengths and weaknesses of individual models. Furthermore, we describe how to possibly expand the framework to account for spatial impacts and economic consequences, for instance by linking to the individual-vessel based DISPLACE modeling approach. We conclude that the proposed model integration and management scenario evaluation scheme lays the foundations for developing a robust framework for management strategy evaluation that is of strategic importance to stakeholders from around the Baltic Sea.
Antarctic krill and ecosystem monitoring survey at South Orkney Islands in 2015, and assessing escape mortality of krill in trawls

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Institute of Marine Research
Authors: Skaret, G. (Ekstern), Krafft, B. A. (Ekstern), Krag, L. A. (Intern), Pedersen, R. (Ekstern)
Number of pages: 20
Publication date: 2015

Publication information
Publisher: Institute of Marine Research
Original language: English
Series: Rapport fra havforskningen
Number: 9-2015
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers_version
Publication: Research › Report – Annual report year: 2015

Antarctic krill; assessment of mesh size selectivity and escape mortality from trawls
This working paper presents the aims and methodology for a three-year-project (commenced in 2015) assessing size selectivity and escape mortality of Antarctic krill from trawl nets. The project is widely based on acquired experiences from a completed study Net Escapement of Antarctic krill in Trawls (NEAT), presented in WG-EMM 2012/24, WGEMM 2013/34, WG-EMM 2014/14 and WG-EMM 2014/16. Funding is provided by the Norwegian Research Council and ship-time for executing the field-experiments is offered free-of-charge by two Norwegian commercial fishing companies; Olympic Seafood AS and Aker BioMarine AS. The project will examine krill escape mortality from the codend during a full scale field experiment, model size selectivity and escape mortality in codends including different designs and assess the size selectivity in the trawl body forward of the codend. Based on end results from the preceding examinations we will be able to predict size selectivity and escape mortality from the entire trawl body with the appurtenant mortality for different trawl designs

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Institute of Marine Research, SINTEF, Olympic Seafood AS
Authors: Krafft, B. A. (Ekstern), Krag, L. A. (Intern), Herrmann, B. (Ekstern), Engas, A. (Ekstern), Bruheim, I. (Ekstern), Nordrum, S. (Ekstern)
Number of pages: 8
Publication date: 2015

Publication information
Bibliographical note
WG-EMM-15/14
Main Research Area: Technical/natural sciences
Publication: Research › Working paper – Annual report year: 2015

Archived DNA reveals fisheries and climate induced collapse of a major fishery
Fishing and climate change impact the demography of marine fishes, but it is generally ignored that many species are made up of genetically distinct locally adapted populations that may show idiosyncratic responses to environmental and anthropogenic pressures. Here, we track 80 years of Atlantic cod (Gadus morhua) population dynamics in West Greenland using DNA from archived otoliths in combination with fish population and niche based modeling. We document how the interacting effects of climate change and high fishing pressure lead to dramatic spatiotemporal changes in the proportions and abundance of different genetic populations, and eventually drove the cod fishery to a collapse in the early 1970s. Our results highlight the relevance of fisheries management at the level of genetic populations under future scenarios of climate change
Are 'pretty good yield' ranges precautionary?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Queen's University Belfast, Lund University
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
A review of programs established to encourage industry-led approaches to selective gear development

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Marine Scotland Science
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences

Assessment of mortality of Antarctic krill (Euphausia superba) escaping from a trawl

The overall purpose of this study was to estimate the mortality of Antarctic krill (Euphausia superba) that escape from the most common mesh size used for codends (16mm) in the current commercial fishery. The experiment was carried out off the South Orkney Islands (60°35′S, 45°30′W) using a covered codend sampling technique for retaining escaped krill, which thereafter were observed in holding tanks to monitor their mortality rate. Our results suggest that krill with smaller body lengths suffered higher mortality. However, sampling depth, haul duration and catch accumulation as well as handling effects onboard, such as exposure to temperature differences, likely increased the mortality rates in our experiment. The results indicates that mortality of krill which escape trawl nets is relatively small, suggesting that krill, in common with many other crustacean species, are fairly tolerant to a process of capture-and-escape.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Institute of Marine Research
Authors: Krafft, B. A. (Ekstern), Krag, L. A. (Intern)
Pages: 102-105
Publication date: 2015
Main Research Area: Technical/natural sciences
Behavior of different trawl codend concepts

The overall objective of this study was to evaluate the behavior of different codend designs to provide basic information that is relevant for implementing technical management measures, improving selectivity and catch quality, and reducing energy consumption. Six different codend designs were evaluated: a traditional diamond mesh codend; a T90 codend (meshes turned 90°); a Bacoma codend with diamond meshes in the lower panel and square meshes in the upper panel; a Bacoma codend with the square meshes orientated in the T0 direction; a two panel square mesh codend; and a four panel square mesh codend. The codends were tested in a flume tank with flow of 1.8 knots/h. A simulated catch of 500 kg was placed in the tested codend. A motion tracking system was used with four track markers placed on each of three successive cross-sections and a single marker at the end of the codend. This made it possible to assess and compare the
movements of the codend and the netting in three dimensions. The drag of the codends also was measured and compared.
Best practice for restoration of stone reefs in Denmark (codes of conduct) 2013

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University, Naturstyrelsen
Authors: Dahl, K. (Ekstern), Støttrup, J. (Intern), Stenberg, C. (Intern), Berggreen, U. C. (Ekstern), Jensen, J. H. (Ekstern)
Number of pages: 26
Publication date: 2015

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Original language: English
Main Research Area: Technical/natural sciences
Links:
http://naturstyrelsen.dk/media/nst/Attachments/Bestpracticestonereefenglishversion.pdf

Beyond the Target Species: Future Consequences of MSY under different scenarios of change

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of St Andrews, University of Copenhagen
Authors: Smout, S. (Ekstern), Kempf, A. (Ekstern), Hoff, A. (Ekstern), Hamon, K. (Intern), Stabler, M. (Ekstern), Rindorf, A. (Intern), Northridge, S. (Ekstern)
Publication date: 2015
Event: Poster session presented at ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Links:

Bottom fish assemblages at the shelf and continental slope off East Greenland
During 2006 and 2008 two bottom trawl surveys were conducted at East Greenland to 72°N covering depths down to 1500 m. In the 149 trawl hauls in total 113 fish species were recorded of which 37 were considered pelagic and excluded from the analyses. As a first step the abundance data for the 76 benthic species were used for analyses of the fish fauna diversity and fish assemblages. Nine assemblages were found by a standard type of cluster analysis. A Bayesian multinomial logit model was then applied to calculate vectors of probabilities defining the likelihood of each haul belonging to each of the nine clusters. By means of a geostatistical tool the spatial distribution of the conditional probabilities for each cluster (assemblage) was mapped. Each of the nine assemblages was further defined by indicator species, depth and temperature. The assemblages were well defined regarding geographical distribution, species composition, temperature and depth. Three of the assemblages were located in the cold Iceland Sea while six were found in the somewhat warmer Irminger Sea.
Can the rectangular mesh codends solve multispecies fishery selectivity problems?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Çukurova University Fisheries Faculty, Mersin University Fisheries Faculty, Ege University, SINTEF
Authors: Gokce, G. (Ekstern), Herrmann, B. (Ekstern), Ozbilgin, H. (Ekstern), Saygu, I. (Ekstern), Kal-ecik, E. (Ekstern), Demir, O. (Ekstern), Tokaç, A. (Ekstern), Krag, L. A. (Intern)
Publication date: 2015
Main Research Area: Technical/natural sciences

Bibliographical note
ICES CM 2015/SSGIEOM:22, p. 11
Publication: Research › Conference abstract for conference – Annual report year: 2015

Causes and consequences of technical, biological and spatial interactions in fisheries management modelled from the individual distribution of fishing effort

Our individual-vessel based bio-economic modeling approach (www.displace-project.org) evaluates the harvesting dynamics using information about fishing ground preferences and experienced vessel-specific catch rates. The assessment computes the daily decision-making of the fishing vessels and the individual or overall economic and stock status indicators together with the size-based spatial distribution dynamics of the main fishery resources. In this application to the western Baltic Sea sprat, herring and cod fisheries of Danish, Swedish and German commercial vessels (>12 m) the biological interactions (fish predation mortality) are included by a dynamic coupling to the Stochastic Multi Species model (SMS) on annual basis, under the mitigation from the "yet to be implemented" NATURA 2000 zonation in the area. The spatial technical interactions between vessels revealed to be the predominant factors affecting the fishery profit and the energy efficiency while species interactions play a minor role, albeit increasing the final profit estimates. Interestingly, the zonation affects the profit depending on the biological interactions from a spatial effect on the size composition of the stocks, therefore the fish size composition in the landings originating from different fishing areas. Such a model coupling contributes to the integration of different spatial activities in certain sea areas considering the combined effects of technical and biological interactions and dynamics for reducing potential inefficient management and use of space according to the aims of both EU CFP regulation (No 1380/2013) and EU MSP (2014/89/EU) directive

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Bastardie, F. (Intern), Nielsen, J. R. (Intern), Vinther, M. (Intern)
Number of pages: 3
Publication date: 2015
Event: Paper presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences

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Publication: Research › Paper – Annual report year: 2015

Co-location of passive gear fisheries in offshore wind farms: Fairytale or future marine spatial planning approach?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Sea Fisheries, University of Hamburg, Johann Heinrich von Thünen-Institute
Authors: Stelzenmüller, V. (Ekstern), Diekmann, R. (Ekstern), Bastardie, F. (Intern), Schultz, T. (Ekstern), Berkenhagen, J. (Ekstern), Kloppmann, M. (Ekstern), Pogoda, B. (Ekstern), Kraus, G. (Ekstern)
Publication date: 2015
Event:
Main Research Area: Technical/natural sciences
Electronic versions:
Competition for marine space: modelling the Baltic Sea fisheries and effort displacement under spatial restrictions

Maritime spatial planning (MSP) and fishery management may generate extra costs for fisheries by constraining fishers activity with conservation areas and new utilizations of the sea. More-energy-efficient fisheries are also likely to alter existing fishing patterns, which already vary from fishery to fishery and from vessel to vessel. The impact assessment of new spatial plans involving fisheries should be based on quantitative bioeconomic analyses that take into account individual vessel decisions, and trade-offs in cross-sector conflicting interests. We use a vessel-oriented decision-support tool (the DISPLACE model) to combine stochastic variations in spatial fishing activities with harvested resource dynamics in scenario projections.

The assessment computes economic and stock status indicators by modelling the activity of Danish, Swedish, and German vessels (.12 m) in the international western Baltic Sea commercial fishery, together with the underlying size-based distribution dynamics of the main fishery resources of sprat, herring, and cod. The outcomes of alternative scenarios for spatial effort displacement are exemplified by evaluating the fishers’s abilities to adapt to spatial plans under various constraints. Interlinked spatial, technical, and biological dynamics of vessels and stocks in the scenarios result in stable profits, which compensate for the additional costs from effort displacement and release pressure on the fish stocks. The effort is further redirected away from sensitive benthic habitats, enhancing the ecological positive effects. The energy efficiency of some of the vessels, however, is strongly reduced with the new zonation, and some of the vessels suffer decreased profits. The DISPLACE model serves as a spatially explicit bioeconomic benchmark tool for management strategy evaluations for capturing tactical decision-making in reaction to MSP.
Danish seine – ecosystem effects of fishing

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Noack, T. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern), Madsen, N. (Intern)
Publication date: 2015
Main Research Area: Technical/natural sciences

Bibliographical note
ICES CM 2015/SSGIEOM:22, p. 14
Publication: Research › Conference abstract for conference – Annual report year: 2015

De marine fiskeudsætninger er udfordrede

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Pages: 35
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Detecting ecological-economic effects of marine spatial plans from displacing the bottom fishing pressure

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
Authors: Thoya, P. (Intern), Bastardie, F. (Intern), Dinesen, G. E. (Intern), Hansen, J. L. (Ekstern), Nielsen, J. R. (Intern)
Publication date: 2015
Event: Paper presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions:

Developing a computer vision method to quantify impact on seabed of bottom gillnets

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

Diel effects on bottom-trawl survey catch rates of shallow- and deep-water Cape hakes, Merluccius capensis and M. paradoxus, off Namibia, using solar zenith angle

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Ecosystem based Marine Management
Authors: Kainge, P. I. (Intern), Wieland, K. (Intern), Feekeings, J. P. (Intern)
Pages: 583-592
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication Information
Journal: African Journal of Marine Science
Volume: 37
Issue number: 4
ISSN (Print): 1814-232X
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
Discarding of cod in the Danish Fully Documented Fisheries trials

Denmark was the first nation in Europe to promote the use of Fully Documented Fisheries (FDF) through Remote Electronic Monitoring (REM) and CCTV camera systems, with pilot schemes in place since 2008. In theory, such a scheme could supplement and even potentially replace expensive control and monitoring programmes; and when associated with a catch quota management (CQM) system, incentivize positive changes in fishing patterns in a results-based management approach. New data flows are, however, required to ensure the practical implementation of such a scheme. This paper reviews the quality of the FDF data collected during 2008–2014 and their potential in strengthening information on cod discards. The analyses demonstrate the improved reporting of discards in logbooks and overall discard reductions, but they also show that some uncertainties around the absolute estimates of discard quantities have remained. Regular validation of weight estimation methods and close collaboration between scientific monitoring and control are important to support the use of reported discards as a reliable source of information. We discuss the potential of electronic monitoring in the context of the EU landing obligation.
Does population genetic structure support present management regulations of the northern shrimp (Pandalus borealis) in Skagerrak and the North Sea?

Population structuring in the northern shrimp (Pandalus borealis) in the North Sea area (including Fladen and Skagerrak) was studied by microsatellite DNA analyses. Screening 20 sample locations in the open ocean and Skagerrak fjords for nine loci revealed low but significant genetic heterogeneity.

The spatial genetic structure among oceanic samples of Skagerrak and the eastern North Sea was weak and non-significant, consistent with the current management regime of one single stock. However, Skagerrak fjord samples generally displayed elevated levels of genetic differentiation, and significantly so in several pairwise comparisons with other fjords and oceanic samples. Although the Skagerrak fjord populations are of less economic value, some of them are regulated separately (e.g. the Gullmarsfjord) and local stocks may prove important to uphold genetic variability and biocomplexity in a changing environment.
Does recreational catch impact the TAC for commercial fisheries?
The western Baltic cod is one of the first fish stocks in Europe that, since 2013, includes recreational catches in stock assessment and fisheries management advice. In this paper, we investigate the sensitivity of the calculated commercial total allowable catch (TAC) to including recreational catches in stock assessment. Our results show that the most crucial aspect in terms of the impact on commercial TAC is the assumption on recreational catch dynamics relative to that of commercial fisheries used in forecast. The results were less sensitive to the information on the historical amount and age structure of recreational catch. Our study is intended to inform potential debates related to resource allocation between the commercial and recreational sectors and contribute to developing a general framework for incorporating recreational catches in fisheries management advice in ICES.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Baltic Sea Fisheries, University of Florida
Authors: Eero, M. (Intern), Strehlow, H. V. (Ekstern), Adams, C. M. (Ekstern), Vinther, M. (Intern)
Pages: 450-457
Publication date: 2015
Main Research Area: Technical/natural sciences
Eastern Baltic cod in distress: biological changes and challenges for stock assessment

The eastern Baltic (EB) cod (Gadus morhua) stock was depleted and overexploited for decades until the mid-2000s, when fishing mortality rapidly declined and biomass started to increase, as shown by stock assessments. These positive developments were partly assigned to effective management measures, and the EB cod was considered one of the most successful stock recoveries in recent times. In contrast to this optimistic view, the analytical stock assessment failed in 2014, leaving the present stock status unclear. Deteriorated quality of some basic input data for stock assessment in combination with changes in environmental and ecological conditions has led to an unusual situation for cod in the Baltic Sea, which poses new challenges for stock assessment and management advice. Anumber of adverse developments such as low nutritional condition and disappearance of larger individuals indicate that the stock is in distress. In this study, we (i) summarize the knowledge of recent changes in cod biology and ecosystem conditions, (ii) describe the subsequent challenges for stock assessment, and (iii) highlight the key questions where answers are urgently needed to understand the present stock status and provide scientifically solid support for cod management in the Baltic Sea.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Institute Management, Section for Monitoring and Data, Swedish University of Agricultural Sciences, University of Skövde, International Council for the Exploration of the Sea, University of Kiel, Lund University, Johann Heinrich von Thünen-Institute
Ecological benefits from restoring a marine cavernous boulder reef in Kattegat, Denmark

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
Authors: Stenberg, C. (Intern), Stattrup, J. (Intern), Dahl, K. (Ekstern), Lundsteen, S. (Ekstern), Göke, C. (Ekstern), Andersen, O. (Ekstern)
Number of pages: 43
Publication date: 2015

Publications information
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ISSN: 1395-8216
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Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Research › Report – Annual report year: 2015

Economic gains from introducing international ITQs - the case of the mackerel and herring fisheries in the Northeast Atlantic

Achieving a balance between fishing capacity and fishing opportunities is one of the major challenges in European fisheries. One way to achieve this is to introduce individual tradable quotas or similar management measures. In several mackerel and herring fisheries in the Northeast Atlantic, such systems have already been introduced on a national basis and the long term economic gains of this have been acknowledged. This paper takes this a step further and investigates the potential economic gains from introducing individual tradable quotas between countries. Overall, the results show that the gross cash flow can be improved by 21% by allowing the mackerel and herring quotas to be traded internationally in the Northeast Atlantic. This rent gain arises mainly from increased productivity by allowing tradability between areas and fleets. The analysis also shows that the Danish pelagic fleet will gain from increasing its share of mackerel and herring quotas, whereas the Irish fleets are incentivised to sell quota, if individual quotas are allowed to be traded among countries. This result is in line with the qualitative analyses that show that Irish fishermen targeting herring in the Celtic Sea are negatively oriented towards international individual tradable quotas, whereas the Danish pelagic fishermen have strong preferences for international individual tradable quotas

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Copenhagen, National University of Ireland, University of Iceland
Authors: Thøgersen, T. T. (Intern), Eigaard, O. R. (Intern), Fitzpatrick, M. (Ekstern), Mardle, S. (Ekstern), Andersen, J. L. (Forskerdatabase), Haraldsson, G. (Ekstern)
Pages: 85-93
Publication date: 2015
Main Research Area: Technical/natural sciences

Publications information
Journal: Marine Policy
Volume: 59
ISSN (Print): 0308-597X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
Effect of spatial differences in growth on distribution of seasonally co-occurring herring Clupea harengus stocks

The mechanisms most likely to determine the distribution of the two major herring Clupea harengus stocks in their common early summer feeding ground in the eastern North Sea, Skagerrak and Kattegat were investigated through analysis of acoustic survey data from six consecutive years. No change was detected in biomass of North Sea autumn spawning C. harengus (NSAS) over time, whereas the biomass of western Baltic spring spawning C. harengus (WBSS) declined severely. Analyses of centre of abundance by stock showed no change in NSAS distribution, whereas the WBSS changed to a more western distribution over time. Contrary to previous perception of the juvenile migration, NSAS were found to leave the study area at the age between 1 and 2 years and WBSS 1 year olds were encountered in the Skagerrak. The estimated parameters of von Bertalanffy growth equations showed marked differences between areas with fish in the eastern part of the area having the lowest size at age at all ages. Further, their growth conditions appeared to deteriorate progressively over the period studied. Both NSAS and WBSS showed the highest condition in the North Sea and Skagerrak while condition was substantially lower in age Kattegat. The westward movement of spring spawners over time suggests that growth rate and possibly density of conspecifics influence the migration pattern and distribution of C. harengus in the area. In contrast, there was no evidence to suggest that distribution was constant over time within stocks.
or that distribution reflected size-dependent limitations on migration distance

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Monitoring and Data, Section for Ecosystem based Marine Management
Authors: Worsøe Clausen, L. (Intern), Stæhr, K. (Intern), Rindorf, A. (Intern), Mosegaard, H. (Intern)
Pages: 228–247
Publication date: 2015
Main Research Area: Technical/natural sciences

**Publication Information**

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- Web of Science (2018): Indexed yes
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- 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
- Scopus rating (2013): SJR 1.049 SNIP 1.118 CiteScore 1.98
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 0.93 SNIP 1.035 CiteScore 1.88
- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 0.895 SNIP 0.946 CiteScore 1.66
- ISI indexed (2011): ISI indexed yes
- Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 0.774 SNIP 0.834
- Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 1
- Scopus rating (2009): SJR 0.773 SNIP 0.891
- Web of Science (2009): Indexed yes
- BFI (2008): BFI-level 2
- Scopus rating (2008): SJR 0.883 SNIP 0.968
- Web of Science (2008): Indexed yes
- Scopus rating (2007): SJR 0.996 SNIP 1.06
- Web of Science (2007): Indexed yes
- Scopus rating (2006): SJR 0.897 SNIP 1.051
- Web of Science (2006): Indexed yes
- Scopus rating (2005): SJR 0.827 SNIP 0.898
Effects of recent changes in stock conditions and mixing on sustainability and economic viability of the fishery – The Danish fisheries for Baltic cod

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Bastardie, F. (Intern), Nielsen, J. R. (Intern), Rindorf, A. (Intern), Eero, M. (Intern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences

Empowering fishermen towards the landing obligations, with their own technical solutions
Environmental determinates of blue whiting (Micromesistius poutassou) spawning distribution

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Centre for Ocean Life, Section for Marine Ecology and Oceanography
Authors: Miesner, A. K. (Intern), Payne, M. (Intern)
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences

Establishment of blue mussel beds to enhance fish habitats

Human activity has impacted many coastal fjords causing degeneration of the structure and function of the fish habitats. In Nørrefjord, Denmark, local fishermen complained of declining fish catches which could be attributed to eutrophication and extraction of sediments over several decades. This study aimed to establish blue mussel beds (Mytilus edulis) to increase structural complexity and increase the abundance of fish and epifauna in Nørrefjord. It was expected that the mussels would improve water transparency and increase the depth range and coverage of eelgrass (Zostera marina). New methods for mussel production and -bed construction were investigated in collaboration with local volunteer fishermen. The effect of the artificial mussel beds was most evident on a small scale. Video observations directly at the beds (Impact area) demonstrated increased biodiversity and a three times higher abundance of mesopredator fish compared to the Control area. Water clarity and eelgrass coverage were unchanged. Two methods for establishing mussel beds were tested. A total of 44 tons of blue mussels were produced and established in beds over an area of 121,000 m². Production of blue mussels directly on hemp sacs hanging on long-lines was the most effective method. This new method is potentially a useful management tool to improve fish habitats
Estimering af zooplankton dødelighed i en 3D økosystemmodel ved at anvende en rumlig- og tidslig varierende fiskeprædation

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Aarhus University, Danish Meteorological Institute
Authors: Maar, M. (Ekstern), Rindorf, A. (Intern), Møller, E. F. (Ekstern), Christensen, A. (Intern), Madsen, K. S. (Ekstern), Deurs, M. V. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences

Et hav fuld af mikroplastik
Experiences of how fishers grab opportunities in (more) free regulation of gear

In the Minidisc project 14 vessels fished under conditions corresponding to free choose of gear. Based on the skippers initial idea of gear adjustment and a subsequent interview 6 months later the experiences of the skippers’ choice of “free” gear, the process for adjusting it and the tools for evaluating the efficiency and selectivity are discussed. Only incremental development using elements from previous used gear and other fisheries were found. Gear development took place in an interaction between the skipper and trawl maker, while no research was involved. This indicates that free choice of gear (under monitored discard ban) would lead to incremental adjustments. Parts of the fleet would have difficulties in evaluating the gear and subsequently optimise by adjusting. This would leave a need for support for development of
evaluation procedures, especially among the small vessels. Radical changes probably would still need collective or public investments.

**General information**

*State:* Published  
*Organisations:* National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aalborg University  
*Authors:* Qvist Eliasen, S. (Intern), Mortensen, L. O. (Intern), Ulrich, C. (Intern)  
*Number of pages:* 2  
*Publication date:* 2015  
*Event:* Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.  
*Main Research Area:* Technical/natural sciences  
*Electronic versions:* Publishers_version

**Bibliographical note**

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**Feltundersøgelse af økosystem-effekter af fiskeri: Snurrevod**

**General information**

*State:* Published  
*Organisations:* National Institute of Aquatic Resources, Section for Ecosystem based Marine Management  
*Authors:* Noack, T. (Intern)  
*Publication date:* 2015

**Publication information**

*Original language:* Danish  
*Main Research Area:* Technical/natural sciences  
*Electronic versions:* vendelbo_movie  
*Links:* https://www.youtube.com/watch?v=tn6OKESf_Gk  
*Publication:* Communication › Sound/Visual production (digital) – Annual report year: 2015

**Fisheries Management: Is Europe turning the corner?**

**General information**

*State:* Published  
*Organisations:* National Institute of Aquatic Resources, Section for Ecosystem based Marine Management  
*Authors:* Ulrich, C. (Intern)  
*Number of pages:* 1  
*Publication date:* 2015

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*Main Research Area:* Technical/natural sciences  
*Conference:* DTU Sustain Conference 2015, Lyngby, Denmark, 17/12/2015 - 17/12/2015  
*Electronic versions:* F6_DTU_Sustain_2015.pdf  
*Publication:* Research › peer-review › Conference abstract in proceedings – Annual report year: 2015

**Fishing for food: simple changes in codend design improves the quality of fish products**

**General information**

*State:* Published  
*Organisations:* National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources  
*Authors:* Karlsen, J. D. (Intern), Krag, L. A. (Intern), Albertsen, C. M. (Intern), Frandsen, R. (Intern)
From fishing to fish processing: Separation of fish from crustaceans in the Norway lobster-directed multispecies trawl fishery improves seafood quality

Fishing gears have negative impacts on seafood quality, especially on fish in the mixed trawl fishery targeting Norway lobster (Nephrops norvegicus). In this fishery, which is worth about €80 millions in Denmark alone, the quality of fish can be significantly improved by simple gear changes. A trawl codend divided into an upper and lower codend was designed to separate fish from Norway lobster during the fishing process by encourage fish to swim into the upper codend by using a frame at the entrance of the lower codend. Separate codends for fish and Norway lobster in the same gear provide the opportunity to selectively reduce small low-value fish, which will reduce catch weight and sorting time onboard the vessel. For this horizontally divided test codend and a standard codend, in which the catch was mixed, quality assessments were performed on the same batches of fish during three steps of the value chain: i) aboard the fishing vessel; ii) at the Fishermen’s Collection Central, and iii) in the production plant. Four species of fish and fillets from fish caught in the upper codend of the test codend were of significantly better quality for several of the assessed parameters compared with those caught in the standard codend: i) newly caught fish showed significantly less scale loss and discolorations and had significantly better texture; ii) landed fish had significantly better skin appearance and texture and significantly fewer discolorations; and iii) fillets showed significantly fewer blood spots and had significantly better texture. There were no differences in injuries for newly caught fish or gaping and bruises for fillets between the test and standard codends. The decrease in catch-related damages in the test codend is explained by little contact between fish and animals with hard or
spiny surfaces due to successful separation of fish and Norway lobster into the upper and lower codends, respectively, and by lower catch weight in the upper codend of the test codend compared with the standard codend. The decrease in damages may also improve quality indirectly by inflicting less stress to the fish and subsequently give better texture, which offers advantages such as pre-rigor filleting and fresher products for the market.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Karlsen, J. D. (Intern), Krag, L. A. (Intern), Albertsen, C. M. (Intern), Frandsen, R. (Intern)
Publication date: 2015
Main Research Area: Technical/natural sciences

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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 3.11 SJR 1.201 SNIP 1.092
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.631 SNIP 1.161
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.473 SNIP 0.985
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.323 SNIP 0.96
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.289 SNIP 0.525
Web of Science (2006): Indexed yes
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Fully documented fisheries - is remote electronic monitoring the future tool in fisheries control?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Ministry of Food, Agriculture and Fisheries
Authors: Schreiber Plet-Hansen, K. (Intern), Ulrich, C. (Intern), Olesen, H. J. (Intern), Mortensen, L. O. (Intern), Bergsson, H. (Ekstern)
Publication date: 2015
Event: Poster session presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions:


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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Ulrich, C. (Intern)
Publication date: 2015
Event: Poster session presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
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Has human-induced eutrophication promoted fish production in the Baltic Sea?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Eero, M. (Intern), Andersson, H. (Ekstern), Rosel, E. A. (Ekstern), MacKenzie, B. (Intern)
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Links:

Bibliographical note
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Publication: Research › Conference abstract for conference – Annual report year: 2015

Havets artsrigdom

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Gislason, H. (Intern)
Pages: 12
Heterogeneous distribution of plankton within the mixed layer and its implications for bloom formation in tropical seas

Intensive sampling at the coastal waters of the central Red Sea during a period of thermal stratification, prior to the main seasonal bloom during winter, showed that vertical patches of prokaryotes and microplankton developed and persisted for several days within the apparently density uniform upper layer. These vertical structures were most likely the result of in situ growth and mortality (e.g., grazing) rather than physical or behavioural aggregation. Simulating a mixing event by adding nutrient-rich deep water abruptly triggered dense phytoplankton blooms in the nutrient-poor environment of the upper layer. These findings suggest that vertical structures within the mixed layer provide critical seeding stocks that can rapidly exploit nutrient influx during mixing, leading to winter bloom formation.
How can discards in European fisheries be mitigated? Strengths, weaknesses, opportunities and threats of potential mitigation methods

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Icelandic Food Research, University of East Anglia, Instituto Español de Oceanografía, European Commission, Institute for Agricultural and Fisheries Research, Cefas, Aalborg University, Hellenic Centre for Marine Research, IFREMER
Authors: Sigurdardottir, S. (Ekstern), Stefansdottir, E. K. (Ekstern), Condie, H. (Ekstern), Margeirsson, S. (Ekstern), Catchpole, T. L. (Ekstern), Bellido, J. M. (Ekstern), Elíasen, S. Q. (Ekstern), Goni, R. (Ekstern), Madsen, N. (Intern), Palialexis, A. (Ekstern), Uhlmann, S. S. (Ekstern), Vassilopoulou, V. (Ekstern), Feekeings, J. P. (Intern), Rochet, M. (Ekstern)
Pages: 366-374
Publication date: 2015
Main Research Area: Technical/natural sciences

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BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.7 SJR 1.335 SNIP 1.182
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.591 SNIP 1.397 CiteScore 3.07
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.438 SNIP 1.56 CiteScore 3.09
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.472 SNIP 1.635 CiteScore 2.71
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.339 SNIP 1.495 CiteScore 2.54
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Identifying marine pelagic ecosystem management objectives and indicators

International policy frameworks such as the Common Fisheries Policy and the European Marine Strategy Framework Directive define high-level strategic goals for marine ecosystems. Strategic goals are addressed via general and operational management objectives. To add credibility and legitimacy to the development of objectives, for this study stakeholders explored intermediate level ecological, economic and social management objectives for Northeast Atlantic pelagic ecosystems. Stakeholder workshops were undertaken with participants being free to identify objectives based on their own insights and needs. Overall 26 objectives were proposed, with 58% agreement in proposed objectives between two workshops. Based on published evidence for pressure-state links, examples of operational objectives and suitable indicators for each of the 26 objectives were then selected. It is argued that given the strong species-specific links of pelagic species with the environment and the large geographic scale of their life cycles, which contrast to demersal systems, pelagic indicators are needed at the level of species (or stocks) independent of legislative region. Pelagic community indicators may be set at regional scale in some cases. In the evidence-based approach used in this study, the selection of species or region specific operational objectives and indicators was based on demonstrated pressure-state links. Hence observed changes in indicators can reliably inform on appropriate management measures. (C) 2015 Elsevier Ltd. All rights reserved.
Impact of dietary fatty acids on muscle composition, liver lipids, milt composition and sperm performance in European eel

In order for European eel aquaculture to be sustainable, the life cycle should be completed in captivity. Development of broodstock diets may improve the species’ reproductive success in captivity, through the production of high-quality gametes. Here, our aim was to evaluate the influence of dietary regime on muscle composition, and liver lipids prior to induced maturation, and the resulting sperm composition and performance. To accomplish this fish were reared on three "enhanced" diets and one commercial diet, each with different levels of fatty acids, arachidonic acid (ARA), eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA). Neutral lipids from the muscle and liver incorporated the majority of the fatty acid profile, while phospholipids incorporated only certain fatty acids. Diet had an effect on the majority of sperm fatty acids, on the total volume of extractable milt, and on the percentage of motile sperm. Here, our results suggest that the total volume of extractable milt is a DHA-dependent process, as we found the diets with the highest DHA levels induced the most milt while the diet with the lowest DHA level induced the least amount of milt. The diet with the highest level of ARA induced medium milt volumes but had the highest sperm motility. EPA also seems important for sperm quality parameters since diets with higher EPA percentages had a higher volume of milt and higher sperm motility. In conclusion, dietary fatty acids had an influence on fatty acids in the tissues of male eel and this impacted sperm performance.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, National Food Institute, Division of Industrial Food Research, Universidad Politecnica de Valencia
Authors: Butts, I. (Intern), Baeza, R. (Ekstern), Støttrup, J. (Intern), Krüger-Johnsen, M. (Intern), Jacobsen, C. (Intern), Pérez, L. (Ekstern), Asturiano, J. (Ekstern), Tomkiewicz, J. (Intern)
Pages: 87-96
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Main Research Area: Technical/natural sciences

Publication information
Journal: Comparative Biochemistry and Physiology. Part A: Molecular & Integrative Physiology
Volume: 183
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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 2.16 SJR 0.794 SNIP 0.879
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.917 SNIP 0.915 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.983 SNIP 0.94 CiteScore 2.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.956 SNIP 1.058 CiteScore 2.36
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.773 SNIP 1.032 CiteScore 2.18
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.858 SNIP 1.048 CiteScore 2.2
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Impacts of the local environment on recruitment – a comparative study of North Sea and Baltic Sea fish stocks

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Pécuchet, L. (Intern), Nielsen, J. R. (Intern), Christensen, A. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Impacts of the local environment on recruitment: a comparative study of North Sea and Baltic Sea fish stocks
While the impact of environmental forcing on recruitment variability in marine populations remains largely elusive, studies spanning large spatial areas and many stocks are able to identify patterns common to different regions and species. In this study, we investigate the effects of the environment on the residuals of a Ricker stock-recruitment (SR) model, used as a proxy of prerecruits’ survival, of 18 assessed stocks in the Baltic and North Seas. A probabilistic principal components (PCs) analysis permits the identification of groups of stocks with shared variability in the prerecruits’ survival, most notably a group of pelagics in the Baltic Sea and a group composed of gadoids and herring in the North Sea. The first two PCs generally grouped the stocks according to their localizations: the North Sea, the Kattegat-Western Baltic, and the Baltic Sea. This suggests the importance of the local environmental variability on the recruitment strength. Hence, the prerecruits’ survival variability is studied according to geographically disaggregated and potentially impacting abiotic or biotic variables. Time series (1990-2009) of nine environmental variables consistent with the spawning locations and season for each stock were extracted from a physical-biogeochemical model to evaluate their ability to explain the survival of prerecruits. Environmental variables explained >70% of the survival variability for eight stocks. The variables water current, salinity, temperature, and biomass of other fish stocks are regularly significant in the models. This study shows the importance of the local environment on the dynamics of SR. The results provide evidence of the necessity of including environmental variables in stock assessment for a realistic and efficient management of fisheries.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Ecosystem based Marine Management, Department of Physics, Section for Marine Living Resources
Authors: Pécuchet, L. (Intern), Nielsen, J. R. (Intern), Christensen, A. (Intern)
Number of pages: 13
Pages: 1323-1335
Publication date: 2015
Improving escape panel selectivity by active stimulation of fish behaviour

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF
Authors: Krag, L. A. (Intern), Herrmann, B. (Ekstern), Feekings, J. P. ( Intern), Karlsen, J. D. (Intern)
Publication date: 2015
Main Research Area: Technical/natural sciences

Bibliographical note
ICES CM 2015/SSGIEOM:22, p. 45
Publication: Research › Conference abstract for conference – Annual report year: 2015

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
Journal: Journal of Applied Ichthyology
Volume: 31
Issue number: 3
ISSN (Print): 0175-8659
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 0.94
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 0.84
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.06
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 0.99
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.99
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.04
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Integration of fisheries in marine spatial planning: Quo vadis?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Leibniz-Institute for Baltic Sea Research, Wageningen IMARES, IFREMER, GEOMAR - Helmholtz Centre for Ocean Research Kiel, Agrocampus Ouest, Thünen Institute of Sea Fisheries, Cefas
Authors: Janssen, H. (Ekstern), Bartelings, H. (Ekstern), Bastardie, F. (Intern), Eero, M. (Intern), Girardin, R. (Ekstern), Hamon, K. (Intern), Hinrichsen, H. (Ekstern), Marchal, P. (Ekstern), Nielsen, J. R. (Intern), Le Pape, O. (Ekstern), Schulze, T. (Ekstern), Simons, S. (Ekstern), Teal, L. R. (Ekstern), Tidd, A. (Ekstern)
Number of pages: 2
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions:
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Bibliographical note
ICES CM 2015/O:01
Source: PublicationPreSubmission
Source-ID: 117610762
Publication: Research › Conference abstract for conference – Annual report year: 2015

Is warm-up important in fish locomotion? Recovery from anaerobic metabolism during exercise in striped surfperch Embiotoca lateralis

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Aquaculture, University of Porto, University of Iowa, University of Copenhagen, Consiglio Nazionale delle Ricerche
Authors: Svendsen, J. C. (Intern), Methling, C. (Intern), Tirsgaard, B. (Ekstern), Cordero, G. A. (Ekstern), Steffensen, J. F. (Ekstern), Domenici, P. (Ekstern)
Publication date: 2015
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Kan frit redskabsvalg hjælpe når discardforbudet kommer?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Public Sector Consultancy, Aalborg University
Publication date: 2015
Event: Poster session presented at Internationale fiskerimesse, Aalborg, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2015
Katalog over selektive redskaber afprøvet i dansk fiskeri: En guide til bedre at undgå uønsket fangst

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Frandsen, R. (Intern), Krag, L. A. (Intern), Karlsen, J. D. (Intern), Feeings, J. P. (Intern)
Number of pages: 55
Publication date: 2015

Publication information
Place of publication: Charlottenlund
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
ISBN (Electronic): 978-87-7481-211-1
Original language: Danish
Series: DTU Aqua-rapport
Number: 300-2015
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers_version
Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Research › Report – Annual report year: 2015

Kortlægning af sælskader i dansk fiskeri

General information
State: Published
Authors: Larsen, F. (Intern), Krog, C. (Ekstern), Klastrup, M. (Ekstern), Buchmann, K. (Ekstern)
Number of pages: 74
Publication date: 2015

Publication information
Place of publication: Charlottenlund
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
ISBN (Electronic): 978-87-7481-210-4
Original language: English
Series: DTU Aqua-rapport
Number: 299-2015
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers_version
Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Research › Report – Annual report year: 2015

Kystnære stenrev – en oversigt over deres historiske skæbne, nuværende status og biologiske betydning

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University, Geological Survey of Denmark and Greenland, DHI Denmark
Authors: Stenberg, C. (Intern), Dahl, K. (Ekstern), Al-Hamdani, Z. (Ekstern), Møhlenberg, F. (Ekstern), Støttrup, J. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Larval grazing on zooplankton from a spatial model of the North Sea larval community
Live and let die: The rapid development of research to assess survival of discards in European fisheries

Long-term effects of an offshore wind farm in the North Sea on fish communities

Long-term effects of the Horns Rev 1 offshore wind farm (OWF) on fish abundance, diversity and spatial distribution were studied. This OWF is situated on the Horns Reef sand bank in the North Sea. Surveys were conducted in September 2001, before the OWF was established in 2002, and again in September 2009, 7 yr post-establishment. The sampling surveys used a multi-mesh-size gillnet. The 3 most abundant species in the surveys were whiting Merlangius merlangus, dab Limanda limanda and sandeels Ammodytidae spp. Overall fish abundance increased slightly in the area where the OWF was established but declined in the control area 6 km away. None of the key fish species or functional fish groups showed signs of negative long-term effects due to the OWF. Whiting and the fish group associated with rocky habitats showed different distributions relative to the distance to the artificial reef structures introduced by the turbines. Rocky habitat fishes were most abundant close to the turbines while whiting was most abundant away from them. Species diversity was significantly higher close to the turbines. Overall, these results indicate that the artificial reef structures were large enough to attract fish species with a preference for rocky habitats, but not large enough to have adverse negative effects on species inhabiting the original sand bottom between the turbines.
Lost in translation: Increased complexity in management results in lost pelagic catch opportunities

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Wageningen IMARES
Authors: Hintzen, N. T. (Ekstern), Pastoors, M. (Ekstern), Sparrevoorn, C. R. (Ekstern), Rindorf, A. (Intern), Cooper , A. (Ekstern), Worsøe Clausen, L. (Intern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Links:
Management of fisheries in harbour porpoise (Phocoena phocoena) marine protected areas

The harbour porpoise (Phocoena phocoena) is the focus of a range of conservation efforts and policies aiming at reducing bycatch of the species in gillnet fisheries. In European waters, the harbour porpoise is protected within the Habitats Directive (Annexes II and IV), implying that the population has to be maintained at a favourable conservation status and the deliberate actions of killing and disturbance and habitat deterioration shall be prohibited in accordance with the directive's aims. A spatial network, Natura2000, will further protect all Annex II species. According to Natura2000, Member States are obliged to nominate candidate protected areas in their waters to the EU Commission and within six years establish legislation to implement them as special areas of conservation and prepare management plans. Up to this point in time, however, no such management plans exist. This Ph.D. thesis focuses on research methods and management tools, which can contribute to a better scientific understanding in the preparation of fisheries management plans for Natura2000 sites designated for harbour porpoises. Firstly, it investigates the potential use of CCTV cameras to document bycatch of marine mammals. Here it is shown that Remote Electronic Monitoring (REM) systems installed on commercial fishing vessels can provide video footage, time and position of all net hauls and record bycatches of marine mammals. Comparisons between the visual analysis of the REM data and fishers logbooks showed that the REM system gave more reliable results since fishers did not, in many instances, observe the bycatch while working on the deck because it dropped out of the net before coming on board. Furthermore, REM provided high percentage coverage at low cost, compared to on-board observers. Secondly, the suitability of using high-resolution spatial and temporal data on porpoise density and fishing effort data from the Danish Skagerrak Sea as a method to predict harbour porpoise bycatches was examined. The results showed that a simple relation between the two could predict bycatch and that the final model can thus be used as a tool to identify areas of porpoise bycatch risk and thereby support the management of both fisheries and harbour porpoises in accordance with the Habitats Directive. Thirdly, the behaviour of porpoises in relation to two different pinger types with different acoustic properties was studied at three different locations. The results showed that at one location, the AQUAmark100 pinger had a significant effect on porpoise echolocation behaviour at 0 and 200 m distances, whereas another trial showed a significant reduction in such behaviour for up to 400 m. In none of the studies of the AQUA100 did the behaviour reveal any signs of habituation. Studies of the AQUAmark300, however, revealed clear habituation effects. Fourthly and finally, the thesis describes the governance process and its mechanisms and conflicts surrounding ongoing fisheries management planning with a focus on two Natura2000 sites in the Danish part of the Skagerrak Sea designated to protect harbour porpoises.
Managing population mixing; genetics supported stock splitting in Atlantic cod

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management
Authors: Hansen, J. H. (Intern), Hüsey, K. (Intern), Huwer, B. (Intern), Mosegaard, H. (Intern), Eero, M. (Intern)
Publication date: 2015
Event:
Bibliographical note
ICES C.M. 2015/I:12
Publication: Research › Conference abstract for conference – Annual report year: 2015

Marine litter in Nordic waters

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University, Swedish Environmental Research Institute
Authors: Strand, J. (Ekstern), Tairova, Z. (Ekstern), Danielsen, J. (Ekstern), Hansen, J. W. (Ekstern), Magnusson, K. (Ekstern), Naustvoll, L. (Ekstern), Sørensen, T. K. (Intern)
Number of pages: 76
Publication date: 2015
Publication information
Place of publication: Copenhagen
Publisher: Nordic Council of Ministers
ISBN (Print): 978-92-893-4030-4
Original language: English
Series: TemaNord
Number: 2015:521
ISSN: 0908-6692
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers_version
DOIs:
10.6027/TN2015‐521
Links:
Publication: Research - peer-review › Report – Annual report year: 2015

Methods for integrated use of fisheries research survey information in understanding marine fish population ecology and better management advice: Improving methods for evaluation of research survey information under consideration of survey fish detection and catch efficiency

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Nielsen, J. R. (Intern)
Number of pages: 187
Publication date: 2015
Publication information
Place of publication: Wageningen
Publisher: Wageningen University
ISBN (Print): 978-94-6257-255-3
Original language: English
Main Research Area: Technical/natural sciences
Modelling population effects of juvenile offshore fish displacement towards adult habitat

Recent studies of fish distribution patterns highlight shifts in the spatial distributions of particular life-stages. Focus has thus far been on changes in habitat use and possible drivers for these changes. Yet, small-scale shifts in habitat use of certain life stages may have profound consequences on population dynamics through changes in resource use and competition. To explore this, a conceptual stage-structured model was developed with 3 stages and 2 resources and allowing a move of large juveniles from the shallow to the deep habitat. Large juveniles compete with small juveniles in shallow waters and with adults in deeper waters. Alternative stable states occur, with one state dominated by small juvenile biomass and the other dominated by adult biomass. The model results show for both states that while large juvenile biomass responds to a change in time spent in the deep habitat, the biomass of small juveniles and adults is barely affected.

Between the 2 states there is a profoundly different population response to increased fishing mortality. In the adult biomass dominated state, adult biomass is hardly affected while juvenile biomass increases until population collapse, with increased fishing. In the small juvenile dominated state, adult and small juvenile biomass decrease, and large juvenile biomass increases. This state persists at much higher fishing mortality than the adult biomass dominated state. This study highlights that safeguarding nursery functions in a changing environment requires monitoring of juvenile life-stages in a range of habitats and a spatially adaptive management strategy.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Wageningen IMARES, Swedish University of Agricultural Sciences
Authors: van de Wolfshaar, K. (Ekstern), Tulp, I. (Ekstern), Wennhage, H. (Ekstern), Støttrup, J. (Intern)
Pages: 193-201
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Marine Ecology - Progress Series
Volume: 540
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
MSC certification of plaice fisheries in area IIIa: Basic investigations and development of a management plan

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Section for Marine Ecology and Oceanography
Authors: Hansen, J. H. (Intern), Ulrich, C. (Intern), Boje, J. (Intern), Christensen, A. (Intern), Degel, H. (Intern), Hüsy, K. (Intern), Worsae Clausen, L. (Intern)
Number of pages: 52
Publication date: 2015

Publication information
Place of publication: Charlottenlund
Publisher: DTU aqua. National Institute of Aquatic Resources
ISBN (Electronic): 978-87-7481-216-6
Original language: English

Series: DTU Aqua Report
Number: 302-2015
ISSN: 1395-8216
Main Research Area: Technical/natural sciences
Electronic versions:
MSY ranges in a multispecies stochastic model environment

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Vinther, M. (Intern), Rindorf, A. (Intern), Kempf, A. (Ekstern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Links:

Multidisciplinary mapping of fish habitats in the Sound, Denmark for maritime spatial planning

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Natural History Museum of Denmark
Number of pages: 2
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences

New policies may call for new approaches: the case of Swedish Norway lobster (Nephrops norvegicus) fisheries in the Kattegat and Skagerrak

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Hornberg, S. (Ekstern), Ulmestrand, M. (Ekstern), Sköld, M. (Ekstern), Jonsson, P. (Ekstern), Eigaard, O. R. (Intern), Feekings, J. P. (Intern), Nielsen, J. R. (Intern), Bastardie, F. (Intern), Lövgren, J. (Ekstern)
Publication date: 2015
Event: Poster session presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences

New policies will require new approaches: the case of the Swedish Norway Lobster (Nephrops norvegicus) fisheries in the Kattegat and Skagerrak

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SP Technical Research Institute of Sweden, Swedish University of Agricultural Sciences
Optimal bæredygtig udnyttelse af tilgængelige torskebestande for dansk fiskeri

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life
Authors: Eero, M. (Intern), Hansen, J. H. (Intern), Hüsy, K. (Intern), Huwer, B. (Intern), Berg, C. W. (Intern), Mariani, P. (Intern), Mosegaard, H. (Intern), Nielsen, A. (Intern), Eg Nielsen, E. (Intern), Rindorf, A. (Intern), Ulrich, C. (Intern), Vinther, M. (Intern), Worsøe Clausen, L. (Intern)
Number of pages: 52
Publication date: 2015

Overraskende fangst af pigghvar

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Pages: 26
Publication date: 2015
Main Research Area: Technical/natural sciences

Overraskende fangst af stor pigghvar med mærke

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2015
Main Research Area: Technical/natural sciences

Links:
http://www.fiskepleje.dk/Nyheder/2015/10/Overraskende-fangst-af-stor-pigghvar-med-maerke?id=09649acf-c478-4eee-b80b-cc6290ee2cf7&utm_source=newsletter&utm_media=mail&utm_campaign=Nyhedsbrev%20%2028.%20oktober%202015
Pilot project for the preparation of MSC certification of the gillnet fishery in the Baltic Sea

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Ecosystem based Marine Management, Danish Fishermen’s Producers’ Organization
Authors: Olesen, H. J. (Intern), Larsen, F. (Intern), Kindt-Larsen, L. (Intern), Jacobsen, J. B. (Ekstern)
Number of pages: 26
Publication date: 2015

Presfaktorer på miljøet i Limfjorden – betydning af fiskeriet på udvalgte nøgleparametre

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Ecosystem based Marine Management
Authors: Petersen, J. K. (Intern), Canal-Vergés, P. (Intern), Dinesen, G. E. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Processes controlling recruitment in Baltic cod

General information
State: Published
Organisations: National Institute of Aquatic Resources, Institute Management, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Leibniz Institute of Marine Sciences
Authors: Köster, F. (Intern), Huwer, B. (Intern), Hinrichsen, H. (Ekstern), Neumann, V. (Intern), Makarchouk, A. (Ekstern), Eero, M. (Intern), Hüssy, K. (Intern), Plikshs, M. (Ekstern)
Publication date: 2015
Event:
Main Research Area: Technical/natural sciences
Bibliographical note
ICES C.M. 2015/Q:20
Publication: Research › Conference abstract for conference – Annual report year: 2015

Reaching out: Communicating the Danish Eel Expedition 2014

General information
State: Published
Organisations: National Institute of Aquatic Resources, Institute Management, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Reeh, L. (Intern), Christoffersen, M. (Intern), Sørensen, S. R. (Intern), Nielsen, T. G. (Intern), Munk, P. (Intern)
Publication date: 2015
Event: Poster session presented at 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Communication › Poster – Annual report year: 2015

Reducing the impact of blue mussel (Mytilus edulis) dredging on the ecosystem in shallow water soft bottom areas
Dredging blue mussels (Mytilus edulis) and thus removing structural elements, inducing resuspension of sediment as well as reducing filtration capacity, will inevitably affect the ecosystem. The study demonstrates that the impacts of fishing can be reduced through gear developments. A new light dredge was tested on commercial vessels using two different...
experimental setups. First, a twin haul experiment tested the standard gear (i.e., a Dutch dredge) against the light dredge by fishing the two gears side by side onboard the same vessel. Second, a single dredge experiment tested the absolute performance of the two gears by fishing in areas with a known blue mussel density. Results from the twin haul experiment demonstrate that the weight of sediment retained in the gear per square metre fished is 49% less in the light dredge compared with the Dutch dredge which will reduce resuspension of sediment at the surface. Also, the drag resistance of the light dredge was significantly less (177.1 vs. 202.7kgm-1). In the twin haul experiment no significant difference was found in the catch per unit effort (CPUE) of the two gears. The single dredge experiment, on the other hand, demonstrated a significant increase in CPUE exceeding 200% when using the light dredge. Seafloor tracks made by the two dredges could not be distinguished by use of side-scan sonar and the tracks were still detectable 2 months after fishing. It was concluded that replacement of the Dutch dredge with the light dredge would reduce the impact of the fishery on the ecosystem by (i) reducing resuspension of sediment, (ii) reducing fuel consumption, and (iii) potentially reducing energy transfer to the sediment through a reduced gear drag resistance. A potential increase in catch efficiency may reduce the area affected. Fishing with the light dredge is discussed in relation to management of Natura 2000 sites.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Shellfish Centre, Section for Marine Living Resources, Section for Maritime Service, NIRAS A/S, Orbicon
Authors: Frandsen, R. (Intern), Eigaard, O. R. (Intern), Poulsen, L. K. (Ekstern), Tørring, D. B. (Intern), Stage, B. (Intern), Lisbjerg, D. (Intern), Dolmer, P. (Ekstern)
Pages: 162-173
Publication date: 2015
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Aquatic Conservation : Marine and Freshwater Ecosystems
Volume: 25
Issue number: 2
ISSN (Print): 1052-7613
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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 2.5 SJR 1.099 SNIP 1.018
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.066 SNIP 1.025 CiteScore 1.98
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.983 SNIP 1.196 CiteScore 1.99
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.116 SNIP 1.009 CiteScore 1.95
Scopus rating (2012): SJR 1.055 SNIP 1.134 CiteScore 2.15
Scopus rating (2011): SJR 1.164 SNIP 1.108 CiteScore 1.97
Scopus rating (2010): SJR 0.885 SNIP 0.936
Scopus rating (2009): SJR 0.824 SNIP 0.903
Scopus rating (2008): SJR 1.035 SNIP 1.182
Scopus rating (2007): SJR 0.802 SNIP 0.948
Scopus rating (2006): SJR 0.833 SNIP 0.928
Scopus rating (2005): SJR 0.81 SNIP 0.981
Scopus rating (2004): SJR 0.634 SNIP 1.333
Scopus rating (2003): SJR 0.606 SNIP 0.656
Scopus rating (2002): SJR 0.566 SNIP 0.593
Scopus rating (2001): SJR 0.571 SNIP 0.753
Scopus rating (2000): SJR 0.757 SNIP 0.784
Scopus rating (1999): SJR 0.545 SNIP 0.94

Original language: English
DOIs: 10.1002/aqc.2455
Relative abundance of Round Goby in a brackish Danish Fjord

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Number of pages: 16
Publication date: 2015

Publication information
Media of output: PowerPoint
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
Mads_Christoffersen_Relative_abundance_of_Round_Goby_in_a_brackish_Fjord.pdf

Relations
Activities:
Relative abundance of Round Goby in a brackish Danish Fjord
Publication: Research › Sound/Visual production (digital) – Annual report year: 2015

Relativ forekomst af fiskesamfund i en dansk fjord – med speciel fokus på Europæisk ål og sortmundet kutling

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Freshwater Fisheries Ecology, State Research Centre for Agriculture and Fishery Mecklenburg-Vorpommern
Authors: Christoffersen, M. (Intern), Jepsen, N. (Intern), Pedersen, M. I. (Intern), Støttrup, J. (Intern), Dorow, M. (Ekstern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Relativ forekomst af fiskesamfund i en dansk fjord – speciel fokus på sortmundet kutling (Neogobius melanostomus)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Number of pages: 18
Publication date: 2015

Publication information
Media of output: PowerPoint
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
HFM15_Relativ_forekomst_af_fiskesamfund_i_en_dansk_fjord_270115.pdf

Relations
Activities:
Relativ forekomst af fiskesamfund i en dansk fjord – speciel fokus på sortmundet kutling (Neogobius melanostomus)
Publication: Research › Sound/Visual production (digital) – Annual report year: 2015

Relaxing technical regulations under the Landings Obligation – effects on the discard ratio

The landings obligation (LO), currently being implemented in the new CFP, puts major constraints on fishers, by making the landing of unwanted catch mandatory. Less restrictive technical rules (TR) in a results-based management frame have been suggested as a mechanism to release some of these constraints. To investigate the effects of the existing TR, some fishers were relaxed from TR during the trial and could freely choose and develop alternative gears, aiming to optimize annual catch value, while reducing discards. The study included 14 demersal fishing vessels, operating in the North Sea, Skagerrak and the Baltic Sea. Fishers used test and control gears interchangeably or in pairs and were required to sort
and weight all discard of seven common target species on a haul by haul basis. All vessels were equipped for Fully Documented Fisheries, including cameras. Collected data were analyzed to investigate differences in landings, discards, discard ratio, CPUE, VPUE and DPUE, between conventional (control) and new gears (test). The results showed a varying degree of success, depending both on area and on choices made by the individual fisher. The best results were observed in the Baltic Sea, where relaxing technical rules led to major improvements in fishing patterns. But gear changes did not contribute much in fisheries where initial discards rates were already low.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Aalborg University
Authors: Mortensen, L. O. (Intern), Olesen, H. J. (Intern), Qvist Elíasen, S. (Intern), Egekvist, J. (Intern), Rindorf, A. (Intern), Ulrich, C. (Intern)
Number of pages: 2
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions:

Bibliographical note
ICES C.M. 2015/L:16
Publication: Research › Conference abstract for conference – Annual report year: 2015

Reply to 'Sources of uncertainties in cod distribution models'

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, University of Lausanne, University of Copenhagen, University of Fribourg, Aarhus University, Danish Meteorological Institute, Universite de Bordeaux
Authors: Wisz, M. (Intern), Broennimann, O. (Ekstern), Grønkjær, P. (Ekstern), Møller, P. D. R. (Ekstern), Olsen, S. M. (Ekstern), Swingedouw, D. (Ekstern), Hedeholm, R. (Ekstern), Eg Nielsen, E. (Intern), Guisan, A. (Ekstern), Pellissier, L. (Ekstern)
Pages: 790-791
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Nature Climate Change
Volume: 5
Issue number: 9
ISSN (Print): 1758-678X
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 10.06
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 9.64
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 7.38
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 5.86
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
RevFisk – et projekt som kvantificerer stenrevs betydning for fisk

**General information**

**State:** Published

**Organisations:** National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Freshwater Fisheries Ecology, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life, Aarhus University, DHI Denmark


**Publication date:** 2015

**Event:** Poster session presented at 18. Danske Havforskermøde, Copenhagen, Denmark.

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

**Electronic versions:**

**Publishers version**

Publication: Research › Poster – Annual report year: 2015

Science-industry partnerships: The value of cooperative research in fisheries and marine management

**General information**

**State:** Published

**Organisations:** National Institute of Aquatic Resources, Section for Ecosystem based Marine Management

**Authors:** Ulrich, C. (Intern), Manderson, J. (Ekstern), Fitzpatrick, M. (Ekstern), Robins, R. (Ekstern)

**Number of pages:** 5

**Publication date:** 2015

**Event:** Paper presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.

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

**Electronic versions:**

**Publishers version**

Publication: Research › Paper – Annual report year: 2015

Size selection in codends made of thin-twined Dyneema netting compared to standard codends: A case study with cod, plaice and flounder

**General information**

**State:** Published

**Organisations:** National Institute of Aquatic Resources, Section for Ecosystem based Marine Management

**Authors:** Ulrich, C. (Intern), Manderson, J. (Ekstern), Fitzpatrick, M. (Ekstern), Robins, R. (Ekstern)

**Number of pages:** 5

**Publication date:** 2015

**Event:** Paper presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.

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

**Electronic versions:**

**Publishers version**

Publication: Research › Paper – Annual report year: 2015
In an experimental trawl fishery, diamond mesh codends made out of 2.5 mm flexible Dyneema twinewe were tested. The principle aim was to investigate the effect of the number of meshes in the codend circumference, the number of twines (single or double), and netting orientation (T0 or T90) on the size selection of cod (Gadus morhua), plaice (Pleuronectes platessa) and flounder (Platichthys flesus). In addition, the obtained size selectivity for the codends made of Dyneema netting were compared to results obtained for T90 codends made of standard 5 mm single twine PE netting, and to previous results for other PE codends used in the same fishery. It was observed that the selective performance of the Dyneema netting codends was very high compared to other T0 and T90 codends of the same mesh size and number of meshes in the codends circumference. This demonstrates the high selective potential of the thin and flexible Dyneema netting compared to nettings which are traditionally used in the construction of trawl codends. Furthermore, reducing the number of meshes in the codend circumference for the Dyneema codends significantly increased the size selection of cod but did not affect the size selection of plaice and flounder. This difference between the species is likely linked to their different morphologies. No differences in the size selection of the T0 and T90 designs made of Dyneema twine tested were observed for any of the three species. For cod, the effect of using single or double twine in the Dyneema codend was also tested, however, no significant differences were found.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF, Thünen Institute of Baltic Sea Fisheries, University of Hamburg, Sea Fisheries Institute
Pages: 82-91
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 167
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
Social, economic, and ecological impact assessment across marine sectors?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Nielsen, J. R. (Intern), Schmidt, J. (Ekstern), Thunberg, E. (Ekstern), Holland, D. (Ekstern)
Number of pages: 4
Publication date: 2015
Event: Paper presented at ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version

Bibliographical note
ICES Theme session M
Publication: Research › Paper – Annual report year: 2015

Sortmundet kutling

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2015

Publication information
Source/Publisher: Fiskepleje.dk
Main Research Area: Technical/natural sciences
Links:
http://www.fiskepleje.dk/Fiskebiologi/sortmundet-kutling?utm_source=newsletter&utm_media=mail&utm_campaign=Nyhedsbrev%202015
Species selectivity in different sized topless trawl designs: Does size matter?

Most demersal trawl fisheries are conducted in a multispecies setting, and the catch consists of several different species. An inherent challenge in such fisheries is to provide both biologically and economically sustainable exploitation of individually fluctuating stocks and vessel- or fleet-specific quotas. The toplesstrawl design was developed to improve species-specific selectivity in such fisheries. In a topless trawl, the foot rope is located more forward than the headline to allow fish to escape upwards, whereas the headline is located in front in traditional trawl designs. In this study we conducted twin trawls with a topless trawl towed parallel to a similar standard trawl; we tested a topless trawl design on a small trawl with a low headline height and on a larger trawl with a high headline height. We conducted the tows in the Nephrops (Nephrops norvegicus) directed mixed fisheries. For both the small and large trawls, we found a significant topless effect for haddock (Melanogrammus aeglefinus) and no effect for Nephrops. For Atlantic cod (Gadus morhua) we found a significant topless effect for the low headline trawl but no effect for the high headline trawl. In both the eastern and western Atlantic, topless trawls have been introduced as legal cod-selective trawl designs. However, this study demonstrates that identical gear modifications made to similar trawls of different sizes and used in the same fishery can lead to different results.
Status og muligheder for det danske hav: Rapport til VILLUM FONDEN og VELUX FONDENs miljøprogram

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
Publication date: 2015

Publication information
Publisher: Aarhus Universitet, DCE – Nationalt Center for Miljø og Energi
Original language: Danish
Main Research Area: Technical/natural sciences
Source: FindIt
Source-ID: 2291736712
Publication: Research - peer-review › Report – Annual report year: 2015

Stock mixing of eastern and western Baltic cod in SD 24

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Marine Living Resources, Section for Ecosystem based Marine Management
Authors: Hüssy, K. (Intern), Mosegaard, H. (Intern), Albertsen, C. M. (Intern), Hansen, J. H. (Intern), Eero, M. (Intern)
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Surveillance indicators and their use in implementation of the Marine Strategy Framework Directive

The European Union Marine Strategy Framework Directive (MSFD) uses indicators to track ecosystem state in relation to Good Environmental Status (GES). These indicators were initially expected to be “operational”, i.e. to have well-understood relationships between state and specified anthropogenic pressure(s), and to have defined targets. Recent discussion on MSFD implementation has highlighted an additional class of “surveillance” indicators. Surveillance indicators monitor key aspects of the ecosystem for which there is: first, insufficient evidence to define targets and support formal state assessment; and/or second, where links to anthropogenic pressures are either weak or not sufficiently well understood to underpin specific management advice. Surveillance indicators are not only expected to directly track state in relation to GES, but also to provide complementary information (including warning signals) that presents a broader and more holistic picture of state, and inform and support science, policy, and management. In this study, we (i) present a framework for including surveillance indicators into the Activity–Pressure–State–Response process, (ii) consider a range of possible indicators that could perform this surveillance role, and (iii) suggest criteria for assessing the performance of candidate surveillance indicators, which might guide selection of the most effective indicators to perform this function.

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Marine Scotland Science, Wageningen IMARES, International Council for the Exploration of the Sea, Queen's University Belfast
Authors: Shephard, S. (Ekstern), Greenstreet, S. P. R. (Ekstern), Piet, G. J. (Ekstern), Rindorf, A. (Intern), Dickey-Collas, M. (Intern)
Pages: 2269-2277
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information

Journal: ICES Journal of Marine Science
Volume: 72
Issue number: 8
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
Surveillance indicators and their use in implementation of the Marine Strategy Framework Directive

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Marine Scotland Science, Wageningen IMARES, International Council for the Exploration of the Sea, Queen's University Belfast
Authors: Shephard, S. (Ekstern), Greenstreet, S. P. R. (Ekstern), Piet, G. J. (Ekstern), Rindorf, A. (Intern), Dickey-Collas, M. (Intern)
Number of pages: 1
Publication date: 2015
Event: Abstract from ICES Annual Science Conference 2015, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Electronic versions:

Bibliographical note
ICES CM 2015/P:04
Publication: Research › Conference abstract for conference – Annual report year: 2015

Sustainability, fuel use, and profitability: interlinked consequences of stock dynamics and choices of individual vessel spatial effort allocation within the Western Baltic

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Publication date: 2015
Event: Abstract from SOCIOEC EU-FP7-SYMPOSIUM: the socio-economic impacts of management measures of the new Common Fisheries Policy, Brussels, Belgium.
SYMBIOSE: Ecologically relevant data for marine strategies
The main objective of the SYMBIOSE project was to develop spatial distributions of anthropogenic pressures and ecosystem components for nationwide Danish marine waters including the eastern North Sea, Skagerrak, Kattegat and Belt Sea. In this report we present the resulting data including distributions of 78 spatially harmonized indicators (38 human activities and 40 ecosystem components including key species and habitats). Knowledge of the spatial distribution of these indicators is a prerequisite for identifying and mapping cumulative human pressures and impacts in Danish marine waters. This report provides a detailed overview of the spatial distribution of human activities and ecosystem components based on the available data (see annex). The methodology is based on the methodology adopted by the HARMONY project for the eastern North Sea, but applied nationwide in SYMBIOSE. The result is a catalogue of spatial maps and data sheets with a detailed description of data sources and methods for selected data layers. The maps developed provide a state-of-the-art data collection for a future mapping of cumulative pressures and impacts in Danish marine waters.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
Authors: Mohn, C. (Forskerdatabase), Göke, C. (Forskerdatabase), Timmermann, K. (Forskerdatabase), Andersen, J. H. (Ekstern), Dahl, K. (Ekstern), Dietz, R. (Ekstern), I. Iversen, L. (Ekstern), Mikkelsen, L. (Forskerdatabase), Petersen, I. K. (Forskerdatabase), Koefoed Rømer, J. (Forskerdatabase), Sørensen, T. K. (Intern), Stæhr, P. (Ekstern), Sveegaard, S. (Forskerdatabase), Teilmann, J. (Ekstern), Tougaard, J. (Forskerdatabase)
Number of pages: 104
Publication date: 2015

Publication information
Publisher: Aarhus Universitet, DCE – Nationalt Center for Miljø og Energi
Volume: 62
Original language: English
Main Research Area: Technical/natural sciences
Human Activities, Marine Ecosystem Components, Marine Strategy Framework Directive, North Sea, Skagerrak, Kattegat, Belt Sea, Western Baltic Sea
Temporal development of coastal ecosystems in the Baltic Sea over the past two decades

Coastal areas are among the most biologically productive aquatic systems worldwide, but face strong and variable anthropogenic pressures. Few studies have, however, addressed the temporal development of coastal ecosystems in an integrated context. This study represents an assessment of the development over time in 13 coastal ecosystems in the Baltic Sea region during the past two decades. The study covers between two to six trophic levels per system and time-series dating back to the early 1990s. We applied multivariate analyses to assess the temporal development of biological ecosystem components and relate these to potential driving variables associated with changes in climate, hydrology, nutrient status, and fishing pressure. Our results show that structural change often occurred with similar timing in the assessed coastal systems. Moreover, in 10 of the 13 systems, a directional development of the ecosystem components was observed. The variables representing key ecosystem components generally differed across systems, due to natural differences and limitation to available data. As a result of this, the correlation between the temporal development of the biological components in each area and the driving variables assessed was to some extent area-specific. However, change in nutrient status was a common denominator of the variables most often associated with changes in the assessed systems. Our results, additionally, indicate existing strengths as well as future challenges in the capacity of currently available monitoring data to support integrated assessments and the implementation of an integrated ecosystem-based approach to the management of the Baltic Sea coastal ecosystems.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Swedish University of Agricultural Sciences, University of Tartu, Stockholm University, Fish Resources Research Department, Sea Fisheries Institute, AtlantNIRO, Swedish Agency for Water Management, Finnish Environment Institute, Finnish Game and Fisheries Research Institute
Pages: 2539-2548
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 72
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
The Baltic ATLANTIS model: Implementing a holistic framework to evaluate ecosystem wide responses to changes in climate and anthropogenic forcing

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Monitoring and Data, Centre for Ocean Life, Aarhus University
Authors: Palacz, A. (Intern), Nielsen, J. R. (Intern), Christensen, A. (Intern), Gislason, H. (Intern), Bastardie, F. (Intern), Geitner, K. (Intern), Maar, M. (Ekstern), Lindegren, M. (Intern), Hufnagl, M. (Intern), Fulton, E. (Ekstern)
Number of pages: 1
Publication date: 2015
Event: Poster session presented at 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Links:
http://www.marine-vectors.eu/Core_pages/The_Baltic_ATLANTIS_model_a_holistic_framework_to
Publication: Research – Poster – Annual report year: 2015

The history of cod in Greenland: A major fishery collapse explained by archived DNA

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management, University of Fribourg
The MSY concept in a multi-objective fisheries environment – lessons learned from the North Sea

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Wageningen IMARES, University of St Andrews, University of Copenhagen
Authors: Kempf, A. (Ekstern), Mumford, J. (Ekstern), Levontin, P. (Ekstern), Leach, A. (Ekstern), Hoff, A. (Ekstern), Hamon, K. (Intern), Bartelings, H. (Ekstern), Vinther, M. (Intern), Staebler, M. (Ekstern), Poos, J. J. (Ekstern), Smout, S. (Ekstern), Frost, H. (Ekstern), van den Burg, S. (Ekstern), Ulrich, C. (Intern), Rindorf, A. (Intern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Links:

The predictable narwhal: satellite tracking shows behavioural similarities between isolated subpopulations

Comparison of behavioural similarities between subpopulations of species that have been isolated for a long time is important for understanding the general ecology of species that are under pressure from large-scale changes in habitats. Narwhals (Monodon monoceros) east and west of Greenland are examples of separated populations that, in different ocean parts, will be coping with similar anthropogenic and climate-driven habitat alterations. To study this, 28 narwhals from the Scoresby Sound fjord system were tracked by satellite in 2010-2013. The average duration of contact with the whales was 124 days with one tag lasting 305 days and one whale recaptured.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Greenland Institute of Natural Resources, Greeneridge Science Inc.
Authors: Heide-Jørgensen, M. P. (Ekstern), Nielsen, N. (Ekstern), Hansen, R. G. (Ekstern), Schmidt, H. C. (Ekstern), Blackwell, S. B. (Ekstern), Jørgensen, O. A. (Intern)
Pages: 54-65
Publication date: 2015
Main Research Area: Technical/natural sciences
Publication information
Journal: Journal of Zoology
Volume: 297
Issue number: 1
ISSN (Print): 0952-8369
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 2.09 SJR 1.085 SNIP 1.106
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.008 SNIP 1.053 CiteScore 1.94
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
ZOOLOGY, MONODON-MONOCEROS, ADJACENT WATERS, EAST GREENLAND, BAFFIN-ISLAND, MOVEMENTS, WHALES, ABUNDANCE, CLIMATE, AREAS, BAY, Scoresby Sound, whale migration, satellite tracking, Greenland halibut, dive behaviour, site fidelity

DOIs:
10.1111/jzo.12257

Source: FindIt
Source-ID: 2280582994
Publication: Research - peer-review › Journal article – Annual report year: 2015

The use of at-sea-sampling data to dissociate environmental variability in Norway lobster (Nephrops norvegicus) catches to improve resource exploitation efficiency within the Skagerrak/Kattegat trawl fishery

Research into the influence of environmental variables on the behaviour of Norway lobster (Nephrops norvegicus), and hence catch rates, dates back to the 1960s (e.g., Höglund and Dybern, Diurnal and seasonal variations in the catch-composition of Nephrops norvegicus (L.) at the Swedish west coast. ICES CM 1965/I46; Simpson, Variations in the catches of Nephrops norvegicus at different times of day and night. Rapport et Proès-verbaux des Réunions Conseil permanent international pour l’Exploration de la Mer 156:186). However, the use of fishery-dependent data in identifying influential factors is relatively limited and only includes a number of papers on a limited dataset (e.g., Redant and De Clark, Diurnal variations in CPUE and length composition of the catches in a Nephrops directed fishery in the Central North Sea. ICES CM 1984/K:3; Maynou and Sardà, Influence of environmental factors on commercial trawl catches of Nephrops norvegicus (L.). ICES J. Mar. Sci. 58:1318). Here, we aimed to dissociate environmental variability in Norway lobster catches to improve resource exploitation efficiency within the Skagerrak and Kattegat trawl fisheries by utilising data collected as part of an extensive at-sea-sampling programme spanning 16 years. Catch rates were modelled using Generalized Additive Mixed Models (GAMMs) and considered a range of response variables, including depth, temperature, current speed, season, moon phase and time of day. The results obtained herein showed that time of day, season, depth, temperature, year, trawl type and location all significantly affect catch rates of Nephrops.

General information
at-sea-sampling data, environmental variability, Kattegat, Nephrops norvegicus, Norway lobster, Skagerrak DOIs:
10.1111/fog.12116
Source: FindIt
Source-ID: 275559864
Publication: Research - peer-review › Journal article – Annual report year: 2015

Tonsvis af makreller: Invasionen fra vest

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Pages: 54-56
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisk & Fri
Issue number: 8
ISSN (Print): 0108-2000
Turning pests into protein – starfish by-product management in the Danish mussel industry

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Ecosystem based Marine Management
Authors: Fitridge, I. (Intern), Nielsen, C. F. (Intern), Gislason, H. (Intern), Saurel, C. (Intern), Petersen, J. K. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences

Twenty five years of invasion: management of the round goby Neogobius melanostomus in the Baltic Sea
The round goby, Neogobius melanostomus (Pallas, 1814), is one of the most invasive non-indigenous species in the Baltic Sea. It dominates coastal fisheries in some localities and is frequently found in offshore pelagic catches. This paper identifies management issues and suggests actions to be considered for post-invasion management. Priority should be given to the establishment of a coordinated pan-Baltic monitoring programme and associated data storage and exchange, as well as the compilation of landing statistics of the round goby in commercial and recreational fisheries. While eradication is unrealistic, population control that leads to minimising the risk of transfer to yet uncolonised areas in the Baltic Sea and adjacent waterbodies is feasible. This should comprise the requirement that the species be landed in commercial fishery bycatch, the management of ships’ ballast water and sediments, and hull fouling of inland and sea-going vessels, including recreational boats.

Extensive involvement of stakeholders is crucial at all phases of the management process.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Israel Oceanographic and Limnological Research, Baltic Sea Advisory Council, Swedish University of Agricultural Sciences, Finnish Environment Institute, University of Tartu
Authors: Ojaveer, H. (Ekstern), Galil, B. S. (Ekstern), Lehtiniemi, M. (Ekstern), Christoffersen, M. (Intern), Clink, S. (Ekstern), Florin, A. (Ekstern), Gruszka, P. (Ekstern), Punttila, R. (Ekstern), Behrens, J. (Intern)
Pages: 329-339
Publication date: 2015
Main Research Area: Technical/natural sciences
Understanding the release efficiency of Atlantic cod (Gadus morhua) from trawls with a square mesh panel: effects of panel area, panel position, and stimulation of escape response

Based on size selectivity data for more than 25,000 cod (Gadus morhua) collected during experimental trawl fishing with six different codends, all of which included a square mesh panel, we investigated the effect on cod-release efficiency based on the size of the square mesh panel area, position of the square mesh panel, and stimulation of the escape response. Based on the results, we were able to explain why the BACOMAcodend, applied in the Baltic Sea cod-directed trawl fishery, releases juvenile cod efficiently, whereas other designs, including a square mesh panel with similar mesh size, are less efficient. Our main findings reveal that the release efficiency of the square mesh panel in the BACOMA codend depends largely on the overlap of the square mesh panel and the catch-accumulation zone in the codend, where cod do not have the option of just drifting further back in the trawl when proximate to the panel. On the contrary, the reduction in panel size by 50% did not significantly affect the release efficiency when the panel overlapped with the catch-accumulation zone. It was possible to stimulate an escape response for cod to achieve a release through a square mesh panel positioned away from the catch-accumulation zone. Our findings demonstrated that this release was as efficient as for a panel mounted in the catch-accumulation zone of the codend. Devices that stimulate behaviour may improve the release efficiency of cod through square mesh panels in other fisheries where this is a problem.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Baltic Sea Fisheries, SINTEF, Sea Fisheries Institute
Authors: Herrmann, B. (Ekstern), Wienbeck, H. (Ekstern), Karlsen, J. D. (Intern), Stepputtis, D. (Ekstern), Dahm, E. (Ekstern), Moderhak, W. (Ekstern)
Pages: 686-696
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 72
Issue number: 2
Ups and downs in the cooperation between Danish fishers and scientists

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Fishermen's Producers' Organization
Authors: Rindorf, A. (Intern), Fischer, K. S. (Ekstern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
What are the major global threats and impacts in marine environments? Investigating the contours of a shared perception among marine scientists from the bottom-up

Marine scientists broadly agree on which major processes influence the sustainability of marine environments worldwide. Recent studies argue that such shared perceptions crucially shape scientific agendas and are subject to a confirmation bias. Based on these findings a more explicit engagement with scientists' (shared) perceptions of global change in marine environments is called for. This paper takes stock of the shared understanding in marine science of the most pertinent, worldwide threats and impacts that currently affect marine environments. Using results from an email survey among leading academics in marine science this article explores if a shared research agenda in relation to global change in
marine environments exists. The analysis demonstrates that marine scientists across disciplines are largely in agreement on some common features of global marine change. Nevertheless, the analysis also highlights where natural and social scientists diverge in their assessment. The article ends discussing what these findings imply for further improvement of interdisciplinary marine science.
What is it we want to maximise and sustain in Maximum Sustainable Yield?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Imperial College London, Marine Institute
Authors: Rindorf, A. (Intern), Mumford, J. (Ekstern), Worsøe Clausen, L. (Intern), Hill, L. (Ekstern), Hintzen, N. (Ekstern), Hoefnagel, E. (Ekstern), Holt, J. (Ekstern), Kempf, A. (Ekstern), Leach, A. (Ekstern), Levontin, P. (Ekstern), Mace, P. (Ekstern), Mackinson, S. (Ekstern), Olesen, C. (Ekstern), Potter, C. (Ekstern), Prellezo, R. (Ekstern), Rossberg, A. (Ekstern), Tserpes, G. (Ekstern), Voss, R. (Ekstern), Reid, D. (Ekstern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

What is MSY when stock productivity shifts? A worked example from the North Sea

General information
State: Published
Authors: Worsøe Clausen, L. (Intern), Rindorf, A. (Intern), Deurs, M. V. (Intern), Vinther, M. (Intern), Dickey-Collas, M. (Ekstern), Hintzen, N. (Ekstern)
Publication date: 2015
Event: Abstract from ICES MYFISH Symposium, Athens, Greece.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

When bigger is better - a theoretical and empirical examination of factors contributing to selection on offspring size in fish

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Centre for Ocean Life
Authors: Olsson, K. (Intern), Gislason, H. (Intern), Andersen, K. H. (Intern)
Number of pages: 164
Publication date: 2015

Publication information
Place of publication: Charlottenlund
Publisher: National Institute of Aquatic Resources, Technical University of Denmark
Original language: English
Main Research Area: Technical/natural sciences
25.000 små pigghvarrer udsættes ved sjællandske kyster for at øge pighvarbestanden

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2014

Publication information
Source/Publisher: Fiskepleje.dk
Main Research Area: Technical/natural sciences
Links:

Achieving MSY and minimising conflicts in mixed-fisheries management

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas, University of Copenhagen
Authors: Ulrich, C. (Intern), Dolder, P. J. (Ekstern), Hoff, A. (Ekstern), Kempf, A. (Ekstern), Poos, J. (Ekstern), Rindorf, A. (Intern), Vermard, Y. (Ekstern)
Number of pages: 15
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

A comparative analysis of legislated and modified Baltic Sea trawl codends for simultaneously improving the size selection of cod (Gadus morhua) and plaice (Pleuronectes platessa)

Five modified trawl codends were assessed for their utility in simultaneously improving the size selectiv-ity of cod (Gadus morhua) and plaice (Pleuronectes platessa) in the Baltic Sea. The modifications included refining the selective performance of the current Bacoma codend by increasing the mesh size of the lower panel from 109 mm double twine to 129 mm single twine and increasing the mesh size in the upper square mesh panel from 132 to 147 mm, and also making the lower panel the same design as the upper panel; i.e. a full square mesh codend. These three experimental designs were tested in conjunc-tion with the currently legislated codends; Bacoma and T90. The most favourable selective properties with regard to simultaneously improving the selectivity for round and flatfish, considering the current minimum landing sizes (MLS) for cod (38 cm) and plaice (25 cm) in the Baltic Sea and the fish populationsize structures during the sea trials, were found to be the T90 codend and the Bacoma codend with a modified lower panel. For the T90 codend, the selection parameters (L50 and SR) were 43.4 and 6.7 cm for cod, and 24.7 and 2.1 cm for plaice. The selection parameters for the most effective modified Bacoma codend were 41.1 and 8.3 cm for cod and 25.2 and 3.9 cm for plaice

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Thünen Institute of Baltic Sea Fisheries, SINTEF, National Marine Fisheries Research Institute
Authors: Wienbeck, H. (Ekstern), Herrmann, B. (Ekstern), Feekings, J. P. (Intern), Stepputtis, D. (Ekstern), Moderhaak, W. (Ekstern)
Pages: 28-37
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 150
ISSN (Print): 0165-7836
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Acoustic alarms reduce bycatch of harbour porpoises in Danish North Sea gillnet fisheries

A double-blind experiment in the Danish gillnet fishery for cod (Gadus morhua) demonstrated that pingers can substantially reduce bycatch of harbour porpoises (Phocoena phocoena). Fourteen vessels fished a total of 168 days in the North Sea in 1997. In the wreck fishery the total effort was 1052 nets with active pingers, 1056 nets with dummy pingers and 74 nets without pingers. Eight porpoises were caught, all in nets with dummy pingers. In the flat bottom/stony ground fishery the total effort was 5596 nets with active pingers, 5210 nets with dummy pingers and 2973 nets without pingers. Sixteen porpoises were caught, including 1 animal in a net with active pingers, 6 in nets with dummy pingers and 9 in nets without pingers. The difference in bycatch between nets with active pingers and nets with inactive or no pingers was highly significant (p < 0.007) for both the wreck fishery and the flat bottom/stony ground fishery. We conclude that the direct effects of the pinger signals on the porpoises caused the reduction in bycatch, which means that the results can be generalized to other situations where harbour porpoises are taken in gillnets. Generalized linear modelling demonstrated that cod cpue was not affected negatively by pingers. It was furthermore estimated that the stony ground fishery had significantly lower (p < 0.001) cpue values (a factor 0.47) compared to the wreck fishery. The results of this experiment led to the introduction of pingers in Danish gillnet fisheries in 2001 and were also part of the basis for EU Council Regulation 812/2004 introducing EU-wide use of pingers.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Larsen, F. (Intern), Eigaard, O. R. (Intern)
Pages: 108-112
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 153
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
A demonstration of an integrated ecosystem assessment and advice for Baltic Sea fish stocks

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Centre for Ocean Life, Section for Marine Ecology and Oceanography, University of Kiel, University of Hamburg, Stockholm University, Lund University
Authors: Möllmann, C. (Ekstern), Bergström, L. (Ekstern), Blenckner, T. (Ekstern), Casini, M. (Ekstern), Dierking, J. (Ekstern), Eero, M. (Intern), Levin, P. (Ekstern), Lindegren, M. (Intern), Neuenfeldt, S. (Intern), Otto, S. (Ekstern), Schmidt, J. (Ekstern), Tomczak, M. (Ekstern), Voss, R. (Ekstern), Gårdmark, A. (Ekstern)
Publication date: 2014
Main Research Area: Technical/natural sciences

Bibliographical note
ICES CM/2014 C:04
Publication: Research » Conference abstract for conference – Annual report year: 2014

Åleudsætning i Karrebæk Fjord viser flotte resultater

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Pages: 8-9
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Danske Fritidsfiskere
Assessing the state of pelagic fish communities within an ecosystem approach and the European Marine Strategy Framework Directive

Pelagic fish are key elements in marine foodwebs and thus comprise an important part of overall ecosystem health. We develop a suite of ecological indicators that track pelagic fish community state and evaluate state of specific objectives against Good Environmental Status (GES) criteria. Indicator time-series are calculated for the EU Marine Strategy Framework Directive “Celtic Seas” (CS) and “Greater North Sea” subregions. Precautionary reference points are proposed for each indicator and a simple decision process is then used to aggregate indicators into a GES assessment for each subregion. The pelagic fish communities of both subregions currently appear to be close to GES, but each remains vulnerable. In the CS subregion, fishing mortality is close to the precautionary reference point, although the unknown dynamics of sandeel, sprat, and sardine in the subregion may reduce the robustness of this evaluation. In the North Sea, sandeel stocks have been in poor state until very recently. Pelagic fish community biomass is slightly below the precautionary reference point in both subregions.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Queen's University Belfast, International Council for the Exploration of the Sea, Wageningen IMARES, Marine Institute
Authors: Shephard, S. (Ekstern), Rindorf, A. (Intern), Dickey-Collas, M. (Ekstern), Hintzen, N. T. (Ekstern), Farnsworth, K. (Ekstern), Reid, D. G. (Ekstern)
Pages: 1572-1585
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 71
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
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
Assessment of the Greenland Halibut Stock Component in NAFO Subarea 0 + Division 1A offshore + Division 1D-1F

The paper presents the background and the input parameters from research surveys and the commercial fishery to the assessment of the Greenland halibut stock component in NAFO Subarea 0 + Div. 1A offshore + Div. 1B-1F. During 2006-2009 catches have been around 24,000 tons. Catches increased to 26,900 tons in 2010 and has been at that level since. Survey trawlable biomass in Div. 0B decreased between 2011 and 2013 while biomass and recruitment increases in the Greenland shrimp fish survey and the recruitment of the 2012 year class in the entire survey area was the third largest in the time series. A combined standardized CPUE series from Div. 0A + 1AB has been stable since 2002. A combined CPUE series from Div. 1CD+0B decreased between 2011 and 2012 but increased slightly in 2013 and is above the level in 1990-2004. A combined standardized CPUE series from SA0 and 1 combined has been increasing gradually since 1997 and was in 2013 at the third highest level seen since 1990. CPUE series from the gill net in Div. 0A and Div. 0B were close to or at the highest level in the time series.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Fisheries and Oceans Canada
Authors: Jørgensen, O. A. (Intern), Treble, M. (Ekstern)
Number of pages: 53
Publication date: 2014
Conference: Scientific Council Research Meeting NAFO, 01/01/2011
Main Research Area: Technical/natural sciences

Publication information
Journal: Scientific Council Research Documents NAFO
Volume: 14
Issue number: 027
ISSN (Print): 0256-6915
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: English
Electronic versions:
Publishers version
Publication: Research › Conference article – Annual report year: 2014

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.

**General information**

State: Published  
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources  
Authors: Nielsen, J. R. (Intern), Kristensen, K. (Intern), Lewy, P. (Intern), Bastardie, F. (Intern)  
Publication date: 2014  
Main Research Area: Technical/natural sciences

**Publication information**

Journal: P L o S One  
Volume: 9  
Issue number: 6  
Article number: e99151  
ISSN (Print): 1932-6203  
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  
BFI (2015): BFI-level 1  
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32  
Web of Science (2015): Indexed yes  
BFI (2014): BFI-level 1  
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54  
Web of Science (2014): Indexed yes  
BFI (2013): BFI-level 1  
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94  
ISI indexed (2013): ISI indexed yes  
Web of Science (2013): Indexed yes  
BFI (2012): BFI-level 1  
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15  
ISI indexed (2012): ISI indexed yes  
Web of Science (2012): Indexed yes  
BFI (2011): BFI-level 1  
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58  
ISI indexed (2011): ISI indexed no  
Web of Science (2011): Indexed yes  
BFI (2010): BFI-level 1  
Scopus rating (2010): SJR 2.631 SNIP 1.161  
Web of Science (2010): Indexed yes  
BFI (2009): BFI-level 1  
Scopus rating (2009): SJR 2.473 SNIP 0.985  
Web of Science (2009): Indexed yes  
BFI (2008): BFI-level 1  
Scopus rating (2008): SJR 2.323 SNIP 0.96  
Web of Science (2008): Indexed yes
A Sustainability Index of potential co-location of offshore wind farms and open water aquaculture

This paper presents the definition of a Sustainability Index for the co-location in marine areas of offshore wind farms and aquaculture plans. The development of the index is focused on the application of MCE technique based on physical constraints and biological parameters that are directly linked to the primary production. The relevant physical factors considered are wind velocity and depth range (which directly governs the choice of the site for energy production and for offshore technology), the relevant biological parameters are SST, SST anomaly and CHL-a concentration (as a measurement of the productivity). The further development of the technique, already used in open water aquaculture localization, consists in converting raw data into sustainability scores, which have been combined using additive models, in order to define the overall sustainability. The study area used to implement the computation of the Sustainability Index (SI) was identified in the Danish portion of the Baltic Sea and in the western part of the Danish North Sea. Results on the spatial distribution of the SI underline different responses as a function of the physical and biological main influencing parameters

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Ecosystem based Marine Management, University of Naples "Parthenope"
Authors: Bennassai, G. (Ekstern), Mariani, P. (Intern), Stenberg, C. (Intern), Christoffersen, M. (Intern)
Pages: 213-218
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Ocean & Coastal Management
Volume: 95
ISSN (Print): 0964-5691
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 2.23 SJR 0.887 SNIP 1.123
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.783 SNIP 1.002 CiteScore 1.92
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.883 SNIP 1.306 CiteScore 2.05
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.719 SNIP 1.394 CiteScore 1.84
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.724 SNIP 1.061 CiteScore 1.72
Cryptic behaviour of juvenile turbot *Psetta maxima* L. and European flounder *Platichthys flesus* L.
The aim of this study was to examine the burying behaviour of hatchery-reared European flounder *Platichthys flesus* and turbot *Psetta maxima*, and whether conditioning on a sandy substrate would improve burying efficiency. Both species buried shortly after release on a sandy substrate. However, the study revealed interspecies differences; the flounder buried immediately after release, while the turbot buried gradually. No significant difference in burying efficiency was observed between naïve and conditioned flounder and turbot. An effect of size on burial efficiency was observed for both flounder and turbot with a tendency for larger fish to bury more efficiently than smaller fish, despite previous conditioning. Size at settlement was found to be >2 cm for flounder and >3 cm for turbot.

**General information**
State: Published
Organisations: Section for Coastal Ecology, National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
Authors: Kristensen, L. D. (Intern), Sparrevohn, C. R. (Intern), Christensen, J. T. (Ekstern), Støttrup, J. (Intern)
Pages: 185-193
Publication date: 2014
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Open Journal of Marine Science
Volume: 4
ISSN (Print): 2161-7384
Ratings:
Web of Science (2018): Indexed yes
Web of Science (2014): Indexed yes
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
Original language: English
Juvenile flatfish , Burying behaviour, Conditioning, Stock enhancement
Electronic versions:
Cryptic_Behaviour_of_Juvenile.pdf
DOIs:
10.4236/ojms.2014.43018
Danish seine - An environmental friendly fishing method?

Today, extensive research is devoted to assess the effects of demersal trawling on the marine ecosystem, but only few of such studies considered the Danish seine. Danish seines and bottom trawls are grouped together in the legislation. Trawling is more common and responsible for the major part of the total landings where the seine fleet and catches are decreasing. The Danish seine is a specific type of encircling net to catch demersal fish. It is characterized by moderate fuel consumption and no use of heavy weights or doors, probably resulting in a relatively gentle bottom-contact and low interactions with the seabed compared to e.g. traditional trawling. However, the assumptions on the more environmental friendliness in seining are not sufficiently addressed.

The present study aims at increasing the knowledge on Danish seining including its effect on the benthic ecosystem. The study starts with a comparison of existing catch data for Danish seines and trawls and continues with several substudies:

- Detailed description of all stages of the seining process to get a basis for the following investigations. Selectivity trials to support existing data, whereby both economically valuable and economically non-valuable species will be regarded
- Estimation of potential interactions of the gear with the sea bottom
- Assessment of survival chance of discarded animals
- Observation of fish behavior during capture process
- Combination of all single parts to provide an overall picture of effects of the Danish seine fishery on the marine environment

This study may contribute to increase understanding the catching process in the seine fishery and the gears interaction with seabed during the different stages of the fishing process. The outcome of such studies will be highly relevant in future discussions on the impacts Danish seining may has on the marine environment and the faunal diversity and to maintain viable fisheries in the future.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Noack, T. (Intern), Eggers, F. (Ekstern), Frandsen, R. (Intern), Krag, L. A. (Intern), Madsen, N. (Intern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Electronic versions:
Publisher: PublicationPreSubmission
Source-ID: 93297341
Publication: Research › Poster – Annual report year: 2014

Danske fritidsfiskere registrerer fangster i Danmarks største projekt med fangstregistrering

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Kristensen, L. (Intern)
Publication date: 2014

Publication information
Source/Publisher: Fiskepleje.dk
Main Research Area: Technical/natural sciences
Links:
Publication: Communication › Internet publication – Annual report year: 2014

Depth preference in released juvenile turbot Psetta maxima

Hatchery-reared juvenile turbot Psetta maxima were tagged with Passive Integrated Transponder (PIT) tags and released at three different depths in a sandy bay in Denmark. About 2–7% of the released fish were registered daily to monitor their distribution using a tag antenna mounted on a modified beam trawl, thus avoiding actually sampling the fish. The change in distribution of the three groups was adequately represented by a twodimensional movement model. Movement along the shorewas described by a Brownianmotion with group specific drift. Movement perpendicular to the shore linewas described by a Cox–Ingersoll–Ross process with a group specific attraction point. All three groups exhibited similar depth preferences of 1.7 m. Immediately after the release, fish were concentrated around the release points but after one day, fish had moved to the preferred depth and subsequently maintained their position at this depth. Farmed turbot exhibited strong site fidelity and an innate behaviour for selecting a preferred depth.
Determining the impacts of trawling on benthic function in European waters: a biological traits approach

One of the most widespread yet manageable pressures we impose on the seabed is disturbance of the substrate by towed demersal fishing gear (bottom trawling and dredging). Over the past forty to fifty years, many studies have been conducted specifically aiming to understand the impacts of such fishing gear on the seabed communities. Their outcomes have demonstrated dramatic effects of bottom trawling on the structure of marine ecosystems although impacts tend to be wide-ranging, depending upon the gear, intensity, spatial area and the nature of the seabed habitats. However, understanding the functional impacts of this activity (as opposed to impacts on the structure of benthic assemblages) has only recently been attempted. Advances in the application of biological traits analysis (BTA) wherein the assemblages are described in terms of their life history, behavioural and morphological characteristics, have allowed us to better understand the interactions between the benthic fauna and their environment at a functional level. We present the initial findings of work conducted under the auspices of the EU-funded project ‘BENTHIS’ which aims to improve our understanding of the impacts of trawling on benthic ecosystem functioning over much larger spatial scales than previously undertaken. Biological traits information from 887 stations across European waters (Norwegian, UK, Belgian, Dutch, Danish waters, the Mediterranean and Black Sea) were analysed to: i) quantify the relationships between infaunal trait composition and environmental variables (depth, sediment granulometry); ii) determine the relationship between traits and habitat type (EUNIS level 4); and iii) assess the relationships between trawling pressure (using data derived under BENTHIS; see Eigaard et al., this volume) and traits composition.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas, Hellenic Centre for Marine Research, Ondokuz Mayis University, Bangor University, Institute for Agricultural and Fisheries Research, Wageningen IMARES, Institute of Marine Research, Aarhus University
Authors: Bolam, S. (Ekstern), Kenny, A. (Ekstern), Garcia, C. (Ekstern), Eggleton, J. (Ekstern), Dinesen, G. E. (Intern), Buhl-Mortensen, L. (Ekstern), Smith, C. (Ekstern), Kalogeropoulou, V. (Ekstern), Gumus, A. (Ekstern), Hiddink, J. G. (Ekstern), Hoey, G. V. (Ekstern), Kooten, T. V. (Ekstern), Hansen, J. (Ekstern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2014

Development and use of a bioeconomic model for management of mussel fisheries under different nutrient regimes in the temperate estuary of the Limfjord, Denmark

Coastal ecosystems worldwide are under pressure from human-induced nutrient inputs, fishing activities, mariculture, construction work, and climate change. Integrated management instruments handling one or more of these problems in combination with socioeconomic issues are therefore necessary to secure a sustainable use of resources. In the Limfjord, a temperate eutrophic estuary in Denmark, nutrient load reductions are necessary to fulfill EU regulations such as the Water Framework Directive (WFD). The expected outcome of these load reductions is an improved water quality, but also reduced production of the abundant stock of filter-feeding blue mussels, Mytilus edulis. This is expected to have significant economic consequences for the million-euro mussel fishing industry taking place in the Limfjord today. We developed a bioeconomic model that can be used to explore the consequences of load reductions for mussel fishery as practiced today, as well as potential management options, to obtain an economically and ecologically sustainable mussel fishery. Model simulations clearly demonstrate a substantial decrease in mussel production after the nutrient load reductions necessary to obtain the targets in the WFD. With today’s practice, the mussel fishery in the Limfjord will not be profitable in a future, less eutrophic estuary. However, model simulations also revealed that mussel fishery can be profitable after implementation of the WFD with a reduction in the total fishing quota, fewer fishing vessels, and a higher fishing quota per vessel.

General information
Discarded fish in European waters: general patterns and contrasts

To reduce the practice of discarding commercially fished organisms, several measures such as a discard ban and extra allowances on top of landings quotas (“catch quota”) have been proposed by the European Commission. However, for their development and successful implementation, an understanding of discard patterns on a European scale is needed. In this study, we present an inter-national synthesis of discard data collected on board commercial, towed-gear equipped vessels operating under six different national flags spanning from the Baltic to the Mediterranean Seas mainly between 2003 and 2008. We considered discarded species of commercial value such as Atlantic cod (Gadus morhua), haddock (Melanogrammus aeglefinus), European hake (Merluccius merluccius), and European plaice (Pleuronectes platessa).

Comparisons of discard per unit effort rates expressed as numbers per hour of fishing revealed that in the Mediterranean Sea minimum size-regulated species such as hake are generally discarded in much lower numbers than elsewhere. For most species examined, variability in discard rates across regions was greater than across fisheries, suggesting that a region-by-region approach to discard reduction would be more relevant. The high uncertainty in discard rate estimates suggests that current sampling regimes should be either expanded or complemented by other data sources, if they are to be used for setting catch quotas.
Discards of Danish set nets fisheries in the Kattegat

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Savina, E. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Source: PublicationPreSubmission
Source-ID: 93455398
Publication: Research - peer-review › Journal article – Annual report year: 2013

Electronic versions:
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DOIs:
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Publication: Research › Poster – Annual report year: 2014
DISPLACE: a dynamic, individual-based model for spatial fishing planning and effort displacement - integrating underlying fish population models

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Bastardie, F. (Intern), Nielsen, J. R. (Intern), Miethe, T. (Ekstern)
Pages: 366-386
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 71
Issue number: 3
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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
Does copepod size determine food consumption of particulate feeding fish?

The climate-induced reduction in the mean copepod size, mainly driven by a decrease in the abundance of the large Calanus finmarchicus around 1987, has been linked to the low survival of fish larvae in the North Sea. However, to what extent this sort of reduction in copepod size has any influence on adult particulate feeding fish is unknown. In the present study, we investigated the hypothesis that the availability of the large copepods determines food consumption and growth conditions of lesser sandeel (Ammodytes marinus) in the North Sea. Analysis of stomach content suggested that food consumption is higher for fish feeding on large copepods, and additional calculations revealed how handling time limitation may provide part of the explanation for this relationship. Comparing stomach data and zooplankton samples indicated that lesser sandeel actively target large copepods when these are available. Finally, we observed that the length of lesser sandeel began to decrease in the late 1980s, simultaneously with the C. finmarchicus decline.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Centre for Ocean Life, Section for Ecosystem based Marine Management
Authors: Deurs, M. V. (Intern), Koski, M. (Intern), Rindorf, A. (Intern)
Pages: 35-43
Does the 'snot' of the oceans matter? Engaging with the public on gelatinous zooplankton. Lessons learned from The Danish Eel Expedition 2014

General information
State: Published
Organisations: National Institute of Aquatic Resources, Institute Management, Centre for Ocean Life, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management
Authors: Reeh, L. (Intern), Jaspers, C. (Intern), Sørensen, S. R. (Intern), Christoffersen, M. (Intern), Nielsen, T. G. (Intern), Munk, P. (Intern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014

DTU Aqua søger fiskere til discardprojekt

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Public Sector Consultancy
Authors: Ulrich, C. (Intern), Olesen, H. J. (Intern), Dalskov, J. (Intern)
Pages: 12
Publication date: 2014

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Publication: Communication › Newspaper article – Annual report year: 2014

DTU og fiskere samarbejder om optimering af fangstmuligheder

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State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Public Sector Consultancy
Authors: Ulrich, C. (Intern), Olesen, H. J. (Intern), Dalskov, J. (Intern)
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ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Publication: Communication › Newspaper article – Annual report year: 2014

Ecosystem-based management objectives for the North Sea: riding the forage fish rollercoaster
The North Sea provides a useful model for considering forage fish (FF) within ecosystem-based management as it has a complex assemblage of FF species. This paper is designed to encourage further debate and dialogue between stakeholders about management objectives. Changing the management of fisheries on FF will have economic consequences for all fleets in the North Sea. The predators that are vulnerable to the depletion of FF are Sandwich terns, great skuas and common guillemots, and to a lesser extent, marine mammals. Comparative evaluations of management
strategies are required to consider whether maintaining the reserves of prey biomass or a more integral approach of monitoring mortality rates across the trophic system is more robust under the ecosystem approach. In terms of trophic energy transfer, stability, and resilience of the ecosystem, FF should be considered as both a sized-based pool of biomass and as species components of the system by managers and modellers. Policy developers should not consider the knowledge base robust enough to embark on major projects of ecosystem engineering. Management plans appear able to maintain sustainable exploitation in the short term. Changes in the productivity of FF populations are inevitable so management should remain responsive and adaptive.
Effects of dietary fatty acids on the production and quality of eggs and larvae of Atlantic cod (Gadus morhua L.)
Cultivated Atlantic cod (Gadus morhua) entering their first year of gamete maturation were fed diets with different levels of arachidonic acid (ARA) and eicosapentaenoic acid (EPA) for 6.5 months prior to commencement of spawning. Gravid females were stripped three times: at the beginning, peak and end of spawning. Lipid composition and egg and larval quality of 34 family crosses were investigated. Results indicated that ARA uptake into eggs from broodstock diet was highly efficient achieving proportions of ARA up to 84% higher in eggs than in the diet. EPA was 42–76% higher, and DHA was 155–173% higher in eggs than in diets. Cod fed the diet with the lowest EPA/ARA ratio had the greatest egg production. Eggs from fish on a diet with high ARA level had significantly higher fertilization and hatching success than those fed low levels of ARA. This diet produced on average 71 viable eggs g^1 female compared with 32.5 and 4 eggs in diet B and C, respectively. Furthermore, larval survival until 8 days posthatch was higher in diets with lower ARA levels. The combined results showed that ARA dietary supplementation and low EPA/ARA ratio yielded a greater number of viable larvae kg^1 female

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, National Food Institute, Division of Industrial Food Research, Section for Marine Ecology and Oceanography, Section for Marine Living Resources, Fisheries and Oceans Canada
Authors: Røjbek, M. (Intern), Støttrup, J. (Intern), Jacobsen, C. (Intern), Tomkiewicz, J. (Intern), Nielsen, A. (Intern), Trippel, E. (Ekstern)
Pages: 654-666
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Main Research Area: Technical/natural sciences

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Scopus rating (2016): SJR 0.957 SNIP 1.448 CiteScore 1.96
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.005 SNIP 1.216 CiteScore 1.86
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.159 SNIP 1.285 CiteScore 1.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.205 SNIP 1.207 CiteScore 2.16
ISI indexed (2013): ISI indexed yes
Estimation of seafloor impact from demersal trawls, seines and dredges based on gear design and dimensions

This study estimates the seafloor impact of towed fishing gears from a bottom-up perspective. Traditionally fishing pressure, often in terms of indicators, is calculated topdown using the fishing effort information available in large-scale statistics such as logbook and VMS data. Here we take a different approach using the gear itself (design and dimensions) for understanding and estimation of the physical interactions with the seafloor at the individual fishing operation level. With reference to the métier groupings of EU logbooks, we defined 17 distinct towed gear
groups in European waters (11 otter trawl groups, 3 beam trawl groups, 2 demersal seine groups, and 1 dredge group), for which we established seafloor "footprints". The footprint of a gear was defined as the relative contribution from individual larger gear components, such as the trawl doors, sweeps and ground gear, to the total area and severity of the gear impact. An industry-based vessel and gear survey covering 13 different countries provided the basis for estimating the relative impact-area contributions from individual gear components, whereas seafloor penetration and resuspension was estimated for different sediment types based on a review of the scientific literature. For each defined gear group a vessel-size (kW or total length) – gear size (total gear width or circumference) relationship was estimated to enable the prediction of gear footprint area and sediment penetration from vessel size. The implications for the definition and monitoring of fishing pressure indicators are far-reaching, and are discussed in context of an ecosystem approach to fisheries management (EAFM).

Evaluating pyrene toxicity on Arctic key copepod species Calanus hyperboreus

Calanus hyperboreus is a key species in the Arctic regions because of its abundance and role in the Arctic food web. Exploitation of the off shore oil reserves along Western Greenland is expected in the near future, and it is important to evaluate the acute and chronic effects of oil emissions to the ecosystem. In this study C. hyperboreus females were exposed to concentrations of 0, 0.1, 1, 10 and 100 nM pyrene and saturated concentrations measured to ~300 nM. Daily quantification of egg and faecal pellet production showed significant decreases in the pellet production, while the egg production was unaffected. The hatching success was also unaffected, although the total reproductive output was reduced with increased pyrene concentrations. Accumulation of pyrene in the copepods was higher in feeding than starving females and only trace amounts of the phase I metabolite 1-hydroxypyrene, were found. Lowered reproductive output, reduced grazing, and reduced ability to metabolize pyrene suggest that oil contamination may constitute a risk to C. hyperboreus recruitment, energy transfer in the food web and transfer of pyrene to higher trophic levels.
Evaluation of integrated ecological-economic models - What are they used for?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Lund University
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Main Research Area: Technical/natural sciences
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Evaluation of the environmental sustainability of aquaculture products using the "sense-tool"

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Iceland
Authors: Pérez-Villareal, B. (Ekstern), Ramos, S. (Ekstern), Olafsdottir, G. (Ekstern), Larsen, E. (Intern)
Publication date: 2014
Event: Abstract from Aquaculture Europe 14, Donostia-San Sebastian, Spain.
Main Research Area: Technical/natural sciences
Fangsmetoden ved snurrevod skal udvikles

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Noack, T. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern), Madsen, N. (Intern)
Pages: 24
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Volume: 21
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ISI indexed (2012): ISI indexed no
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Main Research Area: Technical/natural sciences
Publication: Communication › Newspaper article – Annual report year: 2014

Fiskeriforvaltning i Natura 2000 områder

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Research Secretariat, Section for Marine Living Resources
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Publication: Commissioned › Report – Annual report year: 2014

Forage fish interactions: A symposium on creating the tools for ecosystem-based management of marine resources

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Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management
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Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 1
Forage fish, their fisheries, and their predators: who drives whom?

The North Sea has a diverse forage fish assemblage, including herring, targeted for human consumption; sandeel, sprat, and Norway pout, exploited by industrial fisheries; and some sardine and anchovy, supporting small-scale fisheries. All show large abundance fluctuations, impacting on fisheries and predators. We review field, laboratory, and modelling studies to investigate the drivers of this complex system of forage fish. Climate clearly influences forage fish productivity; however, any single-species considerations of the influence of climate might fail if strong interactions between forage fish exist, as in the North Sea. Sandeel appears to be the most important prey forage fish. Seabirds are most dependent on forage fish, due to specialized diet and distributional constraints (breeding colonies). Other than fisheries, key predators of forage fish are a few piscivorous fish species including saithe, whiting, mackerel, and horse-mackerel, exploited in turn by fisheries; seabirds and seals have a more modest impact. Size-based foodweb modelling suggests that reducing fishing mortality may not necessarily lead to larger stocks of piscivorous fish, especially if their early life stages compete with forage fish for zooplankton resources. In complex systems, changes in the impact of fisheries on forage fish may have potentially complex (and perhaps unanticipated) consequences on other commercially and/or ecologically important species.
High-resolution mapping of European fishing pressure on the benthic habitats

Mapping and monitoring of pressure from fishery on the marine benthic environment is necessary to support an ecosystem approach to fisheries management (EAFM). In many cases this need is not reflected in official fisheries statistics and logbooks, where focus typically is on catch rather than effort. Consequently, most logbook information is not well suited for quantitative estimation of seafloor impact (swept area and impact severity) of the different gears and trips. We present a method to overcome this information deficiency of official statistics and develop high-resolution large-scale maps of benthic fishing pressure covering the EU, Norwegian and Turkish waters. First individual logbook observations from 13 countries were assigned to 17 different functional gear groups (métiers) based on target species and gear type information. Secondly, relationships between gear width and vessel size (e.g. trawl door spread and vessel kW) for each métier were used to assign quantitative information of bottom contact to each logbook trip by translating vessel size information into measures of gear size. Thirdly the extended logbook data was merged with high-resolution activity data (VMS) and gear width estimates were assigned to individual interpolated vessel tracks based on VMS data. The outcome was European wide highresolution fishing intensity maps (total yearly swept area within grid cells of 1*1 minutes longitude and latitude) for 2010, 2011 and 2012. Finally the high-resolution fishing pressure maps were overlaid with existing marine habitat maps to identify areas of potential ecosystem service conflicts.

General information
State: Published
How does prey quality affect life-history traits under different temperature regimes?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Marine Ecology and Oceanography
Authors: Ross, S. D. (Intern), Holt, R. (Ekstern), Deurs, M. V. (Intern), Andersen, N. G. (Intern), Nielsen, J. R. (Intern), Jørgensen, C. (Ekstern)
Publication date: 2014
Event: Abstract from 11th International Congress on the Biology of Fish, Edinburgh, United Kingdom.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014

How spatial planning constrains cross-border fisheries: the bio-economic DISPLACE evaluation on the Baltic Sea

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Bastardie, F. (Intern), Nielsen, J. R. (Intern)
Publication date: 2014
Main Research Area: Technical/natural sciences
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Hvad med havmiljøet?

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State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Christoffersen, M. (Intern)
Publication date: 2014

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Source/Publisher: fishingzealand.dk
Main Research Area: Technical/natural sciences
Links:
http://fishingzealand.dk/debat/lille-hav-hvad-nu/
Publication: Communication › Internet publication – Annual report year: 2014

Hvorfor lægger fisk små æg?
Impact assessment of a fisheries closure with effort and landings spatial analyses: A case study in the Western Baltic Sea

Commercial fisheries in the Western Baltic Sea (WBS; ICES Subdivisions 22–24) are dominated by Danish and German vessels. By combining and processing logbook and Vessel Monitoring System (VMS) data for Germany and Denmark, we compare patterns of spatial effort allocation and the origin of the landings before (2005–2007) and during (2008–2010) implementation of the EU long-term management plan (LTMP) for cod. This management plan is likely to have affected the temporal and spatial extent of fisheries in the WBS. Changes that took place between 2005 and 2010 on the large scale of the WBS were therefore considered when selecting an appropriate stable reference period to inform and evaluate small-scale effort-displacement scenarios in the Fehmarn Belt. The WBS fisheries appear not to have been restricted by effort limits until 2010, but rather by total allowable catches (TACs) for cod. The amount of cod landed in the WBS decreased, and the origin of these landings shifted farther east without affecting the seasonal effort allocation. Landings of cod have also decreased in the Fehmarn Belt area, and since 2008, sprat has been the species most landed there. The planned construction of the Fehmarn Belt Fixed Link connecting Denmark and Germany could lead to the temporal closure of fishing activities. Three different effort-displacement scenarios were tested to determine how lost landings, caused by a fishing closure of a corridor near the link during construction, could be counteracted by moving the activities to a nearby area. To compensate for lost landings, the best strategy appears to be redistributing fishing effort of sprat-targeting métiers to areas that have had relatively high catch rates (landings per unit of effort (LPUE)) or with large absolute sprat landings, assuming spatial stability of sprat distribution in the area. Because high effort did not lead to large sprat landings in all locations, effort displacement to high effort areas may not compensate for lost sprat landings, particularly for mixed fishery métiers that also landed herring.
Impact of deep-sea fishery for Greenland halibut (Reinhardtius hippoglossoides) on non-commercial fish species off West Greenland

Since the late 1980s, a deep-sea fishery for Greenland halibut (Reinhardtius hippoglossoides) has been developing gradually in West Greenland. Deep-sea fish species are generally long-lived and characterized by late age of maturity, low fecundity, and slow growth, features that probably cause low resilience following overexploitation. In order to evaluate whether populations of nine potential bycatch species are negatively affected by the commercial fishery for Greenland halibut, scientific data from bottom-trawl surveys conducted in the same area and period as the commercial fishery were analysed. During the period 1988–2011, population abundance and size composition changed as catch and effort in the Greenland halibut fishery increased. Two species showed a significant decrease in
abundance, and four populations showed a significant reduction in mean weight of individuals (p < 0.05). Correlation analyses show that most of the observed trends in abundance are probably not related to increasing fishing effort for Greenland halibut. The analysis did, however, show that most of the observed decreases in mean weight were significantly correlated with fishing effort during the 24-year period.
Implications of stock recovery for a neighbouring management unit: experience from the Baltic cod

Cod in the Baltic Sea is assessed and managed as two separate stocks, i.e. eastern and western Baltic cod. The eastern Baltic cod has recently started to recover after several decades of severe depletion. In the present study, we suggest that the recovery of the eastern Baltic cod population has also substantially increased cod abundance in a specific area of the adjacent western Baltic management unit. This is investigated through long time-series of spatially resolved stock assessment data supplemented by genetic analyses of origin of the cod currently found in the transition area between the two populations. Due to immigrating cod from the east, there are currently large spatial differences in cod abundance and mean weight in the western Baltic management unit that raise new management concerns. First, the high abundance of cod of eastern origin found in the western Baltic management unit can mask the relatively poor state of the western Baltic cod population. Second, the current fishing mortality estimates for the entire western Baltic management unit, used as basis for fisheries management, are difficult to interpret as these are highly influenced by mixing of biological populations and the spatial distribution of fisheries.
Importance of food web dynamics in coupling of multispecies models and bio-economic fisheries management evaluation models

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Ross, S. D. (Intern), Nielsen, J. R. (Intern), Gislason, H. (Intern), Andersen, N. G. (Intern), Vinther, M. (Intern), Bastardie, F. (Intern)
Number of pages: 1
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Event: Poster session presented at Danish Innovation Fund Conference, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2014

Incentivising selective fishing under catch quotas: using an FCube modelling approach to evaluate management options for North Sea mixed fisheries

Reforms of EU Common Fisheries Policy will make fundamental changes to European fisheries management, including a discard ban with catch quotas for regulated species and management to achieve MSY. We evaluate the impact of these changes on revenue of North Sea demersal finfish fleets and fish stocks. With no change in behaviour, revenue is reduced by a mean of 31% compared to current management in the first year, but partly recovers by year 3, as fishing mortality is reduced and stocks increase. There are large differences in revenue changes between fleets, varying from -99% to +36%, depending on whether the stock with the most limiting catch quota is a primary target and the rate at which it is caught relative to other stocks. Impacts will be greatest if catch quotas are set at current landings quotas, and reduce with an uplift to reflect current discarding levels. Large reductions in revenue create a strong incentive to avoid catching the limiting species, particularly if it is not a primary target. Selectivity changes that avoid 30% cod catch reduced the economic impact for some fleets in moving to catch quotas. Increased flexibility will therefore be important in maintaining the profitability of the fisheries.

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State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas, University of East Anglia
Authors: Condie, H. M. (Ekstern), Dolder, P. J. (Ekstern), Catchpole, T. L. (Ekstern), Ulrich, C. (Intern), Grant, A. (Ekstern)
**Incorporating the Benthic Ecosystem in Fisheries Management: BENTHIS a European FP7-project**

General information

State: Published

Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Central Fisheries Research Institute

Authors: Rijnsdorp, A. (Ekstern), Eigaard, O. R. (Intern), Gregersen, O. (Ekstern), Hammon, K. (Ekstern), Hiddink, J. (Ekstern), Kenny, A. (Ekstern), Laffarque, P. (Ekstern), Nielsen, J. R. (Intern), Piet, G. J. (Ekstern), Polet, H. (Ekstern), Sala, A. (Ekstern), Zengin, M. (Ekstern)

Publication date: 2014

Event: Poster session presented at 9th International Flatfish Symposium 2014, Cle Elum, United States.

Main Research Area: Technical/natural sciences

Publication: Research › Poster – Annual report year: 2014

**Indirect effects of otter trawling on the condition and trophic level of Nephrops and flatfish in the Kattegat**

The fishing gear used in bottom trawl fisheries cause mortality of benthic invertebrates and this can decrease the long-term availability of prey to exploited fish species by reducing the abundance of benthic invertebrates. Alternatively, low trawling levels could increase food production for species that feed on small invertebrates that are released from competition with large invertebrates by trawling. Both outcomes may have consequences for biodiversity, the food-web and the sustainability of fisheries. We assessed the impact of bottom trawling on the food availability of fish by comparing the condition (as weight-at-length) and trophic level of the fish Pleuronectes platessa, Limanda limanda, Hippoglossoides platessoides and the crustacean Nephrops norvegicus in an area with strong variation in commercial otter-trawling effort owing to the presence of MPAs with different levels of protection in the Kattegat (Sweden and Denmark). The results show that the abundance and body size of Nephrops was much higher in the fully closed areas, whereas that of the flatfish was less affected. The condition and trophic level for Nephrops were highest on intensively trawled areas suggesting that trawling reduces competition and increases food availability for Nephrops. In contrast, the condition of the flatfish species was the highest at low levels of trawling. This study therefore suggests that high effort levels of bottom trawling have a negative effect on the prey availability and thus on the condition of some of the target species, but not others, and that low levels of trawling might positively affect food availability for some flatfish species. Alternatively, flatfishes might avoid areas with high densities of large Nephrops

General information

State: Published

Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Bangor University, Instituto Español de Oceanografía, Lund University

Authors: Hiddink, J. G. (Ekstern), Balestrin, S. (Ekstern), Moranta, J. (Ekstern), Coleman, M. (Ekstern), Bastardie, F. (Intern), Sköld, M. (Ekstern), Sciberras, M. (Ekstern), Hinz, H. (Ekstern)

Publication date: 2014


Main Research Area: Technical/natural sciences

Publication: Research › Conference abstract for conference – Annual report year: 2014

**Inferring fish escape behaviour in trawls based on catch comparison data: Model development and evaluation based on data from Skagerrak, Denmark**

During the fishing process, fish react to a trawl with a series of behaviours that often are species and size specific. Thus, a thorough understanding of fish behaviour in relation to fishing gear and a scientific understanding of the ability of different gear designs to utilize or stimulate various behavioural patterns during the catching process are essential for developing more efficient, selective, and environmentally friendly trawls. Although many behavioural studies using optical and acoustic observation systems have been conducted, harsh observation conditions on the fishing grounds often hamper the ability to directly observe fish behaviour in relation to fishing gear. As an alternative to optical and acoustic methods, we developed and applied a new mathematical model to catch data to extract detailed and quantitative information about species- and size-dependent escape behaviour in towed fishing gear such as trawls. We used catch comparison data collected with a twin trawl setup; the only difference between the two trawls was that a 12 m long upper section was replaced with 800 mm diamond meshes in one of them. We investigated the length-based escape behaviour of cod (Gadus morhua), haddock (Melanogrammus aeglefinus), saithe (Pollachius virens), witch flounder (Glyptocephalus cynoglossus), and lemon sole
(Microstomus kitt) and quantified the extent to which behavioural responses set limits for the large mesh panel's selective efficiency. Around 85% of saithe, 80% of haddock, 44% of witch flounder, 55% of lemon sole, and 55% of cod (below 68 cm) contacted the large mesh panel and escaped. We also demonstrated the need to account for potential selectivity in the trawl body, as it can bias the assessment of length-based escape behaviour. Our indirect assessment of fish behaviour was in agreement with the direct observations made for the same species in a similar section of the trawl body reported in the literature.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF Fisheries and Aquaculture
Authors: Krag, L. A. (Intern), Herrmann, B. (Ekstern), Karlsen, J. D. (Intern)
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: PLoS ONE
Volume: 9
Issue number: 2
Article number: e88819
ISSN (Print): 1932-6203
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 3.11 SJR 1.201 SNIP 1.092
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.631 SNIP 1.161
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.473 SNIP 0.985
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.323 SNIP 0.96
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.289 SNIP 0.525
Integrated assessment of marine biodiversity status using a prototype indicator-based assessment tool

Integrated assessment of the status of marine biodiversity is and has been problematic compared to, for example, assessments of eutrophication and contamination status, mostly as a consequence of the fact that monitoring of marine habitats, communities and species is expensive, often collected at an incorrect spatial scale and/or poorly integrated with existing marine environmental monitoring efforts. The objective of this Method Paper is to introduce and describe a simple tool for integrated assessment of biodiversity status based on the HELCOM Biodiversity Assessment Tool (BEAT), where interim biodiversity indicators are grouped by themes: broad-scale habitats, communities, and species as well as supporting non-biodiversity indicators. Further, we report the application of an initial indicator-based assessment of biodiversity status of Danish marine waters where we have tentatively classified the biodiversity status of Danish marine waters. The biodiversity status was in no areas classified as “unaffected by human activities.” In all the 22 assessment areas, the status was classified as either “moderately affected by human activities” or “significantly affected by human activities.” Spatial variations in the biodiversity status were in general related to the eutrophication status as well as fishing pressure.

Introducing time-varying natural mortality in the length-based assessment model for the Pandalus Borealis stock in ICES Div. Illa and Iva east

Introducing time-varying natural mortality in the length-based assessment model for the Pandalus Borealis stock in ICES Div. Illa and Iva east
Konsekvensvurdering af fiskeri på blåmuslinger i Lillebælt 2014

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data, Section for Ecosystem based Marine Management
Authors: Nielsen, P. (Intern), Geitner, K. (Intern), Christoffersen, M. (Intern), Petersen, J. K. (Intern)
Number of pages: 51
Publication date: 2014

Publication information
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
ISBN (Electronic): 978-87-7481-188-6
Original language: Danish
Series: DTU Aqua-rapport
Number: 282-2014
ISSN: 1395-8216
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Commissioned › Report – Annual report year: 2014

KYSTFISK I. Kortlægning af de kystnære fiskebestandes udvikling på basis af fiskernes egne observationer i perioden fra 1980’erne til 2013

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Section for Marine Ecology and Oceanography
Authors: Støttrup, J. (Intern), Lund, H. S. (Ekstern), Kindt-Larsen, L. (Intern), Egekvist, J. (Intern), Munk, P. (Intern), Stenberg, C. (Intern)
Number of pages: 45
Publication date: 2014

Publication information
Place of publication: Charlottenlund
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
Original language: Danish
Series: DTU Aqua-rapport
Number: 278-2014
ISSN: 1395-8216
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Research › Report – Annual report year: 2014

KYSTFISK I. Udviklingen i kystnære fiskebestande. Slutrapport

General information
Landings obligation as a pathway towards the integration of CFP and MSFD – lessons learned and forward look after 2015

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas, IFREMER
Authors: Catchpole, T. (Ekstern), Ulrich, C. (Intern), Rochet, M. (Ekstern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Bibliographical note
ICES Theme Session O
Publication: Research › Paper – Annual report year: 2014

Links between implementation of Water Framework Directive and changes in plaice distribution along the Danish west coast

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Støttrup, J. (Intern), Kodama, J. (Ekstern), Stedmon, C. (Intern)
Publication date: 2014
Event: Abstract from The International Symposium on Integrated Coastal Zone Management, Antalya, Turkey.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014

Marine fish species richness in the north and north-eastern Atlantic

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Gislason, H. (Intern)
Publication date: 2014
Event: Abstract from World Conference on Marine Biodiversity 2014, Qingdao, China.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014
Miljøskånsomhed og økologisk bæredygtighed i dansk fiskeri

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Public Sector Consultancy, Section for Monitoring and Data, Section for Freshwater Fisheries Ecology
Number of pages: 83
Publication date: 2014

Publication information
Place of publication: Charlottenlund
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
ISBN (Print): 978-87-7481-195-4
ISBN (Electronic): 978-87-7481-194-7
Original language: Danish

Series: DTU Aqua Report
Number: 279-2014
ISSN: 1395-8216
Main Research Area: Technical/natural sciences

Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter

Minimising conflicts in mixed-fisheries management using flexible Harvest Control Rules

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas
Authors: Ulrich, C. (Intern), Dolder, P. J. (Ekstern), Hoff, A. (Ekstern), Kempf, A. (Ekstern), Poos, J. J. (Ekstern), Rindorf, A. (Intern), Vermard, Y. (Ekstern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014

Modelling prey consumption and switching by UK grey seals

Grey seals (Halichoerus grypus) are adaptable generalist predators whose diet includes commercial fish species such as cod. Consumption by the seals may reduce the size of some fish stocks or have an adverse effect on stock recovery programmes, especially because predation may trap sparse prey populations in a “predator pit”. To assess the likely impact of such effects, it is important to know how consumption and consequent predation mortality respond to the changing availability of prey. We present a model of grey seal consumption as a function of the availability of multiple prey types [a Multi-Species Functional Response (MSFR)]. We fit this MSRF to data on seal diet and prey availability (based on the overlap between the distributions of predators and prey). Bayesian methodology was employed to account for uncertainties in both dependent and independent variables, improve estimation convergence by the use of informative priors, and allow the estimation of missing data on prey availability. Both hyperbolic (Type 2) and sigmoidal (Type 3) functional response models were fitted to the data and the Type 3 model was clearly favoured during model selection, supporting the conclusion that seal–prey encounter rates change with prey abundance (sometimes referred to as “switching”). This suggests that some prey species may be vulnerable to predator pit effects. The fitted model reproduced contrasts in diet observed between different regions/years and, importantly, added information to the prior distributions of prey abundance in areas where the availability of some prey species (such as sandeels) was not known. This suggests that the diet of predators such as seals could provide information about the abundance and distribution of prey in areas that are not covered by fisheries and research surveys.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of St Andrews, University of Glasgow
Authors: Smout, S. (Ekstern), Rindorf, A. (Intern), Hammond, P. S. (Ekstern), Harwood, J. (Ekstern), Matthiopoulos, J. (Ekstern)
A simple Schaefer model was tested on the Greenland halibut stock offshore in NAFO SA 0 and 1. The minimum data required for this model is a catch time series and a measure of the resilience of the species. Other input parameters that
had to be guessed were the carrying capacity, the biomass as a fraction of the carrying capacity at both the beginning and end of the time series, and the growth rate. MSY was estimated to be between 19 000 and 23 000 t. Sensitivity tests showed that the estimation of MSY was heavily dependent on the guess of especially the biomass at the end of the time series and the growth rate. The model assumptions and limitations were discussed.

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Jørgensen, O. A. (Intern), Chrysafi, A. (Intern)
Number of pages: 29
Publication date: 2014
Main Research Area: Technical/natural sciences
Electronic versions:
Publication: Research › Paper – Annual report year: 2014

**Nyt trawldesign kan gøre jomfruhummer fiskeriet meget mere effektivt**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Fishermen's Producers’ Organization
Authors: Kråg, L. A. (Intern), Frandsen, R. (Intern), Dinesen, G. E. (Intern), Karlsen, J. D. (Intern), Lund, H. S. (Ekstern)
Pages: 10-12
Publication date: 2014

**Publication information**
Pages (from-to): 10-12
Newspaper: Fiskeritidende
Volume: 21
No.: 48
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: 2014

**Patterns in marine fish species richness in the north and north-eastern Atlantic**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Gislason, H. (Intern)
Publication date: 2014
Event: Abstract from EU VECTORS Final Meeting, La Grande Motte, France.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014

**Perceived benefits and limitations of simplified sustainability assessment for aquaculture using the "sense-tool"**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, University of Iceland
Authors: Olafsdottir, G. (Ekstern), Yngvadottir, E. (Ekstern), Gudmundsdottir, R. (Ekstern), Ramos, S. (Ekstern), Larsen, E. (Intern), Bogason, S. G. (Ekstern), Lane, A. (Ekstern)
Publication date: 2014
Event: Poster session presented at Aquaculture Europe 14, Donostia-San Sebastian, Spain.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2014
Prey or predator – expanding the food web role of sandeel (Ammodytes marinus)

We report an unexpected observation of lesser sandeel Ammodytes marinus foraging on juveniles and late larval stages of the same species. This recording sheds new light on the cannibalistic and piscivorous capacity of forage fish and raises a number of questions about the role of forage fish in marine food webs. In 2012 and 2013 the stomachs of 748 sandeels from 36 different commercial sandeel hauls in the central North Sea were opened. 9% of these stomachs contained late stage sandeel larvae. In order to better understand the cannibalistic nature of sandeels, we made a detailed analysis of another 450 sandeels from a single haul with a high frequency of apparent cannibals. One-third of the stomachs contained a minimum of one young sandeel (mean length 2.7 cm; max. length 4.9 cm), 10 percent contained 5 or more, and one stomach contained 18. Analyses of sample DNA confirmed that predator and prey were conspecifics. Larger specimens were more likely to be cannibals. However, among cannibals the specific sandeel larvae consumption was independent of cannibal size. We argue that this piscivorous cannibalistic behaviour may not only be a key factor in explaining recruitment fluctuations in North Sea sandeel stocks, but it may also add a new element to the complexity of energy flow in marine food chains.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life
Authors: Eigaard, O. R. (Intern), Deurs, M. V. (Intern), Behrens, J. (Intern), Bekkevold, D. (Intern), Brander, K. (Intern), Plambech, M. (Intern), Schreiber Plet-Hansen, K. (Intern), Mosegaard, H. (Intern)
Pages: 267-273
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Marine Ecology Progress Series
Volume: 516
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
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 2.85
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Priority research areas for evaluating ecosystem consequences of a discard ban

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Borges, M. D. F. (Ekstern), Andonegui, E. (Ekstern), Depestele, J. (Ekstern), Piet, G. (Ekstern), Reid, D. (Ekstern), Rindorf, A. (Intern), Sørensen, T. K. (Intern), Meeren, G. I. V. D. (Ekstern)
Publication date: 2014
Main Research Area: Technical/natural sciences

Bibliographical note
ICES CM 2014/O:16
Publication: Research › Conference abstract for conference – Annual report year: 2014

Projektet MINIDISC sættes i gang

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Danish Fishermen's Producers' Organization
Authors: Ulrich, C. (Intern), Olesen, H. J. (Intern), Fischer, K. S. (Ekstern)
Pages: 12
Publication date: 2014

Publication information
Pages (from-to): 12
Newspaper: Fiskeritidende
Volume: 21
No.: 37
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: 2014

Recovery in eastern Baltic cod: is increased recruitment caused by decreased predation on early life stages?
Cod (Gadus morhua) recruitment in the eastern Baltic Sea is influenced by predation on early life stages by sprat (Sprattus sprattus) and herring (Clupea harengus), which is considered as one of the mechanisms preventing cod recovery in the 1990s. In the light of improved cod recruitment in the second half of the 2000s, new analyses of stomach content of sprat and herring were conducted, to elucidate the contribution of changes in predation pressure on cod recruitment. Comparison of stomach contents of sprat and herring in 2004–2008 with data from the 1990s showed a
similar diet composition in the two periods; however, changes were found in the ichthyoplankton abundance and composition in the diet, indicating reduced predation pressure on cod eggs in the most recent period. The abundance of cod eggs in the field, availability of other prey, and horizontal and vertical overlap between predator and prey were investigated as potential factors influencing cod egg predation.

**General information**
- **State:** Published
- **Organisations:** National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Institute Management, Section for Ecosystem based Marine Management, Thünen Institute of Sea Fisheries
- **Authors:** Neumann, V. (Intern), Köster, F. (Intern), Schaber, M. (Ekstern), Eero, M. (Intern)
- **Pages:** 1382-1392
- **Publication date:** 2014
- **Main Research Area:** Technical/natural sciences

**Publication information**
- **Journal:** ICES Journal of Marine Science
- **Volume:** 71
- **Issue number:** 6
- **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
  - Web of Science (2010): Indexed yes
  - BFI (2009): BFI-level 1
  - Web of Science (2009): Indexed yes
  - BFI (2008): BFI-level 2
  - Web of Science (2008): Indexed yes
  - Web of Science (2007): Indexed yes
  - Web of Science (2006): Indexed yes
  - Web of Science (2005): Indexed yes
  - Web of Science (2004): Indexed yes
  - Web of Science (2003): Indexed yes
  - Web of Science (2002): Indexed yes
Restoration of a temperate reef: Effects on the fish community

The extraction of large boulders from coastal reefs for construction of harbours and coastal protection has led to habitat degradation for local fish populations through the destruction of cavernous reefs and changes in macroalgal cover resulting from a loss of substrate. The temperate reef at Læsø Trindel in Kattegat, Denmark, has now been re-established with the aim of restoring the reef’s historical structure and function. The effects of the restoration on the local fish community are reported here. Fishing surveys using gillnets and fyke nets were conducted before the restoration (2007) and four years after the restoration of the reef (2012). Species of the family Labridae, which have a high affinity for rocky reefs, dominated both before and after the restoration. Commercially important species such as cod Gadus morhua, and saithe Pollachius virens, occurred infrequently in the catches in 2007 but were significantly more abundant in the catches in 2012. Cods were especially attracted to the shallow part of the reef that was restored by adding stones. For some species, such as ballan wrasse Labrus bergylta, and cod, the proportion of larger individuals increased after the restoration. The findings highlight the importance of reef habitats for fish communities and the need for their protection.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University, University of Copenhagen
Authors: Støttrup, J. (Intern), Stenberg, C. (Intern), Dahl, K. (Ekstern), Kristensen, L. D. (Intern), Richardson, K. (Ekstern)
Pages: 1045-1059
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication information
Journal: Open Journal of Ecology
Review of the functional morphology, biology and perturbation impacts on the boreal, habitat-forming horse mussel Modiolus modiolus (Bivalvia: Mytilidae: Modiolinae)

The boreal bivalve Modiolus modiolus is common subtidally where it aggregates to form extensive, long-lived, biogenic habitats with a diverse associated flora and, especially, fauna. Despite this ecological importance, M. modiolus has not been described in terms of its functional morphology and overall biology. Modiolus modiolus is a typical epibenthic, suspension-feeding mytilid, albeit with anatomical modifications adapting it to a partially buried, gregarious lifestyle in a stable environment experiencing medium–high energy levels. The juvenile shell is covered partly in byssal setae secreted by the byssal gland and foot complex and becomes covered in sand grains held in place by a mucoid cement secreted by the dorsal mantle. The camouflaged shell at this vulnerable time probably serves as an anti-predator device. Individuals grow to maximum shell lengths of ∼60–213 mm, depending on depth and locality. With age (≥ 20–45 years), shells often become deformed, particularly posteriorly and around the byssal gape, thereby increasing reproductive capacity (gonadal volume) without increasing somatic growth. Information on the biology, reproductive strategy and life history traits of M. modiolus are reviewed. These field- and laboratory-derived data provide us with essential information to aid future research into the protection and conservation of this ecologically important biogenic habitat. This is because, today, dredging and fishery activities using bottom-towed gear have seriously damaged several M. modiolus habitats with deleterious impacts on ecosystem functioning. Post-impact recovery times are slow and dependent on both local and mega-population distributions.
Robustfish: New possibilities for growth and robustness in organic aquaculture

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquaculture, National Veterinary Institute, Section for Bacteriology, Pathology and Parasitology, Section for Ecosystem based Marine Management, University of Copenhagen, Dansk Akvakultur
Authors: Jokumsen, A. (Intern), Höglund, E. (Intern), Lund, I. (Intern), Madsen, L. (Intern), Pedersen, L. (Intern), Nielsen, M. (Ekstern), Nielsen, T. (Ekstern), Larsen, V. J. (Ekstern), Larsen, E. (Intern)
Publication date: 2014
Event: Poster session presented at Aquaculture Europe 14, Donostia-San Sebastian, Spain.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review » Review – Annual report year: 2014

Scanning for PIT-tagged flatfish in a coastal area using a sledge equipped with an RFID antenna
A radio frequency identification (RFID) antenna system, built into a sledge that can be towed behind a vessel like a trawl and thereby has the potential to detect the position of a passive inductor technology (PIT)-tagged fish in a wide variety of habitats, is presented. By scanning for hatchery-reared PIT-tagged turbot Psetta maxima released into a natural habitat, the performance of the system was compared to a standard juvenile trawl and results suggested that the efficiency of the
sledge was five times that of the trawl, which in absolute values corresponds to 75% of P. maxima lying in the pathway of the sledge.
Seasonal migration, vertical activity and winter temperature experience of Greenland halibut Reinhardtius hippoglossoides (Walbaum) in West Greenland waters

The deep-water flatfish Greenland halibut Reinhardtius hippoglossoides (Walbaum) is common along the West Greenland coast. In the northwestern fjords, Greenland halibut is an important socio-economic resource for the Greenland community, but due to the deep and partly ice-covered environment, very little is known about its behavior and habitat characteristics. We tagged adult Greenland halibut in the waters off Ilulissat with electronic data storage tags that collected information on depth, temperature, and time. Although clear differences between individuals in migration and vertical behavior were present, we discovered a consistent seasonal migration from the relatively shallow-water Disko Bay area into the deep waters of the Ilulissat Icefjord, where the fish resided in the winter months before returning to Disko Bay. Vertical activity was pronounced at both locations, with fish covering vertical distances of up to 100 m within 15 min. During the winter months, the fish experienced temperatures between ca. 0 and 4°C, with most experiencing temperatures of 2 to 3°C. Irrespective of year and quarter of the year, the fish experienced warmer water and a broader range of temperatures when resident in Disko Bay (mean range 2.6°C) than when resident in the ice fjord (mean range 1.4°C). Using the tagged halibut as a 'live tool,' we show that parts of the ice fjord are hundreds of meters deeper than previously thought. We also document the first seawater temperature measurements made beneath the Jakobshavn Isbrae outlet glacier, revealing a positive relationship between depth and temperature for the upper 600 m and a between-year variation in temperatures beneath the ice sheet in 2001, 2002, and 2003.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Danish Pelagic Producers Organisation
Authors: Boje, J. (Intern), Neuenfeldt, S. (Intern), Sparrevohn, C. R. (Ekstern), Eigaard, O. R. (Intern), Behrens, J. (Intern)
Pages: 211-222
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Marine Ecology Progress Series
Volume: 508
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
Selling unavoidable fish catches to the Far East and other markets, and an invasive story

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Larsen, E. (Intern)
Pages: 1-10
Publication date: 2014

Host publication information
Title of host publication: Fishery by-products: Technological innovations and uses
Publisher: Mediterranean Agronomic Institute of Zaragoza
Main Research Area: Technical/natural sciences
Publication: Education › Compendium/lecture notes chapter – Annual report year: 2014

Size selection of Antarctic krill (Euphausia superba) in trawls
Trawlers involved in the Antarctic krill (Euphausia superba) fishery use different trawl designs, and very little is known about the size selectivity of the various gears. Size selectivity quantifies a given trawl's ability to catch different sizes of a harvested entity, and this information is crucial for the management of a sustainable fishery. We established a morphological description of krill and used it in a mathematical model (FISHSELECT) to predict the selective potential of diamond meshes measuring 5-40 mm with mesh opening angles (oa) ranging from 10 to 90 degrees. We expected the majority of krill to encounter the trawl netting in random orientations due to high towing speeds and the assumed swimming capabilities of krill. However, our results indicated that size selectivity of krill is a well-defined process in which
individuals encounter meshes at an optimal orientation for escapement. The simulation-based results were supported by
data from experimental trawl hauls and underwater video images of the mesh geometry during fishing. Herein we present
predictions for the size selectivity of a range of netting configurations relevant to the krill fishery. The methods developed
and results described are important tools for selecting optimal trawl designs for krill fishing.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aker
BiMarine Antarctic AS, Institute of Marine Research, SINTEF Fisheries and Aquaculture
Authors: Krag, L. A. (Intern), Herrmann, B. (Ekstern), Iversen, S. A. (Ekstern), Engas, A. (Ekstern), Nordrum, S. (Ekstern),
Krafft, B. A. (Ekstern)
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: PLOS ONE
Volume: 9
Issue number: 8
Article number: e102168
ISSN (Print): 1932-6203
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 3.11 SJR 1.201 SNIP 1.092
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
ISI indexed (2011): ISI indexed no
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.631 SNIP 1.161
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 2.473 SNIP 0.985
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 2.323 SNIP 0.96
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.289 SNIP 0.525
Web of Science (2006): Indexed yes
Size spectra and species diversity in the sea

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Gislason, H. (Intern)
Publication date: 2014
Event: Abstract from Mini symposium on size-based approaches to fish and fisheries, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014

Supporting bio-economic evaluation of spatial planning constraining fishing activities: be quantitative, spatially-explicit, vessel-oriented, stochastic, and dynamically coupled to fish populations

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Bastardie, F. (Intern), Nielsen, J. R. (Intern), Eigaard, O. R. (Intern), Fock, O. (Ekstern), Jonsson, P. (Ekstern), Bartolino, V. (Ekstern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2014

Technological development in fisheries management
Many marine fish stocks are overexploited and considerable overcapacity exists in fishing fleets worldwide. One of the reasons for the imbalance between resource availability and fishing capacity is technological development, which continuously increases the efficiency of the vessels—a mechanism referred to as “technological creep.” We review how the introduction of new and more efficient electronic equipment, gear design, engines, deck equipment, and catch-handling procedures influences the capture efficiency (catchability) of commercial fishing vessels. On average, we estimate that catchability increases by 3.2% per year due to technological developments, an increase often ignored in fisheries management. The documentation and quantification of technological creep improves the basis for successfully integrating the effects of technological development (and catchability changes) in fisheries management regulations and policies. Ways of counteracting the undesired effects of technological creep are discussed as are the potential management benefits from improved fishing technology. Specific suggestions are given on the selection, application, and tuning of fisheries management tools that can be used to improve the balance between harvesting capacity and resource availability

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, IFREMER, Wageningen IMARES
Authors: Eigaard, O. R. (Intern), Marchal, P. (Ekstern), Gislason, H. (Intern), Rijnsdorp, A. D. (Ekstern)
Pages: 156-174
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication information
Journal: Reviews in Fisheries Science
Volume: 22
Issue number: 2
ISSN (Print): 1064-1262
Ratings:
The applicability of LCA to evaluate the key environmental challenges in food supply chains

System analysis was performed to gain an overview of key environmental challenges and pinpoint hotspots causing environmental impacts in three European food supply chains. An overview was obtained based on a review on LCA studies for beef, dairy, orange juice and aquaculture food supply chains. Similarities of the main environmental impacts were identified to rationalize and justify the selection of key performance indicators chosen for a simplified web based LCA tool developed within the EC funded project SENSE (FP7). Life Cycle Assessment methodology covered many of the key challenges identified but will not be sufficient to address all environmental impacts generated from the food supply chains. Especially for aquaculture impacts that are not taken into account with LCA are i.e. nutrient and organic matter releases, impacts associated with feed provision, diseases introduction, escapes, and changed usage of coastal areas. In agriculture land use and biodiversity are issues not well covered.

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Swedish Institute for Food and Biotechnology, AZTI-Tecnalia, Efia Consulting Engineers, University of Iceland, Aalborg University, Foodscapes, Innovation og Netværk
Authors: Aronsson, A. K. (Ekstern), Landquist, B. (Ekstern), Esturo, A. (Ekstern), Olafsdottir, G. (Ekstern), Ramos, S. (Ekstern), Pardo, G. (Ekstern), Nielsen, T. (Ekstern), Andrade, G. P. V. (Forskerdatabase), Larsen, E. (Intern), Bogason, S. G. (Ekstern), Mjöll Ingolfsdottir, G. (Ekstern), Yngvadottir, E. (Ekstern)
Number of pages: 11
Pages: 55-63
Publication date: 2014
A case study for testing stock discrimination based on otolith shape analysis in a mixed stock fishery

Balanced harvesting, where species or individuals are exploited in accordance with their productivity, has been proposed as a way to minimize the effects of fishing on marine fish communities and ecosystems. This calls for a thorough examination of the consequences balanced harvesting has on fish community structure and yield. We use a size- and trait-based model that resolves individual interactions through competition and predation to compare balanced harvesting with traditional selective harvesting, which protects juvenile fish from fishing. Four different exploitation patterns, generated by combining selective or unselective harvesting with balanced or unbalanced fishing, are compared. We find that unselective balanced fishing, where individuals are exploited in proportion to their productivity, produces a slightly larger total maximum sustainable yield than the other exploitation patterns and, for a given yield, the least change in the relative biomass composition of the fish community. Because fishing reduces competition, predation and cannibalism within the community, the total maximum sustainable yield is achieved at high exploitation rates. The yield from unselective balanced fishing is dominated by small individuals, whereas selective fishing produces a much higher proportion of large individuals in the yield. Although unselective balanced fishing is predicted to produce the highest total maximum sustainable yield and the lowest impact on trophic structure, it is effectively a fishery predominantly targeting small forage fish.

The consequences of balanced harvesting of fish communities

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Marine Living Resources, Section for Ecosystem based Marine Management
Authors: Hüssy, K. (Intern), Mosegaard, H. (Intern), Hansen, J. H. (Intern), Eero, M. (Intern)
Publication date: 2014
Event: Abstract from 5th International Otolith Symposium, Mallorca, Spain.
Main Research Area: Technical/natural sciences
Links:
Publication: Research › Conference abstract for conference – Annual report year: 2014
The EU discard ban and the future handling and use of unavoidable unwanted catches
The "mapping out" approach: effectiveness of marine spatial management options in European coastal waters

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, IMARES, Instituto Português do Mar e da Atmosfera, Institute of Marine Research
Authors: Soma, K. (Ekstern), Ramos, J. (Ekstern), Bergh, Ø. (Ekstern), Schulze, T. (Ekstern), van Oostenbrugge, H. (Ekstern), van Duijn, A. (Ekstern), Kopke, K. (Ekstern), Stelzenmüller, V. (Ekstern), Grati, F. (Ekstern), Mäkinen, T. (Ekstern), Stenberg, C. (Intern), Buisman, E. (Ekstern)
Pages: 2630-2642
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 71
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
Web of Science (2010): Indexed yes
The marine diversity spectrum

Distributions of species body sizes within a taxonomic group, for example, mammals, are widely studied and important because they help illuminate the evolutionary processes that produced these distributions. Distributions of the sizes of species within an assemblage delineated by geography instead of taxonomy (all the species in a region regardless of clade) are much less studied but are equally important and will illuminate a different set of ecological and evolutionary processes. We develop and test a mechanistic model of how diversity varies with body mass in marine ecosystems. The model predicts the form of the diversity spectrum', which quantifies the distribution of species' asymptotic body masses, is a species analogue of the classic size spectrum of individuals, and which we have found to be a new and widely applicable description of diversity patterns. The marine diversity spectrum is predicted to be approximately linear across an asymptotic mass range spanning seven orders of magnitude. Slope -0.5 center dot 5 is predicted for the global marine diversity spectrum for all combined pelagic zones of continental shelf seas, and slopes for large regions are predicted to lie between -0. center dot 5 and -0 center dot 1. Slopes of -0 center dot 5 and -0 center dot 1 represent markedly different communities: a slope of -0 center dot 5 depicts a 10-fold reduction in diversity for every 100-fold increase in asymptotic mass; a slope of -0 center dot 1 depicts a 1 center dot 6-fold reduction. Steeper slopes are predicted for larger or colder regions, meaning fewer large species per small species for such regions. Predictions were largely validated by a global empirical analysis. Results explain for the first time a new and widespread phenomenon of biodiversity. Results have implications for estimating numbers of species of small asymptotic mass, where taxonomic inventories are far from complete. Results show that the relationship between diversity and body mass can be explained from the dependence of predation behaviour, dispersal, and life history on body mass, and a neutral assumption about speciation and extinction.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Imperial College London, Cefas, European Commission - Joint Research Center
Authors: Reuman, D. C. (Ekstern), Gislason, H. (Intern), Barnes, C. (Ekstern), Melin, F. (Ekstern), Jennings, S. (Ekstern)
Pages: 963-979
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Animal Ecology
Volume: 83
Issue number: 4
ISSN (Print): 0021-8790
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): SJR 2.963 SNIP 1.722 CiteScore 4.65
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 3.298 SNIP 1.769 CiteScore 4.55
The use of at-sea-sampling data to dissociate environmental variability in Norway lobster (Nephrops norvegicus) catches to improve resource efficiency

The primary aim of this study was to determine whether the information collected as part of the at-sea-sampling program could be used to identify hydrographical and environmental variables that are influential on catch rates of Norway lobster. Ultimately, we wanted to know whether environmental variables’ influence on catches could be accounted for in order to improve resource efficiency and economic viability.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Lund University
Authors: Feekings, J. P. (Intern), Christensen, A. (Intern), Jonsson, P. (Ekstern), Frandsen, R. (Intern), Ulmestrand, M. (Ekstern), Munch-Petersen, S. (Intern)
Trading yield against precautionarity and the need for stability in the fishing sector

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management
Authors: Deurs, M. V. (Intern), Rindorf, A. (Intern), Vinther, M. (Intern), Mosegaard, H. (Intern), Worsøe Clausen, L. (Intern)
Publication date: 2014
Main Research Area: Technical/natural sciences

Bibliographical note
ICES CM 2014/G:48
Publication: Research › Conference abstract for conference – Annual report year: 2014

Using inferred drivers of discarding behaviour to evaluate discard mitigation measures
Discards refer to the part of the catch not retained on board during commercial fishing operations, but returned to the sea. The proposed European Union Common Fisheries Policy reform, to be implemented in 2014, sets out a gradual elimination of discards by reducing unwanted catches and ensuring that all catches are landed. To develop successful discard mitigation measures, it is necessary to identify the reasons for discarding. Here, we have developed a simple model that can be applied to data from observer programmes (ObsPs) to establish the contribution of different drivers of discarding behaviour. The analysis makes inferences on the causes of discarding by partitioning discards into four categories based on the length of the fish and the associated regulatory restrictions. The drivers are defined as: fish discarded below the legal minimum landing size; fish for which there is no market and that do not have a minimum landing size; fish for which there are inconsistencies in market and sorting practices; and discards that can be attributed to fishers’ responses to quota restrictions. The approach is applied to data generated from ObsPs from five European Member States. All the inferred drivers contribute to the total discard quantity. Their relative contributions vary widely across countries, areas, gears, and species

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Cefas, Hellenic Centre for Marine Research, Instituto Español de Oceanografía, IFREMER
Authors: Catchpole, T. (Ekstern), Feekings, J. P. (Intern), Madsen, N. (Intern), Palialexis, A. (Ekstern), Vassilopoulou, V. (Ekstern), Valeiras, J. (Ekstern), Garcia, T. (Ekstern), Nikolic, N. (Ekstern), Rochet, M. (Ekstern)
Pages: 1277-1285
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 71
Issue number: 5
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
Using small meshed collecting bags on trawls to quantify trawls seabed disturbance of aquatic organisms

NGOs have become active at uncovering and illustrating potential problems of the environmental and ecosystem impacts of fishing activities, especially demersal trawling, exerting considerable pressure on decision makers and subsequently, fisheries. The environmental impact of demersal trawling activities has been documented by collecting samples before and after the fishing process or by comparing areas of different fishing intensity. These investigations are expensive and labor demanding and are inappropriate for documenting effects of smaller technological changes aimed at reducing trawling impact on commercial fishing grounds. In this study we develop and test small-meshed collecting bags designed to retain juvenile fish and benthic megafauna. The collecting bags are mounted in the wings and body of the trawl. The catches in the collection bags provide information of the species and size of organisms that encounter the trawl, but are not retained by it. Such catch represents an unaccounted trawl disturbance of the organisms associated with the seabed. In combination with knowledge on behavior and habitat utilization of these organisms, their presence can be used to indicate differences in the mechanical effect, such as penetration depth of the ground gear of different trawl designs. Collecting bags are also mounted to the different sections of the trawl in pairs, one to collect the organisms that pass through the trawl meshes and one to collect the population. Standard selectivity analyses thereby allow us to estimate the size-selection of the caught organisms in different parts of the trawl
Zooplankton mortality in 3D ecosystem modelling considering variable spatial–temporal fish consumptions in the North Sea

We tested the feasibility of imposing mesozooplankton mortality into a 3D model based on estimated consumption rates of the dominant planktivorous fish in the North Sea-Kattegat area. The spatial biomass distribution of Atlantic herring (Clupea harengus), horse mackerel (Trachurus trachurus), Atlantic mackerel (Scomber scombrus), sandeel (Ammodytidae) and European sprat (Sprattus sprattus) was derived from quarterly scientific trawl surveys and Danish commercial catches. Spatio-temporal indices of mortality were created based on the estimated biomasses and ingestion rates from the literature. The fish larvae grazing pressure was obtained from a spatial, size-based larval community model. In this model, larvae, herring and sandeel were the most important fish predators on mesozooplankton, but these groups had different spatial and temporal (seasonal) distributions. Fish larvae were particularly dominant in the eastern and southern areas in early summer. Herring and sandeel had the highest consumption in the central and north-western areas and were more important in late summer. The fish index changed the perceived annual, seasonal and spatial patterns in modelled mesozooplankton biomass, production and mortality. In the present study, the index was kept relatively simple and can be further developed with respect to the description of fish as well carnivorous zooplankton ingestion rates. The data input required to create the fish index is i) planktivorous fish stock biomasses and ii) relative fish spawning distribution information and iii) physics (ocean currents and temperatures) for the region and situation of interest. The fish index seems promising as a realistic mortality term for lower trophic levels in 3D ecosystem models in areas with available data on fish stocks to improve management of marine resources.
Acoustic activity of harbour porpoises (Phocoena phocoena) around gill nets: Short note

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Boström, M. K. (Ekstern), Krog, C. (Ekstern), Kindt-Larsen, L. (Intern), Lunneryd, S. (Ekstern), Wahlberg, M. (Ekstern)
Pages: 389-396
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information
Journal: Aquatic Mammals
Volume: 39
Issue number: 4
ISSN (Print): 0167-5427
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 0.378 SNIP 0.567 CiteScore 0.86
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.381 SNIP 0.368 CiteScore 0.77
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.446 SNIP 0.603 CiteScore 0.76
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.472 SNIP 0.604 CiteScore 0.56
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.415 SNIP 0.458 CiteScore 0.68
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.315 SNIP 0.391 CiteScore 0.61
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.254 SNIP 0.405
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.239 SNIP 0.182
BFI (2008): BFI-level 1
Web of Science (2005): Indexed yes
Original language: English
DOIs:
10.1578/AM.39.4.2013.389
Publication: Research - peer-review › Journal article – Annual report year: 2013

A framework for multispecies assessment and management

General information
State: Published
A reliable method for ageing of whiting (Merlangius merlangus) for use in stock assessment and management

Accurate age estimation is important for stock assessment and management. The importance of reliable ageing is emphasized by the impending analytical assessment of whiting (Merlangius merlangus) in the Baltic Sea. Whiting is a top predator in the western Baltic Sea, where it is fished commercially although less extensively compared to the North Sea. Although the species is considered one of the most difficult gadoids to age, few efforts have been made to shed light on the ageing problems. The aim of the present study was to identify and validate the 1st winter ring and to examine the visibility of the subsequent winter rings. Microstructure analysis was used to confirm the 1st winter ring. Additionally, otolith growth trajectories were obtained, confirming the allometric growth as seen in many fish species. The method for ageing of whole otoliths presented in this study can be directly implemented in future ageing of whiting otoliths from the Baltic Sea – and potentially also adjacent areas where the conspecifics have similar growth rates.
A review on broodstock nutrition of marine pelagic spawners: the curious case of the freshwater eels (Anguilla spp.)

To sustain eel aquaculture, development of reproduction in captivity is vital. The aim of this review is to assess our current knowledge on the nutrition of broodstock eels in order to improve the quality of broodstock under farming conditions, drawing information from wild adult eels and other marine pelagic spawners. Freshwater eels spawn marine pelagic eggs with an oil droplet (type II), and with a large perivitelline space. Compared with other marine fish eggs, eel eggs are at the extreme end of the spectrum in terms of egg composition, even within this type II group. Eel eggs contain a large amount of total lipids, and a shortage of neutral lipids has been implied a cause for reduced survival of larvae. Eel eggs have higher ARA but lower EPA and DHA levels than in other fish. Too high levels of ARA negatively affected reproduction in the Japanese eel, although high levels of 18:2n-6 in the eggs of farmed eels were not detrimental. The total free amino acid amount and profile of eel eggs appears much different from other marine pelagic spawners. Nutritional intervention to influence egg composition seems feasible, but responsiveness of farmed eels to induced maturation might also require environmental manipulation. The challenge remains to succeed in raising European eel broodstock with formulated feeds and to enable the procurement of viable eggs and larvae, once adequate protocols for induced maturation have been developed.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, National Food Institute, Division of Industrial Food Research, Section for Marine Ecology and Oceanography, National Institute of Sciences and Technologies of the Sea, BioMar A/S, Wageningen IMARES, National Institute for Agronomic Research
Authors: Heinsbroek, L. (Ekstern), Støttrup, J. (Intern), Jacobsen, C. (Intern), Corraze, G. (Ekstern), Kraiem, M. (Ekstern), Holst, L. (Ekstern), Tomkiewicz, J. (Intern), Kaushik, S. (Ekstern)
Pages: 1-24
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information
Journal: Aquaculture Nutrition
A stochastic length-based assessment model for the Pandalus stock in Skagerrak and the Norwegian Deep

This working document describes a length based stochastic assessment model of Pandalus in ICES areas IIIA and IVA. The model describing stock development is age based, but the model also estimates the relation between age and length assuming a von Bertalan growth curve. The model presented in this paper is based on the assessment data presented at
the 2012 NIPAG meeting, but with updated survey information. Also the estimates shown here are based on equal standard deviations for survey and catch $L = \sigma L$, which is the natural assumption, as this parameter describes the standard deviation of the length distribution in the population.

**General information**

**State:** Published  
**Organisations:** National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management  
**Authors:** Nielsen, A. (Intern), Munch-Petersen, S. (Intern), Eigaard, O. R. (Intern), Søvik, G. (Ekstern), Ulmestrand, M. (Ekstern)  
**Number of pages:** 12  
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**Links:**  
**Publication:** Research › Conference article – Annual report year: 2014

**Bæredygtigt jomfruhummerfiskeri : Sustainable Norway lobster fishing**

**General information**

**State:** Published  
**Organisations:** National Institute of Aquatic Resources, Section for Ecosystem based Marine Management  
**Authors:** Feekings, J. P. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern)  
**Publication date:** 2013  
**Event:** Poster session presented at DanFish International Fisheries Exhibition, Aalborg, Denmark.  
**Main Research Area:** Technical/natural sciences  
**Publication:** Research › Poster – Annual report year: 2013

**Behind the shine: An appraisal of five years of Danish CCTV trials**

Denmark has been the first nation in Europe to promote the use of Fully Documented Fisheries (FDF) through Remote Electronic Monitoring (REM) and CCTV camera systems, and some pilot schemes for monitoring cod catches have been in place since 2008. In theory, such a scheme could supplement and even potentially replace expensive control and monitoring programs; and, when associated to a Catch Quota management system, incentivize positive changes in fishing patterns in a results-based management approach. However, in practice, the technical and institutional challenges remain important hurdles to overcome for the system to be beneficial and reliable. In this paper we investigate the added value on catch information gained over the last five years, and discuss the future of REM as a monitoring program in the context of the future discards ban.

**General information**

**State:** Published  
**Organisations:** National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Public Sector Consultancy, Section for Monitoring and Data  
**Authors:** Ulrich, C. (Intern), Dalskov, J. (Intern), Egekvist, J. (Intern), Håkansson, K. B. (Intern), Olesen, H. J. (Intern), Storr-Paulsen, M. (Intern)  
**Number of pages:** 2  
**Publication date:** 2013  
**Event:**  
**Main Research Area:** Technical/natural sciences  
**Electronic versions:**  
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**Links:**  
**Blue Reef - Reetableret stenrev og deres effekt på fiskefaunen – foreløbige resultater af fiskeundersøgelserne på Læsø Trindel**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Shellfish Centre
Authors: Stenberg, C. (Intern), Støttrup, J. (Intern), Dolmer, P. (Intern)
Publication date: 2013
Event: Poster session presented at 17. Danske havforskermøde, Roskilde, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

**Characteristic sizes of life in the oceans - from bacteria to whales**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Centre for Ocean Life, Section for Ecosystem based Marine Management
Publication date: 2013
Event: Abstract from International Workshop on Trait-based approaches to Ocean Life, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

**Cod recovery as a new challenge for fisheries management: experience from the Baltic Sea**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Section for Marine Living Resources, Institute Management
Authors: Eero, M. (Intern), Hüussy, K. (Intern), Mosegaard, H. (Intern), Hansen, J. H. (Intern), Bastardie, F. (Intern), Köster, F. (Intern)
Publication date: 2013
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

**Comparison of broodstock lipid stores in farmed and wild European eel (Anguilla anguilla) in link with reproductive performance**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Corraze, G. (Ekstern), Støttrup, J. (Intern), Larroquet , L. (Ekstern), Tomkiewicz, J. (Intern), Kaushik, S. (Ekstern)
Publication date: 2013
Event: Poster session presented at Aquaculture Europe 13, Trondheim, Norway.
Main Research Area: Technical/natural sciences
Links: [https://www.was.org/easonline/AbstractDetail.aspx?i=2067](https://www.was.org/easonline/AbstractDetail.aspx?i=2067)
Publication: Research › Poster – Annual report year: 2014
The present report is an EU-FP7-SOCIOEC Report giving an overview and critical evaluation of the current management measures implemented for the North Sea mixed demersal fisheries and the fish stocks involved in this. Also, this involves review and critical evaluation of the scientific advice supporting the fisheries management for the North Sea mixed demersal fisheries and the stocks involved herein. Management of the demersal roundfish and flatfish fisheries in the North Sea is conducted mainly through the EU Common Fisheries Policy (CFP) and the yearly EU-Norway Bilateral Fishery Agreements. The prevailing management system and principle has been landing quotas (TAC, Total Allowable Catch) mainly based on the EU principle of relative stability in the international sharing of the TAC. Also, general effort limitations and technical measures are set for the EU and Norwegian fisheries on top of the TAC regulations. Technical measures have mainly aimed at reducing the retention and discard of the juveniles through gear measures and to protect the spawners and/or recruits in the fish populations through closures. Furthermore, the management is based on a set of national measures especially concerning control and enforcement measures, national distribution of the overall TAC, individual special technical measures, allocation (distribution) of national TACs to different fisheries and vessels including the share to e.g. Individual Transferable Quotas (ITQs) or Vessel Quota Shares (VQSs). The management of the North Sea demersal fisheries has changed quite a lot over the last decades following the need to rebuild the fish stocks, and in particular the North Sea cod stock in relation to the present case study. The CFP has increasing focus towards implementing multi-annual or long term management plans (MAMPS, LTMPs) partly to avoid the annual political battles over setting the TAC. There has furthermore been a trend during the last decade to move away from the Precautionary Approach and towards Maximum Sustainable Yield as the overarching management objective and Harvest Control Rules (HCRs) based on this. There have been introduced increasingly restrictive fisheries-based effort limitations with possibilities for exemption or for less drastic effort reductions provided that cod avoidance behavior can be demonstrated. Although the decision-makers under the CFP have had a reputation of consistently setting TACs way above the scientific advice, the development in recent years has been towards this gap being reduced.

Management of the fisheries has undergone a number of structural and behavioral changes, and these have already yielded some positive results as the status of the demersal stocks in the North Sea have globally improved. The status of main demersal stocks has considerably improved over the last decade. Fishing mortality has globally decreased and biomass has increased, and most of the assessed demersal stocks are now within sustainable limits. Some issues remain with North Sea cod, for which recovery is slower. At present, cod is the limiting species for all the North Sea demersal fisheries. Over a time span from the 1960s landings of demersal stocks have declined with an accelerating decrease since the mid-1990s in line with the falling stock sizes and regulated reductions in total allowable catches (TACs). A clear decrease in the mean fishing mortality (F) is observed in the 2000-2010 period with current F values between Fmsy and Fpa, and the spawning stock biomass (SSB) has on average been above Bpa for the period 1983-2010 for the assessed stocks. The effort in the central North Sea and along the Norwegian waters has decreased as well as the number of operating fishing vessels (capacity). Overall, the nominal effort (kW-days) by European fleets using demersal trawl, seine, beam trawl and gillnet in the North Sea, Skagerrak and the Eastern Channel have been substantially reduced (-20% between 2003 and 2011). Since 2000, the total fish biomass for exploited stocks in the North Sea is about 4-5 million tonnes with an increasing trend in the most recent years. Despite the decrease of landings and fishing mortality in the last recent decade, the overall recruitment has shown a clear decreasing trend from 1985-2010. The recent increase in SSB during the last decade, which is likely due to lower landings and fishing mortality levels in the last 15 years, indicate inclinations of the North Sea ecosystem to recover. However, this has not converted in higher recruitment levels in the most recent years in which there may be a time delay. There is a clear trend that both the gross profit and the net profit has improved from 2008-2010 for the main fleets of the North Sea with the only exception of the Dutch beam trawlers 18-24m, for which the gross profit decreased by nearly 90%. The positive development in economic performance measures can be a result of the structural changes that have recently occurred in many fisheries. There are fewer vessels sharing the available resources (reduction in over-capacity). Especially, the movement towards right-based systems is expected to have had positive effects on reducing the over-capacity and improving the economic performance of many fleets. Historically, EU subsidies over the years have contributed to making the fleet more efficient, so the success of the CFP in the area of developing an efficient fleet has historically contributed to its failure in relation to conserve fish stocks, as overcapacity is consistently mentioned as one of the fundamental reasons for the conservation failure historically. Employment in fishing as a social indicator is shrinking, not least for the North Sea, and has been so for many years.

There are multiple explanations for this: i) individual vessels are getting more efficient; ii) consolidation of fleets whereby fewer vessels catch the available resources with noticeable decrease in number of operating fishing vessels; and iii) decreasing fishing opportunities in the shape of lower quotas. The raw number of fishers tells a story of a sector that in reality, at least in the prosperous countries around the North Sea, provides only few jobs. Despite the above trends
indicating positive effects of the most recent fisheries management of the North Sea mixed demersal fisheries there are a row of general problems in the present management. Population dynamics with respect to recruitment variations, sub-populations and changes in distribution of several demersal North Sea stocks influenced by environmental factors besides fishery are not fully understood and taken into consideration in management (and management advice). Also, biological multi-species interactions between the stocks are not fully taken into account in the management of the stocks when setting the MSY management and exploitation limits for the stocks. Management is not based on broader ecosystem and multi-species objectives, but based mainly on single stock objectives. Also technical interactions between fisheries are not taken fully into account in management of the North Sea demersal fisheries. The fisheries targeting cod, whiting, haddock, saithe, flatfish and Nephrops in the North Sea and Kattegat-Skagerrak are mixed demersal fisheries for towed gears. Mixed fisheries considerations are of primary importance for the management of North Sea species. Single stock management is a cause of discarding in mixed fisheries, because individual stock management objectives may not be consistent with each other. As such, the TAC of one species may be exhausted before the TAC of another, leading to catches of valuable fish that cannot be landed resulting in over-quotas discard. Overall, present management and fisheries policy is characterized by the CFP having in many ways taken form of a classical intergovernmentalist, state-centric command-and-control, top-down management system, where member states’ ministers in the Council have exercised strong control over the fisheries management measures which have been developed and adopted on the background of proposals from the Commission and the Parliament, though since the ratification of the Lisbon Treaty the Parliament has assumed a role of co-legislator alongside the Council. EC has identified the lack of stakeholder involvement as one of the major weaknesses of the CFP, recognizing that this fact clearly undermine its legitimacy. Establishment of the Regional Advisory Councils (RACs) with the 2003 CFP can be seen as the first formal attempt to generate a network of multi-national, multi-interest advisory organizations with a strong regional focus among other involving resource users in the decision making. However, the RACs have at present only an advisory function on decisions and are not formally integrated directly in management on a regional basis, i.e. the RAC system is primarily intended to provide a regional stakeholder perspective to the Commission's deliberations rather than providing stakeholders with real decision-making authority. RACs constitute, nevertheless, a move towards regionalization of the fisheries policy. Present management is, furthermore, characterized by a high degree of complexity, bureaucracy, and examples of micro-management where different management systems and measures are implemented in parallel making evaluation of impact of the individual measures and systems very complicated and the system suffers from lack of transparency. With respect to the complexity the different management measures are acting top of each other with impact on the same fisheries and stocks at the same time (and with time overlap in their implementation) creating a very complex management and associated advisory system, where it is difficult to distinguish specific effects and impacts of each individual measure implemented. Accordingly, it is also very difficult to make scientific management evaluation and advice associated to the individual measures.
Determining optimal pinger spacing for harbour porpoise bycatch mitigation

A trial was conducted in the Danish North Sea hake gillnet fishery in July to September 2006 to determine whether the spacing of the Aquatec AQUAmark100 pinger could be increased without reducing the effectiveness of the pinger in mitigating harbour porpoise bycatch. The trial was designed as a controlled experiment where nets without pingers formed the control group (41 hauls) and nets with pingers spaced at 455 m (24 hauls) and 585 m (43 hauls), respectively, formed the 2 experimental groups. Nets without pingers had a bycatch frequency of 0.54 incidents per haul, nets with pingers spaced at 585 m had a bycatch frequency of 0.12 incidents per haul, and nets with pingers spaced at 455 m had a bycatch frequency of 0. The bycatch frequencies for the 2 experimental groups were both significantly different from the bycatch frequencies of the control group (p < 0.0001). These results show that the spacing of the Aquatec AQUAmark100 pinger can be increased without reducing the effectiveness of the pinger in mitigating harbour porpoise bycatch, thereby reducing some of the disadvantages of widespread pinger deployment. The results also stress the importance of basing implementation regulation on solid evidence and led the Danish Fisheries Directorate in 2007 to allow the use of the AQUAmark100 pinger with a spacing of up to 455 m under derogation to the European Union’s Council Regulation No. 812/2004
Development of a broodstock diet to improve embryonic development competence in female European eel Anguilla anguilla

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, National Food Institute, Division of Industrial Food Research
Authors: Støttrup, J. (Intern), Tomkiewicz, J. (Intern), Jacobsen, C. (Intern), Krüger-Johnsen, M. (Intern), Holst, L. (Ekstern), Lauesen, P. (Intern)
Publication date: 2013
Main Research Area: Technical/natural sciences
Links:
https://www.was.org/easonline/Mobile/Paper.aspx?i=2048
Publication: Research › Paper – Annual report year: 2014

Discarding in the shrimp fisheries in Skagerrak and the Norwegian Deep (ICES Divs. IIIa and IVa East)
In the Pandalus fisheries in Skagerrak, shrimp are discarded because of being non-marketable, either due to poor landing quality or too small size. However, smaller shrimp of low market value are also discarded (so called high-grading). This is mainly the case in the fisheries which are constrained by TACs and subsequent national quotas. Estimates of the total amount of discards in the shrimp fisheries in IIIa and IVa east are based both on onboard sampling of catches (Denmark and Sweden) and indirect estimates (Norway). In fisheries management in the North Atlantic discarding has become an important issue in recent years. In some countries’ EEZ a ban on discarding has been in force for many years, for instance in Norway. A discard ban is expected to be enforced in EU waters in the near future. It is therefore highly relevant with
estimates of the existing discard practices and discard quantities to assess the possible impacts of such measures
species in functional groups, without having to know the detailed ecological interactions between the species.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Department of Fisheries and Oceans, Waaldijk 39, 6621KH Dreumel, The Netherlands
Authors: Rice, J. (Ekstern), Daan, N. (Ekstern), Gislason, H. (Intern), Pope, J. (Intern)
Pages: 734-742
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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
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Web of Science (2008): Indexed yes
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Web of Science (2005): Indexed yes
Web of Science (2004): Indexed yes
Web of Science (2003): Indexed yes
Web of Science (2002): Indexed yes
Web of Science (2001): Indexed yes
Web of Science (2000): Indexed yes
Does whiting play a central role in the food web of the western Baltic Sea?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Ross, S. D. (Intern), Nielsen, J. R. (Intern), Gislason, H. (Intern), Andersen, N. G. (Intern)
Publication date: 2013
Event: Abstract from ICES Annual Science Conference 2013, Reykjavik, Iceland.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2013

Dokumentation af selektiv effekt af SELTRA 180: Slutrapport til Ministeriet for Fødevarer, Landbrug og Fiskeri

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State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Krag, L. A. (Intern), Poulsen, M. (Ekstern), Vinther, M. (Intern), Herrmann, B. (Ekstern), Madsen, N. (Intern), Frandsen, R. (Intern), Karlsen, J. D. (Intern)
Number of pages: 48
Publication date: 2013

En revision af traditionelle koncepter i fiskeriet. Er balanceret fiskeri en mulig forvaltningsstrategi?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management
Authors: Jacobsen, N. S. (Intern), Andersen, K. H. (Intern), Gislason, H. (Intern)
Publication date: 2013
Event: Abstract from 17. Danske havforskermøde, Roskilde, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

Eutrophication and fish production; A challenge for science and management in coastal systems

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University
Authors: Markager, S. (Forskerdatabase), Lynggaard, M. M. (Forskerdatabase), Nielsen, J. R. (Intern), Richardson, K. (Forskerdatabase)
Publication date: 2013
Event: Abstract from Baltic Sea Science Congress, Klaipeda, Lithuania.
Main Research Area: Technical/natural sciences
Evaluating the effect of fishery closures: lessons learnt from the Plaice Box

To reduce discarding of plaice Pleuronectes platessa in the North Sea flatfish fisheries, the major nursery areas were closed to large trawlers in 1995. The area closed was named the 'Plaice Box' (PB) and beam trawl effort fell by over 90% , while the exemption fleets of small flatfish beam trawlers, gill netters targeting sole (Solea solea) and shrimp (Crangon crangon) trawlers increased their effort. Contrary to the expectation, plaice landings and biomass declined. The initial support for the PB from the fisheries was lost, whereas other stakeholder groups claimed that any failure was due to the fact that fishing had never been completely prohibited in the area. To evaluate whether the PB has been an effective management measure, the changes in the ecosystem (plaice, demersal fish, benthos) and fisheries are analysed to test whether the observed changes are due to the PB or to changes in the environment unrelated to the PB. Juvenile growth rate of plaice decreased and juveniles moved to deeper waters outside the PB. Demersal fish biomass decreased, whereas the abundance of epibenthic predators (Asterias rubens and Cancer pagurus) increased in the PB. Endobenthos, in particular the main food items of plaice (polychaetes and small bivalves) remained stable or decreased both inside and outside the PB. Currently catches of both plaice and sole from within the PB are lower than in the late 1980s and the exemption fleet often prefers to fish outside the Plaice Box alongside much larger competitors. It is concluded that the observed changes are most likely related to changes in the North Sea ecosystem, which may be related to changes in eutrophication and temperature. It is less likely that they are related to the change in fishing. This case study highlights the importance setting testable objectives and an appropriate evaluation framework including both ecological and socio-economic indicators when implementing closed areas.

Key words: Marine Protected Area, MPA, spatial management, fisheries management, discards, climate change, trawling impact, North Sea, benthos, ecosystem change, stakeholder perception

General information
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Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Ecosystem based Marine Management, Wageningen IMARES, Johann Heinrich von Thünen-Institute, Alfred Wegener Institute for Polar and Marine Research
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Main Research Area: Technical/natural sciences

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BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
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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
Evaluations of management strategies for Norway pout in the North Sea and Skagerrak

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Vinther, M. (Intern), Nielsen, J. R. (Intern)
Publication date: 2013

Fast growing fish living dangerous lives: Gadoids in the North Atlantic

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Rindorf, A. (Intern)
Publication date: 2013
Event: Annual report year: 2014

Forage fish quality: seasonal lipid dynamics of herring (Clupea harengus L.) and sprat (Sprattus sprattus L.) in the Baltic Sea

This study investigates lipid content and fatty acid composition of two important forage fish, sprat (Sprattus sprattus) and herring (Clupea harengus) in the Baltic Sea ecosystem. Seasonal variation in lipids was studied during three periods following the annual reproductive cycle considering potential differences relating to fish size, sex, and reproductive status. The isopod Saduria entomon, being at times an important prey for predatory fish, was included for comparison. In both sprat and herring, lipid content and absolute contents of essential polyunsaturated fatty acids (PUFAs) varied seasonally with high levels towards the end of the annual zooplankton production cycle, succeeded by a decline. Lipid content and fatty acid composition differed significantly between sprat and herring. Sprat lipid content was higher than herring, increasing with fish size and characterized by large proportions of monounsaturated fatty acids. Herring lipid content was related to the reproductive cycle and proportions of PUFAs were high compared with sprat. Levels of essential PUFAs were high in S. entomon compared with clupeids rendering it a valuable alternative prey species in the Baltic Sea ecosystem. The lipid dynamics of forage fish and benthos, combined with changes in availability and abundance, will affect growth and reproduction of their predators.
Forsøgsfiskeri med jomfruhummertejner i det permanent lukkede område i Kattegat
Haemoglobin genotypes in cod (Gadus morhua L): their geographic distribution and physiological significance

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography, Centre for Ocean Life, Norwegian University of Science and Technology, University of Copenhagen
Authors: Ross, S. D. (Intern), Behrens, J. W. (Intern), Brander, K. (Intern), Methling, C. (Ekstern), Mork, J. (Ekstern)
Publication date: 2013
Main Research Area: Technical/natural sciences

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- 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 2.16 SJR 0.794 SNIP 0.879
- Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 1
- Scopus rating (2015): SJR 0.917 SNIP 0.915 CiteScore 2.01
- Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 1
- Scopus rating (2014): SJR 0.983 SNIP 0.94 CiteScore 2.18
- Web of Science (2014): Indexed yes
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 0.956 SNIP 1.058 CiteScore 2.36
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 0.773 SNIP 1.032 CiteScore 2.18
- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 0.858 SNIP 1.048 CiteScore 2.2
- ISI indexed (2011): ISI indexed yes
- Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 0.836 SNIP 1.041
- BFI (2009): BFI-level 1
- Scopus rating (2009): SJR 0.794 SNIP 0.944
- Web of Science (2009): Indexed yes
- BFI (2008): BFI-level 1
- Scopus rating (2008): SJR 0.725 SNIP 0.806
- Web of Science (2008): Indexed yes
- Scopus rating (2007): SJR 0.639 SNIP 0.893
- Web of Science (2007): Indexed yes
- Scopus rating (2006): SJR 0.62 SNIP 0.892
- Web of Science (2006): Indexed yes
- Scopus rating (2005): SJR 0.653 SNIP 0.907
- Scopus rating (2004): SJR 0.756 SNIP 1.02
Havvindmølleparker og deres indflydelse på fisk - et casestudy fra Horns Rev havvindmøllepark

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Department of Applied Mathematics and Computer Science, Dynamical Systems
Publication date: 2013
Event: Abstract from 17. Danske havforskermøde, Roskilde, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

Højere kvalitet på trawlfangst hummerfisk

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Karlsen, J. D. (Intern), Krag, L. A. (Intern), Kajgaard, L. (Ekstern), Clausen, B. (Ekstern), Thomsen, F. (Ekstern), Jensen, L. (Ekstern), Kajgaard, J. (Ekstern), Kusk, M. (Ekstern), Pedersen, C. (Ekstern), Lund, H. (Ekstern), Madsen, N. (Intern), Frandsen, R. (Intern)
Publication date: 2013
Event: Poster session presented at DanFish International Fisheries Exhibition, Aalborg, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

How important is whiting in the western Baltic Sea ecosystem?

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State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Ross, S. D. (Intern), Nielsen, J. R. (Intern), Gislason, H. (Intern), Andersen, N. G. (Intern)
Publication date: 2013
Event: Abstract from Baltic Sea Science Congress, Klaipeda, Lithuania.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

Identification of seasonal migration, vertical activity and thermal experience of Greenland halibut Reinhardtius hippoglossoides (Walbaum) in west Greenland waters

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Behrens, J. W. (Intern), Neuenfeldt, S. (Intern), Sparrevoth, C. R. (Intern), Eigaard, O. R. (Intern), Boje, J. (Intern)
Publication date: 2013
Identifying pelagic ecosystem indicators for management

When exploiting fish populations under the ecosystem approach, aiming for MSY is not necessarily sufficient to ensure wider ecosystem sustainability. All of the large stocks of pelagic fish are managed through harvest control rules based on an MSY approach. Ensuring good environmental status will probably require further constraints to be imposed by management. Most of the current paradigm with regards to GES for fisheries has been based on demersal fish. Pelagic fisheries and fish are operationally and biologically respectively different. We use the example of applying the ecosystem approach to pelagic fisheries to further explore the setting of management objectives. The objectives were identified through a participatory process including industry, management, scientist and NGO representatives. These objectives were used to identify appropriate driver, pressure and state indicators. The links between objectives and indicators were explored for a range of examples highlighting the importance of the biology and the interaction between the pelagic ecosystem and humans. Considering MSY targets alone will not fulfil GES objectives with regards to e.g. genetic, phenotypic, and behavioural dimensions. The MSY approach also does not consider specifically habitat and bycatch concerns.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Trenkel, V. (Ekstern), Hintzen, N. (Ekstern), Rindorf, A. (Intern), Shephard, S. (Ekstern), Olesen, C. (Ekstern), Farnsworth, K. (Ekstern), Dickey-Collas, M. (Ekstern), Reid, D. (Ekstern)
Publication date: 2013
Event: Poster session presented at Society of Experimental Biology, Annual Main Meeting, Valencia, Spain.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

Improved management based on stock identification of eastern and western Baltic cod

The objective of this project was to establish an empirically founded knowledge base for the sustainable exploitation of the western Baltic cod stock by including the complex stock structure and migration patterns.

Stock mapping: Extensive immigration of “Eastern” cod into the Arkona Basin (SD 24) within the “Western” cod’s management unit was documented using high-powered genetic tools. The majority (91%) of all spawning fish caught in SD 24 in 2011 were “Eastern” cod and only 9% were from the “Western” stock. The results suggest that the stock structure in the Arkona Basin is highly influenced by mixing of genetically separate stocks.

Trends in mixing: Since the 1980’s where cod in SD 24 consisted primarily of “Western” type, the proportion of “Eastern” cod has increased, particularly since 2005. Throughout that period, the immigration of “Eastern” cod into SD 24 consisted primarily of adult, older fish. The changes in biological characteristics (mean size at age, condition and maturity) observed in that area since 2005 are thus a direct consequence of the extensive immigration of “Eastern” cod. As no seasonal signals in stock mixing were observed, the immigration is not associated with a change in “Eastern” cod’s spawning behaviour.

Management: The stock mixing proportions were successfully implemented in DTU Aqua’s modeling framework for management scenarios. “Eastern” immigrants into SD 24 lead the management procedure to advice for higher TACs that enhance the pressure on the fishing mortality level in SD 22. The fishing mortality level in SD 22 in this situation will need to be lowered i.e. by allocating more effort and catch from SD 22 to SD 24. Higher landings are expected if effort is re-directed/re-allocated to SD 24, profiting from the “Eastern” immigrants. By lowering the fishing mortality in SD 22, the SSB in SD 22 is also preserved, which is assumed to be the main source of recruits for the whole “western” stock (i.e. SD 22 + SD 24). In conclusion: Within the frame of this project we showed that substantial immigration “Eastern” cod into SD 24 has occurred and that these stock dynamics should be incorporated in evaluations of future management plans.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Hüssy, K. (Intern), Bastardie, F. (Intern), Eero, M. (Intern), Hansen, J. H. (Intern), Mosegaard, H. (Intern), Nielsen, J. R. (Intern)
Number of pages: 61
Publication date: 2013
Publication information
Place of publication: Charlottenlund
Publisher: National Institute of Aquatic Resources, Technical University of Denmark
Original language: English
In-situ identification of marine organisms using high frequency, wideband ultrasound

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

The objective of this Ph.D. study has been to develop a method to investigate the possibility of in-situ identification of fish with high-frequency, wideband ultrasound. The approach was to build a 1 MHz wideband single-element transducer system to obtain range profiles of fish, and to do fish species identification by comparing measured range profiles with libraries of reference range profiles as it is done in some radar systems used to identify aircraft. To do this, it is also necessary to investigate the properties of ultrasound backscatter of fish in the MHz frequency range to help the interpretation of the range profiles. Three case studies were investigated in this Ph.D. study. The first case study was to investigate the ultrasound backscatter of fish in the MHz frequency range using empirical methods. Measurements using a BK Medical ultrasound scanner equipped with a dedicated research interface were
performed on a saithe (Pollachius virens) and three cods (Gadus morhua) at different frequencies as well as angles between the center line of the transducer beams and the fish bodies. The frequencies are 2, 3.5, and 6 MHz. The angles are -30°, -15°, 0°, 15°, and 30°. The results show that even though there are variations, a scan of the ultrasound backscatter along a fish of a specific species contains patterns that are characteristic for that species. This is true at all frequencies in the low MHz range. The part of a fish that contributes most is not necessarily the swimbladder as the results indicate that in the low MHz frequency range bone structures, and skin surfaces are more important.

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

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

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

**General information**

State: Published

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

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

Number of pages: 171

Publication date: 2013

**Publication information**

Place of publication: Kgs. Lyngby

Publisher: Technical University of Denmark (DTU)

Original language: English

Main Research Area: Technical/natural sciences

Electronic versions: 120913_PhD_Thesis_An_Hoai_Pham..PDF

**Relations**

Projects:

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

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

**Integrating individual trip planning in energy efficiency – Building decision tree models for Danish fisheries**

Danish fishermen have provided information on dynamics in their fuel consumption, running costs, and fishing patterns through a web-based questionnaire. This detailed documentation of the fishing practices is used in spatial modelling tools to improve advice and research for fisheries. The tools integrate detailed information on vessel distribution, catch and fuel consumption for different fisheries with a detailed resource distribution of targeted stocks from research surveys to evaluate the optimum consumption and efficiency to reduce fuel costs and the costs of displacement of effort. The energy efficiency for the value of catch per unit of fuel consumed is analysed by merging the questionnaire, logbook and VMS (vessel monitoring system) information. Logic decision trees and conditional behaviour probabilities are established from the responses of fishermen regarding a range of sequential hypothetical conditions influencing their trip decisions, covering the duration of fishing time, choice of fishing ground(s), when to stop fishing and return to port, and the choice of the port for landing. Fleet-based energy and economy efficiency are linked to the decision (choice) dynamics. Larger fuel-intensive but efficient vessels conducting pelagic or industrial fishing are more inclined to base their decision on fish price only, while numerous smaller and less efficient vessels conducting demersal mixed or crustacean fishery usually consider other flexible factors, e.g., the potential for a
large catch, weather, previous knowledge and experience, and the distance to/from port, which affect the number and duration of trips and the fuel consumption. Integration of the results into our recently developed spatially explicit individual-based fishing vessel model (IBM) incorporate the variability and predict the adaptations of individual fishermen to resource availability dynamics, increasing fuel prices, changes in regulations, and the consequences of socioeconomic external pressures on harvested stocks. A new methodology is described here to obtain quantitative information on the fishermen’s micro-scale decisions initially required.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Management Systems
Authors: Bastardie, F. (Intern), Nielsen, J. R. (Intern), Andersen, B. S. (Intern), Eigaard, O. R. (Intern)
Pages: 119-130
Publication date: 2013
Main Research Area: Technical/natural sciences

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Journal: Fisheries Research
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Web of Science (2018): Indexed yes
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BFI (2016): BFI-level 1
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
Konsekvensvurdering af fiskeri på blåmuslinger i Løgstør Bredning 2012/2013

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data
Authors: Dolmer, P. (Intern), Christoffersen, M. (Intern), Christensen, H. T. (Intern), Geitner, K. (Intern), Larsen, F. (Intern), Holm, N. (Intern)
Publication date: 2013

**Publication information**
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
ISBN (Electronic): 978-87-7481-189-3
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Series: DTU Aqua-rapport
Number: 274-2013
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Main Research Area: Technical/natural sciences
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Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Commissioned › Report – Annual report year: 2013

Konsekvensvurdering af fiskeri på blåmuslinger og søstjerne i Løgstør Bredning 2013/2014

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data, Section for Ecosystem based Marine Management, Danish Shellfish Centre
Authors: Poulsen, L. K. (Intern), Canal-Vergés, P. (Intern), Geitner, K. (Intern), Christoffersen, M. O. (Intern), Holm, N. (Intern), Petersen, J. K. (Intern)
Number of pages: 95
Publication date: 2013

**Publication information**
Place of publication: Charlottenlund
Publisher: Danmarks Tekniske Universitet, Institut for Akvatiske Ressourcer - Dansk Skaldyrcenter
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Original language: Danish
Applicant: NaturErhvervstyrelsen
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Main Research Area: Technical/natural sciences
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Publishers version
Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Commissioned › Report – Annual report year: 2013
Localisation of nursery areas based on comparative analyses of the horizontal and vertical distribution patterns of juvenile Baltic cod (Gadus morhua)

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

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Institute Management
Authors: Frandsen, R. P. (Intern), Feekings, J. P. (Intern), Reeh, L. (Intern)
Pages: 8-9
Publication date: 2013

Publication information
Pages (from-to): 8-9
Newspaper: Fiskeritidende
Volume: 20
No.: 40
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: 2013

Marine and coastal ecosystem-based risk management handbook

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Fisheries and Oceans Canada, University of Hull, Marine Scotland Science, Helmholtz Centre Geesthacht Centre for Materials and Coastal Research
Modelling towing and haul-back escape patterns during the fishing process: a case study for cod, plaice, and flounder in the demersal Baltic Sea cod fishery

The survival likelihood of fish escaping through trawl codends may depend on when they escape. It is therefore relevant to investigate when during the fishing process fish actually attempt to escape and do escape from trawl codends. This subject is addressed by modelling data collected during a specially designed experiment. Results demonstrate that the escape process during towing cannot be described sufficiently by a traditional logistic model or something similar. Instead, a model is required that explicitly considers that not all fish necessarily contact the codend netting to attempt escape during the towing phase. A model that accounts for such behaviour is applied and it is demonstrated that this model can adequately describe the size selection process during towing. The overall escape process, which consists of the attempt probability, partial escape during towing, and partial escape during the haul-back phase, is also modelled. This proposed model sufficiently described the observed escape pattern for cod (Gadus morhua), plaice (Pleuronectes platessa), and flounder (Platichthys flesus). For all three species, a significant percentage of the individuals entering the codends during fishing first attempt to escape during the haul-back operation.
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
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Web of Science (2008): Indexed yes
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Web of Science (2005): Indexed yes
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Web of Science (2003): Indexed yes
Web of Science (2002): Indexed yes
Web of Science (2001): Indexed yes
Web of Science (2000): Indexed yes
Original language: English
DOI:
10.1093/icesjms/fs032
Links:
http://icesjms.oxfordjournals.org.globalproxy.cvt.dk/content/70/4/850
Publication: Research - peer-review › Journal article – Annual report year: 2013

Monitoring af fisk på strukturer – et spørgsmål om skala

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Kristensen, L. (Intern), Stenberg, C. (Intern), Hansen, K. S. (Intern)
Publication date: 2013
Event: Poster session presented at 17. Danske havforskermøde, Roskilde, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

Nephrops area definitions in the Skagerrak and Kattegat (FU 3-4)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Ecosystem based Marine Management
Authors: Feekings, J. P. (Intern), Jonsson, P. (Ekstern), Wieland, K. (Intern), Ulmestrand, M. (Ekstern), Lövgren, J. (Ekstern)
Publication date: 2013
Main Research Area: Technical/natural sciences
Electronic versions:
Nephrops area definition in the Skagerrak and Kattegat
Publication: Research › Paper – Annual report year: 2013
Nephrops UWTV surveys in the Skagerrak and Kattegat (FU 3-4)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Section for Ecosystem based Marine Management
Authors: Wieland, K. (Intern), Ulmestrand, M. (Ekstern), Feekings, J. P. (Intern), Koppetsch, S. (Ekstern)
Publication date: 2013
Main Research Area: Technical/natural sciences
Electronic versions:
Nephrops UWTV surveys in the Skagerrak and Kattegat
Publication: Research › Paper – Annual report year: 2013

No apparent population genetic structure of the North Atlantic blue whale (Balaenoptera musculus musculus)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Oosting, T. (Ekstern), Berube, M. (Ekstern), Sears, R. (Ekstern), Ramp, C. (Ekstern), Vikingsson, G. (Ekstern), Larsen, F. (Intern), Tison, J. (Ekstern), Palsboll, P. (Ekstern)
Publication date: 2013
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

Offspring size as a strategic life history trait

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Olsson, K. (Intern)
Publication date: 2013
Event: Abstract from International Workshop on Trait-based approaches to Ocean Life, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Links:
Publication: Research › Conference abstract for conference – Annual report year: 2013

Patchy zooplankton grazing and high energy conversion efficiency: ecological implications of sandeel behavior and strategy
Sandeel display strong site-fidelity, and spend most of their life buried in the seabed. This strategy carries important ecological implications. Sandeels save energy when they are not foraging but in return are unable to move substantially and therefore possibly are sensitive to local depletion of prey. Here we studied zooplankton consumption and energy conversion efficiency of lesser sandeel (Ammodytes marinus) in the central North Sea, using stomach data, length and weight-at-age data, bioenergetics, and hydrodynamic modeling. The results suggested: (i) Lesser sandeel in the Dogger area depend largely on relatively large copepods in early spring. (ii) Lesser sandeel is an efficient converter making secondary production into fish tissue available for higher trophic levels. Hence, changes in species composition towards a more herring dominated system, as seen in recent times, may lead to a decrease in system transfer efficiency. (iii) Sandeels leave footprints in the standing copepod biomass as far as 100 km from the edge of their habitat, but smaller and more isolated sandeel habitat patches have a much lower impact than larger patches, suggesting that smaller habitats can sustain higher sandeel densities and growth rates per area than larger habitats

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management
Authors: Deurs, M. V. (Intern), Christensen, A. (Intern), Rindorf, A. (Intern)
Pages: 123-133
Publication date: 2013
Main Research Area: Technical/natural sciences
Plankton grazing and high energy conversion efficiency – Ecological implications of sandeel behavior and strategy MEPS 2013[1]
DOIs:
10.3354/meps10390

Relations
Projects:
Patchy zooplankton grazing and high energy conversion efficiency: ecological implications of sandeel behavior and strategy
Population structure of Atlantic Mackerel (Scomber scombrus)

Atlantic mackerel (Scomber scombrus) occurs on both sides of the north Atlantic and has traditionally been grouped into 5 spawning components, some of which were thought to be isolated natal homing stocks. Previous studies have provided no evidence for cross Atlantic migration and no or weak support for isolated spawning components within either side of the North Atlantic. We question the de-facto accepted hypothesis of isolation between spawning components on the basis of spawning and age distribution data. The spawning intensities, proxied by larval abundances, are negatively correlated between the North Sea and Celtic Sea, which indicates that the two spawning components may be connected by straying individuals. This finding is based on unique larvae samples collected before the collapse of North Sea component, thus showing that the exchange is not a recent phenomenon due to the collapse. The analyses of old as well as more recent age distributions show that strong year classes spread into other areas where they spawn as adults (“twinning”). Our findings are in accordance with the lack of solid evidence for stock separation from previous analyses of tagging data, genetics, ectoparasite infections, otolith shapes, and blood phenotypes. Because no method has been able to identify the origin of spawning mackerel unequivocally from any of the traditional spawning components, and in the light of our results, we conclude that straying outweighs spatial segregation. We propose a new model where the population structure of mackerel is described as a dynamic cline, rather than as connected contingents. Temporal changes in hydrography and mackerel behavior may affect the steepness of the cline at various locations. The new interpretation of the population structure of Atlantic mackerel has important implications for research, assessment and management.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Living Resources, Section for Ecosystem based Marine Management
Authors: Jansen, T. (Intern), Gislason, H. (Intern)
Pages: e64744
Publication date: 2013
Main Research Area: Technical/natural sciences

Publication information
Journal: PLoS ONE
Volume: 8
Issue number: 5
ISSN (Print): 1932-6203
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 3.11 SJR 1.201 SNIP 1.092
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.414 SNIP 1.131 CiteScore 3.32
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.545 SNIP 1.141 CiteScore 3.54
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.74 SNIP 1.147 CiteScore 3.94
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.945 SNIP 1.142 CiteScore 4.15
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.369 SNIP 1.23 CiteScore 4.58
ISI indexed (2011): ISI indexed no
Quantifying relative fishing impact on fish populations based on spatio-temporal overlap of fishing effort and stock density

Evaluations of the effects of management measures on fish populations are usually based on the analyses of population dynamics and estimates of fishing mortality from stock assessments. However, this approach may not be applicable in all cases, in particular for data-limited stocks, which may suffer from uncertain catch information and consequently lack reliable estimates of fishing mortality. In this study we develop an approach to obtain proxies for changes in fishing mortality based on effort information and predicted stock distribution. Cod in the Kattegat is used as an example. We use GAM analyses to predict local cod densities and combine this with spatio-temporal data of fishing effort based on VMS (Vessel Monitoring System). To quantify local fishing impact on the stock, retention probability of the gears is taken into account. The results indicate a substantial decline in the impact of the Danish demersal trawl fleet on cod in the Kattegat in recent years, due to a combination of closed areas, introduction of selective gears and changes in overall effort.

General Information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Vinther, M. (Intern), Eero, M. (Intern)
Pages: 618-627
Publication date: 2013
Main Research Area: Technical/natural sciences

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Journal: ICES Journal of Marine Science
Volume: 70
Issue number: 3
ISSN (Print): 1054-3139
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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
Rapport om konsekvenser for fiskeriet ved udpegning af lukkede områder i Kattegat til beskyttelse af den bløde bund

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Public Sector Consultancy
Authors: Vinther, M. (Intern), Frandsen, R. (Intern), Sørensen, T. K. (Intern), Eero, M. (Intern), Storr-Paulsen, M. (Intern), Dalskov, J. (Intern)
Number of pages: 65
Publication date: 2013

Publication information
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Applicant: NaturErhvervstyrelsen
Main Research Area: Technical/natural sciences
Publication: Commissioned › Report – Annual report year: 2013
Recruitment decline in North Sea herring is accompanied by reduced larval growth rates

The stock of North Sea autumn spawning herring (Clupea harengus L.) has shown an unprecedented sequence of ten years of sharply reduced recruitment, in spite of a high spawning biomass. Recent work has identified this below-expected recruitment as being determined during the larval phase; however, the underlying mechanism remains elusive. In this study we analysed archived larval samples captured before and after the onset of the reduced survival to test the hypothesis of a concurrent change in the larval growth rate. Individual larval growth rates, averaged over the 21 days prior to capture, were estimated for two hundred larvae from four different years using a model-based analysis of the otolith ring-widths. Hydrographic-backtracking models complemented the otolith analysis by reconstructing the environmental history and spawning origin of each larva. A significant reduction in net larval growth rate of 8%, concurrent with the reduced larval survival and recruitment, was identified: after correcting for the effect of other explanatory variables (e.g. temperature changes), the gross reduction was found to be 12%. This reduction is most probably due to changes in either the amount or quality of available food. The study demonstrates the potential in coupling of two different techniques, the otolith microstructure analysis and the hydrographic modelling, for affording new insights into fish early-life history. Finally, the study provides a novel indication of the association between reduced growth and larvae survival, thereby narrowing the range of potential mechanisms underlying the observed reduction in the recruitment of North Sea autumn spawning herring.
Seabirds maintain offspring provisioning rate despite fluctuations in prey abundance: A multi-species functional response for guillemots in the North Sea

1. Seabirds that consume more than one prey type may adjust their foraging to maintain provisioning rates for their chicks. How energetically effective are these strategies, and what are the implications for the management of seabirds and their marine habitat? 2. A multi-species functional response links consumption rates to the availability of multiple prey types, but fitting multi-species functional responses to field data can be difficult, requiring consumption measurements over a range of different prey abundances. Such detailed data may be especially difficult to obtain in marine ecosystems. 3. We used annual time-series data on chick provisioning for the common guillemot Uria aalge together with abundance indices for its two main prey (lesser sandeel Ammodytes marinus and sprat Sprattus sprattus) to parameterize a multi-species functional response for parents provisioning chicks at a major North Sea colony from 1992 to 2005.

4. The fitted model reproduced changes in diet and consumption rate which were consistent with changes in local prey abundance including a long-term decline in sandeels. The model predicted that energy intake by chicks would be more sensitive to changes in sprat abundance than sandeel abundance. Guillemots appeared able to adjust their foraging tactics over a wide range of prey abundances to maintain a consistent energetic intake rate for chicks.

6. Synthesis and applications. Our results suggest guillemot chicks obtain adequate caloric intake from their parents despite fluctuating prey abundances, conferring some resilience in the face of environmental variation. The parameterized multi-species functional response model can be used to estimate levels of severe prey shortage that compromise provisioning. It also enables us to interpret predator consumption rates so that these can be used as a metric of prey availability. Further, quantifying trophic links between marine prey and apex predators is needed to support the development of multi-species models in which the predators can be included. Such models are needed as tools to effectively manage the marine ecosystem, taking into account the objectives of fishing, conservation and the need to maintain Good Environmental Status.
SELTRA selektionspaneler i Kattegat og Skagerrak

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Krag, L. A. (Intern), Karlsen, J. D. (Intern), Madsen, N. (Intern)
Publication date: 2013
Event: Poster session presented at DanFish International Fisheries Exhibition, Aalborg, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

Spatial distribution of cod on the Faroe Plateau

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Maj Ottosen, K. (Intern)
Publication date: 2013
Event: Abstract from International Workshop on Trait-based approaches to Ocean Life, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Links:
Publication: Research › Conference abstract for conference – Annual report year: 2013
Stenrev: Gennemgang af den biologiske og økologiske viden, der findes om stenrev og deres funktion i tempererede områder

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Shellfish Centre, Section for Monitoring and Data
Authors: Støttrup, J. (Intern), Stenberg, C. (Intern), Dinesen, G. E. (Intern), Christensen, H. T. (Intern), Wieland, K. (Intern)
Number of pages: 57
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Publication: Commissioned › Report – Annual report year: 2013

Studies of Antarctic krill, krill predators and trawl gear at South Orkney Islands

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Krafft, B. (Ekstern), Skaret, G. (Ekstern), Krag, L. A. (Intern), Trathan, P. (Ekstern), Ying, Y. (Ekstern)
Number of pages: 26
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Number: 8-2013
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http://www.imr.no/filarkiv/2013/04/hi_imr-report_no_8-2013_antarctic_krill.pdf/nb-no
Publication: Research › Report – Annual report year: 2013

Survey for Greenland halibut in NAFO Divisions 1C-1D, 2012

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Jørgensen, O. A. (Intern)
Number of pages: 38
Publication date: 2013
Main Research Area: Technical/natural sciences
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Tejnefiskeri efter jomfruhummer - et alternativ til trawl?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Frandsen, R. (Intern), Feekings, J. P. (Intern), Madsen, N. (Intern)
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Event: Poster session presented at DanFish International Fisheries Exhibition, Aalborg, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

Tejnefiskeri efter jomfruhummer. Et litteraturstudie

The Danish quota for Norway lobster is fished by use of trawl. In the past 5 years, between 10 and 70 % of the quota has not been exploited. This is partly on account of restricted quotas on some of the other species that are targeted in this mixed species fishery. Furthermore, in order to protect cod, trawling is banned in some areas including areas known as Norway lobster grounds. Creels are highly selective gears both with regards to sizes and species and they lead to high quality landings. Compared to trawling, stationary gears such as creels also have much less impact on the benthic habitat and reduce fuel consumption. Commercial creeling for Norway lobster is for example found in Sweden, Norway, Scotland, and the Faroe Islands. However, all available literature report low catch rates and the viability of the fishery therefore depends upon fuel savings and the opportunity to achieve a premium price reflecting the high quality of the landings.

The fleet consists of vessels up to 12 m with a crew of one to two man. Working with creels requires a spacious deck and an advantageous arrangement in order to set and haul a large number of creels. Creeling for Norway lobster is seasonal and off season either other species are targeted (e.g. common lobster and edible crab) or the vessel is rigged for trawling or set netting.

The design of creels varies but generally they have two entrances and entice Norway lobster to the creel by use of bait e.g. salted herring. The low catch rates are primarily due to:
• Norway lobster have difficulty locating the entrance.
• Norway lobster are aggressive and the first ones being caught displays aggressive behavior towards newcomers.
• The creel is an alien element on the seabed and in itself might scare Norway lobster from entering.

The design of the creels and the type of bait contribute to the high selectivity and low by-catch rates of the fishery. It has thus been estimated that approximately 24 % of the catch by weight is discarded in the Swedish fishery and of this 56 % is Norway lobster below minimum landing size and 16 % is juvenile cod. The catch as well as the by-catch is generally undamaged and in a good condition and due to short handling time on deck, survival of the discard is expected to be high.

As the creels are very species selective, the risk of lost creels continuing to fish (ghost – fishing) is regarded to be low. Creeling for Norway lobster is considered to have potential as a commercial fishery in Danish waters if the catch rates are optimized and a market for the high quality live Norway lobsters is ensured.

General information
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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Frandsen, R. (Intern), Krag, L. A. (Intern), Andersen, B. S. (Intern), Madsen, N. (Intern)
Number of pages: 18
Publication date: 2013

Publication information
Place of publication: Charlottenlund
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
Temporal development of coastal ecosystems in the Baltic Sea - an assessment of patterns and trends

Coastal areas are amongst the most biologically productive aquatic systems worldwide, but face strong and variable anthropogenic pressures. Many marine ecosystems worldwide have gone through substantial structural changes during recent decades, but few studies have addressed the temporal development of coastal ecosystems in an integrated context. The current study represents a first example of a coordinated assessment of ecosystem development in 13 coastal systems of the Baltic Sea. The data covers different geographical areas, ranging from the Kattegat and Skagerak in the southwest to the Bothnian Bay in the north, covers between two to five trophic levels per area, and include time series dating back to the early 1990s. Using multivariate analyses, we assess the temporal development of species abundance or biomass at different trophic levels in relation to the development of variables related to local and regional climate, hydrology, nutrient loading and fishing pressure. Our results highlight the relative timing of change in ecosystem structure and the development of key biological elements across areas. Besides describing the temporal development of coastal ecosystems in the Baltic Sea during the past two decades, our results also highlight limitations and gaps in available monitoring data to support integrated environmental status assessments of Baltic ecosystems as required in current international directives as the Baltic Sea Action Plan and Marine Strategy Framework Directive, as well as the potential for further developing multisectorial management advice in coastal ecosystems.

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

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Web of Science (2017): Indexed yes
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Web of Science (2016): Indexed yes
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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
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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
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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
The future of sustainable harvesting strategies

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Döring, R. (Ekstern), Fernández, C. (Ekstern), Hjørleifsson, E. (Ekstern), Rindorf, A. (Intern)
Number of pages: 2
Publication date: 2013
Main Research Area: Technical/natural sciences
Electronic versions: Publishers_version

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ICES Theme Session H
Publication: Research › Paper – Annual report year: 2013

The influence of twine thickness, twine number and netting orientation on codend selectivity

Based on an experimental Baltic trawl fishery, we tested diamond mesh codends with different twine thicknesses, twine numbers (single or double), and netting orientation (T0 or T90) to quantify the effects of the twine characteristics on the size selection of cod (Gadus morhua) and plaice (Pleuronectes platessa). For a given twine thickness: going from T0 to T90 increases selectivity of cod; while going from single to double reduce it. Increasing twine thickness reduces selection but the extent depends on whether the twine is single or double and whether the netting orientation is T0 or T90. In general, the results demonstrate the benefit of using a relatively thin single twine netting to ensure the appropriate size selection with round fish and the best results were obtained using netting with a T90 orientation. For a given twine thickness going from T0 to T90 decreases selectivity of plaice. Increasing twine thickness reduces selection for plaice. Our results demonstrate that very different selectivity results can be obtained using the same mesh size, simply by varying the twine thickness, the twine number, and the netting orientation. In some fisheries, the size selectivity could be improved considerably by adjusting these simple design parameters alternatively to produce more advanced and complex designs.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, National Marine Fisheries Research Institute, Thünen Institute of Baltic Sea Fisheries
Authors: Herrmann, B. (Intern), Wienbeck, H. (Ekstern), Moderhak, W. (Ekstern), Stepputtis, D. (Ekstern), Krag, L. A. (Intern)
Threshold-dependent climate effects and high mortality limit recruitment and recovery of the Kattegat cod

Cod in the Kattegat is one of the most dramatic examples of stock collapse, where despite large management efforts, almost no signs of recovery have been observed. We investigate how multiple physical and biological factors could potentially influence recruitment and recovery of Kattegat cod, using non-additive threshold models. In contrast to previous studies on recruitment dynamics of Kattegat cod Gadus morhua, we found that recruitment variability may be explained by a combination of the size of the spawning stock and external conditions (i.e. sea surface temperature and oxygen concentrations), but only during periods of low stock size. Our results indicate that the long-term decrease and the present poor state of the Kattegat cod stock is likely caused by high total mortality rates and stock-size dependent effects of climate which together are currently preventing recovery. In addition, we illustrate how only a drastic reduction in total mortalities, primarily by limiting unintended bycatch and discards, may promote a recovery of the stock. This knowledge is important for evaluating the success or failure of various management measures which have been employed to recover the stock and for developing future management strategies which can take the environmental and/or ecosystem impacts into account.
To eat glass or fish, that is the question: A Trans-Atlantic examination of haddock (Melanogrammus aeglefinus) food habits

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, National Oceanographic and Atmospheric Administration, Institute of Marine Research, Bedford Institute of Oceanography, Thünen Institute of Sea Fisheries, Cefas, Senckenberg am Meer, Dept. Marine Science
Authors: Link, J. (Ekstern), Bogstad, B. (Ekstern), Bundy, A. (Ekstern), Cook, A. (Ekstern), Dingsør, G. (Ekstern), Howell, D. (Ekstern), Lucey, S. (Ekstern), Kempf, A. (Ekstern), Pinnegar, J. (Ekstern), Rindorf, A. (Intern), Schückel, S. (Ekstern), Smith, B. (Ekstern)
Publication date: 2013
Main Research Area: Technical/natural sciences
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Journal: Danske Fritidsfiskere

Udsætning af mærkede pighvarrer ved Feggesund og Hvalpsund

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Nicolajsen, H. (Intern)
Pages: 20
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Publication information
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Udsætninger af mærkede pighvarrer og skrubber

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Nicolajsen, H. (Intern)
Pages: 21
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Main Research Area: Technical/natural sciences

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- [http://www.fritidsfiskeri.dk/medlemsbladet.html](http://www.fritidsfiskeri.dk/medlemsbladet.html)
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Udsætninger af mærkede pighvarrer og skrubber: Hvad er der sket med de udsatte fisk

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Authors: Nicolajsen, H. (Intern)
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Main Research Area: Technical/natural sciences

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Udvikling af effektivt og skånsomt redskab til tobisfiskeri på Dogger Banke

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Behrens, J. (Intern), Dinesen, G. E. (Intern), Tørring, P. (Ekstern), Eigaard, O. R. (Intern), Pedersen, E. M. (Intern), Stage, B. (Intern), Sørensen, T. K. (Intern), Mosegaard, H. (Intern)
Publication date: 2013
Event: Abstract from 17. Danske havforskermøde, Roskilde, Denmark.
Main Research Area: Technical/natural sciences
Understanding the size selectivity in diamond mesh codends based on flume tank experiments and fish morphology: effect of catch size and fish escape behaviour

This study quantifies potential size selection of a fish and a crustacean species in di-amond mesh codends during a fishing process. Changes in mesh geometry along the codends and at different catch weights were recorded in a flume tank and subse-quently used together with the morphology of cod (Gadus morhua) and Nephrops (N. norvegicus) to simulate potential size selection. By assuming certain patterns of fish escape behaviour in the codend, it was demonstrated that it was possible to replicate results for size selection based on sea trials with similar codends. Results show that L50 can increase significantly with increasing catch weight at the aft end of the codend where most of the selection is known to occur. The results document the var-iation in potential size selection along a codend during a catch-build-up. It is empha-sized that experimental studies aiming at describing the selectivity in different types of codends in a commercial situation, need to be based on catch levels representative for the commercial levels to prevent underestimation of the selectivity in the system, especially for designs to be included in the legislation.

It was additionally noted that escapement happens mostly in the area of catch accumu-lation. In response to questions, it was also noted that FISHSELECT methodology has been used. Mesh penetrations were simulated for each individual. Considering the relationship between catch weight and codend selectivity, studies with lower catches can underestimate size selection in commercial conditions.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF
Authors: Karlsen, J. D. (Intern), Krag, L. A. (Intern), Herrmann, B. (Ekstern), Hansen, K. (Ekstern)
Publication date: 2013
Event:
Main Research Area: Technical/natural sciences
Electronic versions:
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Use of GIS for evaluation of spatially managed areas

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Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Section for Ecosystem based Marine Management
Authors: Geitner, K. (Intern), Kindt-Larsen, L. (Intern)
Publication date: 2013
Event: Abstract from ESRI Europe, Middle East and Africa User Conference, Munich, Germany.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

Variability and connectivity of plaice populations from the Eastern North Sea to the Western Baltic Sea, and implications for assessment and management

An essential prerequisite of sustainable fisheries is the match between biologically relevant processes and management action. Various populations may however co-occur on fishing grounds, although they might not belong to the same stock, leading to poor performance of stock assessment and management. Plaice in Kattegat and Skagerrak have traditionally been considered as one stock unit. Current understanding indicates that several plaice components may exist in the transition area between the North Sea and the Baltic Sea. A comprehensive review of all available biological knowledge on plaice in this area is performed, including published and unpublished literature together with the analyses of commercial and survey data and historical tagging data. The results suggest that plaice in Skagerrak is closely associated with plaice in the North Sea, although local populations are present in the area. Plaice in Kattegat, the Belts Sea and the Sound can be considered a stock unit, as is plaice in the Baltic Sea. The analyses revealed great heterogeneity in the dynamics and productivity of the various local components, and suggested for specific action to maintain biodiversity.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources, Lund University, Danish Fishermen's Producers' Organization, Wageningen IMARES
Pages: 40-48
Discarding Discards: Identification of influential factors and possible mitigation tools in demersal trawl fisheries

Discarding of aquatic organisms is a global problem in the world’s fisheries, where more than 7 million tonnes are caught and subsequently discarded each year. The understanding of what drives discarding can help provide mitigation measures in the future. Altering management measures which result in high discard rates/ratios may prove beneficial not only to the economic viability of the fishery but also to the biological functioning of the ecosystem. The present Ph.D. thesis, titled “Discarding Discards: Identification of influential factors and possible mitigation tools in demersal trawl fisheries”, investigates discarding practices in demersal trawl fisheries and identifies possibilities for reducing discards. In focus, the factors that determine discards, including environmental factors, fishing methods, management regulations, and biological factors have been analysed. This includes an examination of the efficiency of technical regulations currently in force and retrospective analyses of the efficiency of such measures in the past. The thesis consists of a review and 4 papers.

Paper I is an investigation of the factors that can potentially influence the discarding of commercial species in the Kattegat. Previous studies that have investigated the factors that influence discarding have typically focused on the discarded portion as a whole, without considering that discards above and below minimum landing size (MLS) occur for different reasons. The study documented that the factors influential to discarding were different for the two subgroups (under and over MLS) and also for the different species.

Paper II focuses on discarding in the Baltic Sea cod (Gadus morhua) trawl fishery. Over the past 15 years extensive work has been conducted to improve the selectivity of the gears and subsequently reduce discards. This study investigated: i) the effects that technical measures, namely gear selectivity and minimum landing size (MLS), had on discards and; ii) a wide range of factors that can influence discards and may blur a potential effect of improved selectivity. The results showed that when gear regulations are implemented correctly they are an effective management measure. However, their effectiveness is influenced by a diverse range of factors that if unaccounted for may distort a potential effect of improved/hampered selectivity.

Paper III compiles discard data from 11370 fishing events collected across seven European Union (EU) Member States for the North Sea over the period 2003-2010. Knowledge about the spatio-temporal nature of discards is imperative to researchers and regulators but is often lacking. Here we analysed the spatial and temporal distribution of cod discards throughout the entire North Sea together with the main driving factors behind its occurrence. We discuss how such information can be used to improve future fishing activities and their subsequent catch compositions under a discard ban.

Paper IV describes the discarding of plaice (Pleuronectes platessa) in the North Sea. Plaice play an important role in the North Sea benthic ecosystem, being one of the most abundant flatfish species and one of the most important species for the fishery. Nevertheless, the plaice fishery in the North Sea is characterised by a high discard ratio, where approximately 50% (by weight) of plaice are discarded. Here we describe the general patterns in these data with particular focus on factors that could be important for management strategies in the future.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Feekings, J. P. (Intern), Madsen, N. (Intern)
Number of pages: 124
Reproduction of European eel: towards a self-sustained aquaculture (PRO-EEL)

General information
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Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Section for Ecosystem based Marine Management, Centre for Ocean Life, National Food Institute, Division of Industrial Food Research
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Electronic versions: AIPCE CEP Baltic cod recovery
Publication: Research › Conference abstract for conference – Annual report year: 2012

Epifyt og epifauna på ålegræs (Zostera marina) i Nørrefjord, Faaborg

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Ecosystem based Marine Management
Authors: Thorsen, S. W. (Ekstern), Knudsen, M. (Ekstern), Poulsen, L. K. (Intern), Kristensen, L. (Intern), Dolmer, P. (Intern), Stenberg, C. (Intern), Landes, A. (Intern), Støttrup, J. (Intern), Holmer, M. (Ekstern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Electronic versions: AIPCE CEP Baltic cod recovery
Publication: Research › Poster – Annual report year: 2011

The recovery of cod in the Baltic Sea, a success against all odds

General information
State: Published
Organisations: National Institute of Aquatic Resources, Institute Management, Section for Ecosystem based Marine Management, Section for Marine Ecology and Oceanography
Authors: Köster, F. (Intern), Eero, M. (Intern), Huwer, B. (Intern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Electronic versions: AIPCE CEP Baltic cod recovery
Publication: Research › Paper – Annual report year: 2011

Kryptisk adfærd hos naive og tilvænnede juvenile pighvarrer Psetta maxima (L.) og skrubber Platichthys flesus (L.)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Coastal Ecology, Aarhus University
Authors: Kristensen, L. D. (Intern), Kristensen, J. T. (Ekstern), Sparrevoihn, C. R. (Intern), Støttrup, J. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences
Managing fleets and fisheries rather than single stocks – conceptual change in European fisheries management advice

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Nielsen, J. R. (Intern), Limborg, M. (Intern)
Pages: 8-9
Publication date: 2009
Main Research Area: Technical/natural sciences

Seasonal lipid dynamics of herring and sprat in the Baltic Sea and possible implications for cod reproduction
The Baltic Sea experienced a regime shift in the 1980ies with major changes in food web dynamics. These ecosystem alterations were related to climatic driven changes inhydrographic conditions affecting phyto- and zooplankton assemblage and hence the food availability for clupeids. Sprat abundance increased dramatically in the early 1990ies. Thechanges in plankton communities in combination with increased competition resulted indeclined condition of clupeids. Polyunsaturated fatty acids originate from phytoplankton and are transmitted through the food web. The present study investigates if the seasonal variation in lipid composition of herring and sprat reflects the changes in plankton. Fish were sampled five times over a year and the lipid composition of different size groups was analyzed. Significant seasonal variation in average lipid content in sprat was found: 14.00% in November, 11.26% in January, 7.47% in March and 9.60% in June. The lipid content in herring also varied within season but was lower than sprat: 7.42% in November, 6.71% in January and 4.70% in March. The seasonal lipid dynamic was reflected in variation of specific fatty acids. Clupeids are the major prey of Baltic cod so deficiencies of essential fatty acids could be a limiting factor for cod reproduction

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Authors: Røjbek, M. (Intern), Tomkiewicz, J. (Intern), Støttrup, J. (Intern), Jacobsen, C. (Intern), Köster, F. (Intern)
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Vurdering af markedsudsigter for akvakulturproduktion i Danmark

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Authors: Larsen, E. (Intern), Møller, J. (Ekstern), Nielsen, M. (Ekstern)
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Bibliographical note
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Detailed design of preferred scheme

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Function of LCSs

General information