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.
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.
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
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Section for Marine Living Resources, Public Sector Consultancy, Ministry of Food, Agriculture and Fisheries
Pages: 150-157
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 187
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
**FAST TRACK: Industry developed gear solutions under the landing obligation**

**General information**

State: Published

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


Publication date: 2017

Event: Poster session presented at DanFish International, Aalborg, Denmark.

Main Research Area: Technical/natural sciences

Publication: Research – Poster – Annual report year: 2017

---

**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)
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.
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 less 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.
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.

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aarhus University, Pennsylvania State University
Authors: Mortensen, L. O. (Intern), Schmidt, N. M. (Ekstern), Hoye, T. T. (Ekstern), Damgaard, C. (Ekstern), Forchhammer, M. C. (Ekstern)
Pages: 1467-1478
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information

Journal: Polar Biology
Volume: 39
Issue number: 8
ISSN (Print): 0722-4060
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 1.72 SJR 0.866 SNIP 0.761
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.985 SNIP 0.751 CiteScore 1.62
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.931 SNIP 0.81 CiteScore 1.75
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.109 SNIP 1.054 CiteScore 2.07
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.029 SNIP 0.891 CiteScore 1.89
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.857 SNIP 0.925 CiteScore 1.77
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.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Roskilde University, Pennsylvania State University
Authors: Mortensen, L. O. (Intern), Moshøj, C. (Ekstern), Forchhammer, M. C. (Ekstern)
Pages: 523-530
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Arctic, Antarctic, and Alpine Research
Volume: 48
Issue number: 3
ISSN (Print): 1523-0430
Ratings:
Does one glove fit all? A review of Remote Electronic Monitoring as a documentation tool

General information
State: Published
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 Heilmond, E. (Ekstern), Kempf, A. (Ekstern), Needle, C. L. (Ekstern), Oesterwind, D. (Ekstern), Poos, J. J. (Ekstern), Zimmermann, C. (Ekstern), Ulrich, C. (Intern)
Publication date: 2016
Event: Abstract from IIFET 2016, Aberdeen, United Kingdom.
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.

General information
State: Published
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
Authors: Eigaard, O. R. (Intern), Bastardie, F. (Intern), Breen, M. (Ekstern), Dinesen, G. E. (Intern), Hintzen, N. T. (Ekstern), Lafargue, P. (Ekstern), Mortensen, L. O. (Intern), Nielsen, J. R. (Intern), Nilson, H. C. (Ekstern), O'Neil, F. G. (Ekstern), Polet, H. (Ekstern), Reid, D. G. (Ekstern), Sala, A. (Ekstern), Sköld, M. (Ekstern), Smith, C. (Ekstern), Sørensen, T. K. (Intern), Tully, O. (Ekstern), Zenging, M. (Ekstern), Rijnsdorp, A. D. (Ekstern)
Pages: 27-43
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 73
Issue number: Suppl. 1
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
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
DOI: 10.1093/icesjms/fsv099
Links: http://icesjms.oxfordjournals.org/content/early/2015/06/08/icesjms.fsv099.full.pdf+html
Publication: Research - peer-review › Journal article – Annual report year: 2015

MINIDISC-projektet fik afprøvet det frie redskabsvalg

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, Aalborg University
Authors: Mortensen, L. O. (Intern), Ulrich, C. (Intern), Olesen, H. J. (Intern), Eliasen, S. Q. (Forskerdatabase), Lund, H. S. (Ekstern)
Pages: 16
Publication date: 2016
Paths to enhance the development and the uptake of industry-led technical solutions to improved selectivity

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aalborg University
Publication date: 2016
Event: Abstract from International Institute of Fisheries Economics and Trade Conference, Aberdeen, United Kingdom.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2016

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

Allerede mange gode ideer i projekt MINIDISC

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Mortensen, L. O. (Intern), Lund, H. (Ekstern), Ulrich, C. (Intern)
Pages: 6
Publication date: 2015
Empowering fishermen towards the landing obligations, with their own technical solutions

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data
Authors: Mortensen, L. O. (Intern), Olesen, H. J. (Intern), Egekvist, J. (Intern), Rindorf, A. (Intern), Ulrich, C. (Intern)
Publication date: 2015
Event: Abstract from Conference of the European Association of Fisheries Economists, Salerno, Italy.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

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
ICES ASC 2015/L:14
Publication: Research › Conference abstract for conference – Annual report year: 2015

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:
Publishers_version

Bibliographical note
ICES CM 2015/L:36
Publication: Research › Poster – 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
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.

Arctic Ecosystem Responses to a warming climate

General information
State: Published
Organisations: Aarhus University
Authors: Mortensen, L. O. (Intern)
Number of pages: 82
Publication date: 2014
Bird monitoring at Zackenberg, Northeast Greenland, 2011

General information
State: Published
Organisations: Aarhus University, University of Groningen
Authors: Hansen, J. (Ekstern), Holst Hansen, L. (Ekstern), Mortensen, L. O. (Intern), Anker Kyhn, L. (Ekstern), Schmidt, N. M. (Ekstern), Reneerkens, J. (Ekstern)
Pages: 17-27
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Bird Populations
ISSN (Print): 1074-1755
Original language: English
Source: PublicationPreSubmission
Source-ID: 127062562
Publication: Research - peer-review › Journal article – Annual report year: 2014

Temporal trends and variability in a high-arctic ecosystem in Greenland: multidimensional analyses of limnic and terrestrial ecosystems

The high arctic is undergoing a faster change in climate than most other regions of the planet, with already observed ecological consequences. Combined with the characteristics of high-arctic ecosystems, such as low species redundancy, high seasonality and weather extremes, shifts in individual species performance and phenology may lead to altered interaction dynamics through trophic mismatch and cascades. An ecosystem approach is therefore desirable in the attempt to understand the multidimensional impacts of climate. Here, we present ecosystem-wide trend analyses of a long-term dataset on terrestrial and limnic biota with focus on the distribution of observed trends and associated variation across the ecosystem. We used 114 time series drawn from 11 abiotic variables, 19 terrestrial and 7 limnic biotic species/taxa and compared temporal trends, changes and abrupt shifts in the variation within and across the two biota. A total of 36 % of the time series analysed showed a significant trend during the study period with a higher frequency of trends occurring within performance variables. Overall, the changes tended to be negative, indicating advances in phenology but reduced species performance. General system variance was also higher in the limnic biota than in the terrestrial biota, both exhibiting increasing variance up through the trophic system. Overall, our results suggest that multiple biotic responses to the climatic changes in this high-arctic ecosystem are not synchronised across trophic levels and may differ qualitatively and quantitatively between terrestrial and limnic biota.

General information
State: Published
Organisations: Aarhus University
Authors: Mortensen, L. O. (Intern), Jeppesen, E. (Ekstern), Schmidt, N. M. (Ekstern), Christoffersen, K. S. (Ekstern), Tamstorf, M. P. (Ekstern), Forchhammer, M. C. (Ekstern)
Number of pages: 10
Pages: 1073-1082
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Polar Biology
Volume: 37
Issue number: 8
ISSN (Print): 0722-4060
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes

DOIs: 10.1007/s00300-014-1501-2
Source: FindIt
Source-ID: 268998377
Effects of underwater noise on harbour porpoises around major shipping lanes

General information
State: Published
Organisations: Aarhus University
Authors: Mortensen, L. O. (Intern), Tougaard, J. (Ekstern), Teilmann, J. (Ekstern)
Number of pages: 42
Publication date: 2012

Methods in sustainable monitoring: plot sampling versus interviews: plot sampling versus interviews
Biodiversity monitoring in developing countries has long been haunted by problems with sustaining monitoring programs, especially after funding stops. Current programs are developed to fulfill strict scientific demands, which often results in high priced programs, with little local participation and attention. Thus, to enhance sustainability of the biodiversity programs, there is a great need to reconcile scientific rigor with local involvement. In this paper, we analyze the cost-effectiveness and usefulness of a standard and a participatory monitoring method, in their ability to monitor biodiversity, while rising local participation. As a standard method we used a forest characteristic with tree basal area and Shannon index as proxy for biodiversity. Interviews were used as a participatory approach, with hunters' catch-effort as proxy. The analysis showed that the interviews reached a better precision with fewer work hours spent and at the same time involved local populations and stake holders. As a tradeoff, the interviews lacked the scientific rigor from forest characteristic. In order to sustain monitoring programs, we conclude that conservation biologist needs to compromise between scientific rigor and public participation.

General information
State: Published
Organisations: Aarhus University
Authors: Mortensen, L. O. (Intern), Jensen, M. B. (Ekstern)
Pages: 145-153
Publication date: 2012
Main Research Area: Technical/natural sciences

Publication information
Journal: Biodiversity and Conservation
Volume: 21
Issue number: 1
ISSN (Print): 0960-3115
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 1.169 SNIP 1.122 CiteScore 2.5
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.238 SNIP 1.143 CiteScore 2.44
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.236 SNIP 1.381 CiteScore 2.48
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.178 SNIP 1.286 CiteScore 2.59
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.195 SNIP 1.14 CiteScore 2.26
Web of Science (2012): Indexed yes
Population dynamics in Zackenberg, Greenland: Consequences of phenological change on species performance

General information
State: Published
Organisations: Aarhus University
Authors: Mortensen, L. O. (Intern), Schmidt, N. M. (Ekstern), Høye, T. T. (Ekstern), Damgaard, C. (Ekstern), Forchhammer, M. C. (Ekstern)
Publication date: 2012
Main Research Area: Technical/natural sciences
Source: FindIt
Source-ID: 2185911792
Publication: Research › Poster – Annual report year: 2012

Ambient noise and marine mammals: Lessons from pilot studies of ship noise monitoring in the Danish waters

General information
State: Published
Organisations: Aarhus University
Authors: Tougaard, J. (Ekstern), Mortensen, L. O. (Intern), Teilmann, J. (Ekstern)
Pages: 71-73
Publication date: 2011
Main Research Area: Technical/natural sciences

Publication information
Arctic species resilience: Can species cope with predicted climate variability?
The peak of biological activities in Arctic ecosystems is characterized by a relative short and intense period between
the start of snowmelt until the onset of frost. Recent climate changes have induced larger seasonal variation in both timing of
snowmelt as well as changes mean temperatures and precipitation. Concurrently, phenological change has been recorded
in a wide range of plants and animals, with climate change seeming to be the primary driver of these changes. A major
concern is whether species and biological systems embrace the plasticity in their phenological responses needed for
tracking the predicted increase in climate variability. Whereas species may show relatively high phenological resilience to
climate change per se, the resilience of systems may be more constrained by the inherent dependence through
consumer-resource interactions across trophic levels. During the last 15 years, an extensive monitoring program has been
conducted in the North Eastern Greenland National Park, the Zackenberg Basic. The objective of the program is to
provide long time series of data on the natural innate oscillations and plasticity of a High Arctic ecosystem. With offset in
the data provided through Zackenberg Basic, a newly initiated project is focusing on how the changes and variability in the
physical environment affects the species phenology and composition, population dynamics and how species specific
responses at different trophic levels are carried on to the inter-trophic dynamics of consumers and resources. This poster
will present the conceptual framework for this project focusing on species resilience.

General information
State: Published
Organisations: Aarhus University
Authors: Mortensen, L. O. (Intern), Forchhammer, M. C. (Ekstern), Jeppesen, E. (Ekstern)
Publication date: 2011
Event: Poster session presented at The Arctic as a Messenger for Global Processes: Climate Change and Pollution, 2011,
Main Research Area: Technical/natural sciences
Resilience, Ecosystem, Climate Variability, trophic interactions
Source: FindIt
Source-ID: 2185850831
Publication: Research › Poster – Annual report year: 2011

Artkisk ekologi under klimaændringer

General information
State: Published
Organisations: Aarhus University
Authors: Forchhammer, M. C. (Ekstern), Schmidt, N. M. (Ekstern), Mortensen, L. O. (Intern), Nabe-Nielsen, J. (Ekstern)
Pages: 6-9
Publication date: 2011
Main Research Area: Technical/natural sciences
Publication information
Journal: Aktuel Naturvidenskab
Issue number: 2
ISSN (Print): 1399-2309
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: Danish
Source: FindIt
Source-ID: 2185862299
Caribou collaring project in West Greenland - an update

General information
State: Published
Organisations: Aarhus University
Authors: Aastrup, P. (Ekstern), Mortensen, L. O. (Intern), Simonsen, C. E. (Ekstern), Wisz, M. (Intern), Cuyler, C. (Ekstern)
Publication date: 2010
Main Research Area: Technical/natural sciences
Source: FindIt
Source-ID: 2185880427
Publication: Research › Conference abstract for conference – Annual report year: 2010

Projects:

Integration of bycatch in mixed-fisheries management
National Institute of Aquatic Resources
Period: 01/08/2016 → 16/10/2019
Number of participants: 4
Phd Student: Schreiber Plet-Hansen, Kristian (Intern)
Supervisor: Mortensen, Lars O. (Intern)
Nielsen, J. Rasmus (Intern)
Main Supervisor: Ulrich, Clara (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Anden EU-finansiering
Project: PhD

Sustainable, cost effective and responsive gear solutions under the landing obligation (FAST-TRACK) (39323)
With the reform of the Common Fisheries Policy and the introduction of a Landing Obligation the ability of fishers to adjust the selectivity of their gears to suit the quotas which are available to them will be an important factor in determining the revenue and profitability in the fishery. As the combination of gear, fishing practice and quota shares will differ between vessels, changes to the selectivity of the gears will need to be implemented at the vessel level and based on the quotas which are available to the vessel at a given time. For this to be realized, simple and cost effective solutions which can be quickly coupled with existing gears will be in demand. These solutions will need to be implemented quickly in order for them to solve the issues at hand without losing substantial income. Furthermore, these solutions will need to be scientifically tested to document their effect before being considered for implementation into the legislation.

Fast-Track aims to increase flexibility and ownership over the gears used while ensuring an effective introduction of the new EU Common Fisheries Policy. To achieve this, Fast-Track aims to facilitate the development of more selective gears by providing the industry with the possibility to take a more proactive role in the development and testing of new ideas. Here we try to facilitate a more bottom-up approach where the industry are responsible for coming up with the ideas they feel applicable for their fishery, as well as having an important role in the testing of the gear and the collection of the data. Furthermore, it aims to speed up the testing process and diversity of gears being tested by initially having the industry to define the idea and carry out a development/ pre-test to refine the gears performance before proceeding to a more rigorous scientific test.

The expected effects of the project are 1) the establishment of a permanent platform comprised of stakeholders (fishermen, net makers producer organizations, managers and scientists) which can facilitate the development of ideas and solutions originating from the industry, 2) that the industry becomes more proactive role in the development and testing of solutions for the effective implementation of the landing obligation, 3) that the close cooperation between industry and researchers leads to greater ownership of the solutions developed, and 4) the speed with which innovative tools are developed, tested and approved is reduced while profitability and sustainability are increased.

This project is coordinated by DTU Aqua.
The project is funded by the Ministry of Environment and Food of Denmark and the European Maritime and Fisheries Fund (EMFF).

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Aalborg University
Danish Fishermen's Association
SINTEF
Period: 15/12/2015 → 15/12/2018
Number of participants: 5
Research areas: Fisheries Technology & Fisheries Management
Project participant:
Krag, Ludvig Ahm (Intern)
Ulrich, Clara (Intern)
Mortensen, Lars O. (Intern)
Phd Student:
Malta, Tiago Alexandre Matias da Veiga (Intern)
Project Coordinator:
Feekings, Jordan P. (Intern)

**Forward management of sandeel in the North Sea (39316)**
The project will define and align the management of sandeel considering the goals and desires of the fishing industry, administration and science while taking the biology and importance of the sandeel in the ecosystem into account.

The project is structured by several work-packages, each dealing with specific aspects of sandeel biology and/or fishery relevant for management. Among these will the sandeel population structure and its influence on stock assessment, CPUE and counselling be discussed. Analyses of fisheries development and sandeel availability over the fishing season will enable a more accurate calculation of fishing mortality. Furthermore, it is examined whether the increasing concentration of fishing effort on certain banks potentially causes an error in the stock assessment in relation to recruitment from unfished banks. The project will perform a statistical evaluation of fisheries-independent data for sandeel in the North Sea and evaluate existing and alternative methods of stock assessment for sandeel in the North Sea with current and alternative management areas, including implementing an analytical stock assessment of sandeel in sandeel area 4. Finally the project will evaluate existing biological and management reference points, and discuss these in relation to ecosystem reference points.

Throughout the project period, a series of workshops and meetings will be held in order to discuss possible management strategies for sandeel in the North Sea. These discussions will imply a number of fundamental prerequisites defined in collaboration between management, fisheries and science in order to form the basis for an optimal management of sandeel.

This project is coordinated by DTU Aqua.

The project is funded by the Ministry of Environment and Food of Denmark and the European Maritime and Fisheries Fund (EMFF).

National Institute of Aquatic Resources
Section for Marine Living Resources
Danish Pelagic Producers Organisation
Danish Fishermen's Association
Marine Ingredients Denmark
Period: 11/11/2015 → 16/11/2017
Number of participants: 8
Research areas: Marine Living Resources & Population Genetics & Fish Biology & Marine Populations and Ecosystem Dynamics & Fisheries Management & Ecosystem based Marine Management
Project participant:
Rindorf, Anna (Intern)
von Deurs, Mikael (Intern)
Berg, Casper Willestofte (Intern)
Supporting the national monitoring of Marine Strategy Framework Indicators (39304)

In support of the national implementation of EU's Marine Framework Strategy Directive, the project assembles a one-off monitoring of indicators of the following aspects:

- Quality of sandeel habitat
- Proportion of large top predatory fish
- Biomass of planktonic secondary producers
- Pressure on the sea bed from towed fishing gear
- Marine macro-litter
- Marine micro-litter in the food chain

The quality of sandeel habitat is measured as the fraction of sampling sites in known sandeel habitat which are unsuitable for sandeel due to excessive silt content. The proportion of large top predatory fish describes the proportion of large cod and saithe in Danish waters, and biomass of secondary producers is measured as the annual average biomass of zooplankton of three size categories in Skagerrak/Kattegat in summer.

Pressure on the seabed is measured from VMS data and the minimum area which sustains 90 % of all pressure estimated together with the effectively unfished area. Macro-litter is measured as the average catch of litter in fish trawl surveys, whereas micro-litter in the food chain is monitored as the amount and occurrence of microplastic particles in stomachs from pelagic and demersal fish.

This project was coordinated by DTU Aqua.

The project was funded by the Danish Nature Agency.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management

Danish Fishermen's Association

Period: 15/05/2015 → 31/12/2015
Number of participants: 4

Research areas: Ecosystem based Marine Management & Oceanography

Project participant:
Stedmon, Colin (Intern)
Mortensen, Lars O. (Intern)
Egekvist, Josefine (Intern)

Project Coordinator:
Rindorf, Anna (Intern)

Strategies for the gradual elimination of discards in European fisheries (DiscardLess) (39238)

DiscardLess will help provide the knowledge, tools and technologies as well as the involvement of the stakeholders to achieve the gradual elimination of discarding. These will be integrated into Discard Mitigation Strategies (DMS) proposing cost-effective solutions at all stages of the seafood supply chain.

This project is coordinated by DTU Aqua.

The project is funded by EU, Horizon2020.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
IFREMER
Period: 01/03/2015 → 28/02/2019
Number of participants: 7
Research areas: Fisheries Management & Population Genetics & Fisheries Technology & Ecosystem based Marine Management

Documents:
DiscardLess - An overview of the project
DiscardLess - What can science do to help with the landing obligation? Presentation from Sinaval, Bilbao, Spain 22 April 2015
Minimising discards in Danish fisheries (MINIDISC) (39020)
The landings obligation, 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 under Catch Quota Management (CQM) 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 during up to 6 months and were required to sort and weigh all discard of seven common target species on a haul by haul basis. All vessels were equipped for Fully Documented Fisheries (FDF), 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. Interviews realized with the skippers around the end of the trial were performed and analyzed to investigate (i) their experiences with “free” choice of gear, (ii) the processes that they followed for developing their gears and (iii) their tools for evaluating the efficiency and selectivity of their trial.

In addition to the trial, a number of other activities were performed under the MINIDISC project, including (i) the publishing of a catalogue (in Danish) of the selectivity devices experimented in Danish fisheries, (ii) a scientific selectivity trial on Danish seines fisheries in Skagerrak and (iii) a review of international experiences in the uptake of selective devices.

The project has been disseminated through several meetings and conferences. A number of scientific publications are in review or close to submission.

This project was coordinated by DTU Aqua.

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

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Danish Fishermen's Producers' Organization
Period: 01/01/2014 → 15/07/2015
Number of participants: 8
Research areas: Fisheries Management & Fisheries Technology & Marine Living Resources
Project participant:
Mortensen, Lars O. (Intern)
Olesen, Hans Jakob (Intern)
Krag, Ludvig Ahm (Intern)
Feekings, Jordan P. (Intern)
Dalskov, Jørgen (Intern)
Storr-Paulsen, Marie (Intern)
Qvist Eliasen, Søren (Intern)
Project Coordinator:
Ulrich, Clara (Intern)
Project

Maximizing yield of fisheries while balancing ecosystem, economic and social concerns (MYFISH) (38850)
The European Common Fisheries Policy has made a commitment to direct management of fish stocks towards achieving Maximum Sustainable Yield (MSY) by 2015 (or no later than 2020 in special cases). Attaining this goal is complicated by lack of common agreement on the interpretation of both 'sustainability' and 'yield', and because achieving MSY for one stock may affect the possibility of achieving MSY for other stocks and compromise ecological, environmental, economic, or social aims.

The objective of MYFISH was to face these difficulties and provide definitions of MSY variants, evaluations of the effect on ecosystems, economy and social aspects of attaining these variants, their social desirability and an operational framework for their implementation.
This was achieved through cases addressing a range of fisheries in all European regional areas. The cases cover situations ranging from data-poor to the most studied and well-understood marine ecosystems in EU waters. The suggested implementation of MSY builds on the existing ecosystem and fisheries models in the cases, modified to perform the maximization of the relevant yield measure operationally. Social aspects were integrated throughout the project by active involvement of stakeholders in the definition and evaluation of MSY variants. Global experience was engaged through associated partners and communication of results was enhanced through two major events, a dedicated MYFISH/ICES symposium in 2015 and a targeted policy meeting in 2016. More details can be found at www.myfishproject.eu.

The project was coordinated by DTU Aqua.

The project was funded by EU, Framework Programme 7.

National Institute of Aquatic Resources

Section for Ecosystem based Marine Management
Period: 01/01/2012 → 29/02/2016
Number of participants: 10
Research areas: Ecosystem based Marine Management & Fisheries Management & Marine Living Resources

Project participant:
Ulrich, Clara (Intern)
Eigaard, Ole Ritzau (Intern)
Mortensen, Lars O. (Intern)
Nielsen, J. Rasmus (Intern)
Worsøe Clausen, Lotte (Intern)
Nielsen, Anders (Intern)
van Deurs, Mikael (Intern)
Vinther, Morten (Intern)
Neuenfeldt, Stefan (Intern)

Project Manager, academic:
Rindorf, Anna (Intern)

Activities:

STECF Expert Working Group EWG-16-14 on Technical Measures
Period: 6 Feb 2017 → 10 Feb 2017
Lars O. Mortensen (Participant)

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management

Description
STECF Expert Working Group EWG-16-14 on Technical Measures

Related event

STECF Expert Working Group EWG-16-14 on Technical Measures
06/02/2017 → 10/02/2017
Brussels
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

ICES - Herring Assessment Working Group - HAWG (External organisation)
Period: 2016
Lars O. Mortensen (Participant)

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management

Related external organisation
ICES - Herring Assessment Working Group - HAWG
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

ICES - Working Group on Mixed Fisheries Advice for the North Sea - WGMIXFISH (External organisation)
Period: 2015
Lars O. Mortensen (Participant)
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Degree of recognition: International

Related external organisation

ICES - Working Group on Mixed Fisheries Advice for the North Sea - WGMIXFISH
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar