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.
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
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Event: Poster session presented at DanFish International, Aalborg, Denmark.
Main Research Area: Technical/natural sciences
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

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), Feekings, J. P. (Intern), Herrmann, B. (Ekstern), Krag, L. A. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Fouragerings-strategi hos ådsælædende slimål i Kattegat

General information

State: Published

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


Publication date: 2017
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 affecting 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), Seekings, 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
Volume: 74
Issue number: 4
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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
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

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
Pages: 134-145
Publication date: 2017
Main Research Area: Technical/natural sciences
Scavenging strategies of hagfish in the Kattegat

General information
State: Published
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 curve 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), Feekings, J. P. (Intern)
Pages: 26-35
Publication date: 2016
Main Research Area: Technical/natural sciences
Publication: Fisheries Research
Journal: Fisheries Research
Volume: 184
ISSN (Print): 0165-7836
Ratings:
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.
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 specific 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. The results are discussed in relation to the Common Fisheries Policy reform and the increasing importance of industry introduced gear modifications.

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Fishermen's Producers' Organization, Aalborg University
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⁻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 (R² > 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.
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:

Bibliographical note
ICES C.M. 2016/O
Publication: Research › Conference abstract for conference – Annual report year: 2016
Paths to enhance the development and the uptake of industry-led technical solutions to improved selectivity

General information
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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

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 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

Publication information
Journal: Marine and Coastal Fisheries
Volume: 8
Issue number: 1
ISSN (Print): 1942-5120
Ratings:
Web of Science (2018): Indexed yes
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
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
Electronic versions:

Bibliographical note
ICES CM 2015/L:19
Publication: Research › Conference abstract for conference – Annual report year: 2015

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), Feekings, 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
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.36 SJR 0.661 SNIP 0.8
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.696 SNIP 0.732 CiteScore 1.19
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.568 SNIP 0.879 CiteScore 1.15
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.71 SNIP 0.749 CiteScore 1.25
ISI indexed (2013): ISI indexed yes
Escape panels in trawls – a consistent management tool?

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. 10
Publication: Research › Conference abstract for conference – Annual report year: 2015

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), Uhmann, S. S. (Ekstern), Vassilopoulou, V. (Ekstern), Feekings, J. P. (Intern), Rochet, M. (Ekstern)
Pages: 366-374
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), Seeings, 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
Authors: Madsen, N. (Intern), Lewy, P. (Intern), Seeings, J. P. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Hansen, K. (Ekstern)
Pages: 525-528
Publication date: 2015
Main Research Area: Technical/natural sciences

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Journal: Journal of Applied Ichthyology
Volume: 31
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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 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
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
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), Seekings, 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
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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: Research › Report – Annual report year: 2015

MINIDISC - Minimering af discards i danske fiskerier

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Public Sector Consultancy
Number of pages: 89
Publication date: 2015

Publication information
Publisher: DTU Aqua. Institut for Akvatiske Ressourcer
Original language: English
Main Research Area: Technical/natural sciences
Publication: Research › Report – Annual report year: 2016
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

Bibliographical note
ICES ASC 2015/B:29
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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
Authors: Hornborg, 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)
Number of pages: 1
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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Bibliographical note
ICES CM 2015/B:29
Publication: Research › Poster – 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

In an experimental trawl fishery, diamond mesh codends made out of 2.5 mm flexible Dyneema twine 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 T0 and T90 codends made of Dyneema netting.

Size selection 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 traditional 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 traditional PE codends used in the same fishery. 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 codends 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
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.
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 selectivity 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 conjunction 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 population size 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.
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.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Instituto Español de Oceanografía, Matís ltd., Hellenic Centre for Marine Research, Cefas, IFREMER, Wageningen IMARES, European Commission - Joint Research Center
Pages: 1235-1245
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 71
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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
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
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)
Publication date: 2014
Event:
Main Research Area: Technical/natural sciences
Electronic versions:

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

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- 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
**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

**Development of sorting grids for Norway lobster fisheries**

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Madsen, N. (Intern), Frandsen, R. (Intern), Feekings, J. P. (Intern), Krag, L. A. (Intern)
Publication date: 2013
Main Research Area: Technical/natural sciences
Publication: Research › Poster – Annual report year: 2013

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

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

**Publication information**
Journal: Journal of Sea Research
Volume: 75
ISSN (Print): 1385-1101
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.98 SJR 0.932 SNIP 0.931
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.008 SNIP 1.007 CiteScore 2.09
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.977 SNIP 1.024 CiteScore 2.15
Web of Science (2014): Indexed yes
Forbedring af selektiviteten i trawl med henblik på beskyttelse af bestandene af torsk bedst muligt: Slutrapport til Ministeriet for Fødevarer, Landbrug og Fiskeri

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Krag, L. A. (Intern), Herrmann, B. (Ekstern), Karlsen, J. D. (Intern), Feekings, J. P. (Intern), Lund, H. (Ekstern)
Number of pages: 113
Publication date: 2013

Publication information
Original language: Danish
Main Research Area: Technical/natural sciences
Publication: Commissioned › Report – Annual report year: 2013
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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Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 70
Issue number: 4
ISSN (Print): 0706-652X
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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
A wasted resource: cod discards in the North Sea

The public, political, and stakeholder perception of fisheries discards is that they are a waste of a valuable resource. In the North Sea, fisheries discards are some of the highest in the world. Cod (Gadus morhua) has contributed considerably to the amount discarded. The declining cod stock within the North Sea has resulted in changes in technical measures, effort restrictions, closed areas, and the establishment of a recovery programme for cod; all which have attempted to reduce the amount discarded. Here, we combine European Union discard data from seven Member States to describe the trends, spatially and temporally, in discarding over the past decade while pinpointing the major reasons to why it occurs. We discuss how such information can be used to improve future fishing activities and their subsequent catch compositions under a discard management approach.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Management Systems
Authors: Feekings, J. P. (Intern), Poos, J. J. (Ekstern), Aarts, G. (Ekstern), Madsen, N. (Intern), van Helmond, E. (Ekstern), Catchpole, T. (Ekstern), Rochet, M. (Ekstern), Pout, A. (Ekstern), Ulleweit, J. (Ekstern), Vandemaele, S. (Ekstern), Ulrich, C. (Intern)
Publication date: 2012
Event:
Main Research Area: Technical/natural sciences

Bycatch And Discards: Management Indicators, Trends and location (BADMINTON)
Discarding keeps being an important issue in world fisheries; it is a way for fishers to adjust their landings to the legal and market constraints, but is largely considered as a waste of rare natural resources and as contributing to the depletion of stocks bearing a high fishing pressure. Many jurisdictions, including the European Commission, are preparing regulations to reduce or ban discards. To design effective regulations, an understanding of the extent and processes of the issue is required.

The Marifish BADMINTON project aimed to build up the knowledge of discarding patterns and factors in European fisheries, evaluate the efficacy of selective devices and other discard management measures that have been implemented in the past, and improve methods to analyse, monitor, and manage bycatch and discarding. Specific objectives included the provision of discard estimates for selected European fisheries, and of appropriate indicators; the determination of the most important factors affecting discard amounts and composition; and the elaboration of integrated management approaches to the discard issue.

BADMINTON relied on two types of approaches to fulfill these aims and objectives. First was the analysis of onboard observer data, since intensive collection of catch and discard data onboard commercial vessels has been undertaken in European countries under the European Union Data Collection Regulation (2002) followed and intensified by the Data Collection Framework (2008). Thus, one significant contribution of the project was to collate onboard observer data from
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
Publication date: 2012

**Publication information**

Publisher: DTU Aqua. Institut for Akvatiske Ressourcer
Original language: English
Main Research Area: Technical/natural sciences

**Fishery discards: Factors affecting their variability within a demersal trawl fishery**

Discards represent one of the most important issues within current commercial fishing. It occurs for a range of reasons and is influenced by an even more complex array of factors. We address this issue by examining the data collected within the Danish discard observer program and describe the factors that influence discarding within the Danish Kattegat demersal fleet over the period 1997 to 2008. Generalised additive models were used to assess how discards of the 3 main target species, Norway lobster, cod and plaice, and their subcomponents (under and over minimum landings size) are influenced by important factors and their potential relevance to management. Our results show that discards are influenced by a range of different factors that are different for each species and portion of discards. We argue that knowledge about the factors influential to discarding and their use in relation to potential mitigation measures are essential for future fisheries management strategies.

**General information**

State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Feekings, J. P. (Intern), Bartolino, V. (Ekstern), Madsen, N. (Intern), Catchpole, T. (Ekstern)
Pages: e36409
Publication date: 2012

**Publication information**

Journal: PLoS ONE
Volume: 7
Issue number: 4
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
Improving fishing gear selectivity of Atlantic cod (Gadus morhua)

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Feekings, J. P. (Intern)
Pages: 145-167
Publication date: 2012

Host publication information
Title of host publication: Advances in Zoology Research
Volume: 2
Publisher: Nova Science Publishers, Incorporated
ISBN (Print): 978-1-62100-615-2
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 314175
Publication: Research - peer-review › Book chapter – Annual report year: 2012
The impact of gear regulation changes on discard rates: the case of the Baltic Sea cod fishery
Technical regulations have been introduced in almost all developed fisheries worldwide during the last 30 years. The main objective of these regulations has been to improve the state of the fishery or the stocks within by allowing juveniles and young individuals to escape. In the Baltic Sea, cod stocks have decline considerably over the past 30 years which has subsequently led to numerous legislations and policies being introduced to improving the state of the stocks. We evaluate whether the developments made to trawls used in the Baltic Sea cod fishery to improve selectivity and the increase in minimum landing size (MLS) have had any marked effect on the discard rates of the target species, cod. Results show that the gear regulation changes enforced in the Baltic demersal trawl fishery have had diverse effects on discard rates and are largely dependent on the gear, recruitment, and compliance by the fishermen.
Discard of plaice (Pleuronectes platessa) in the Danish North Sea trawl fishery

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Feekings, J. P. (Intern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 286573
Publication: Research › Poster – Annual report year: 2011

Udvikling og demonstration af en selektiv sorteringsrist til jomfruhummerfiskeriet

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Frandsen, R. (Intern), Feekings, J. P. (Intern), Krag, L. A. (Intern), Herrmann, B. (Intern)
Number of pages: 25
Publication date: 2011
Publication information
Place of publication: Hirtshals
Publisher: DTU Aqua. Institut for Akvatiske Ressourcer
Original language: Danish
Main Research Area: Technical/natural sciences
Bibliographical note
Finansieret af EU's fiskerisektorprogram EFF og Fødevareministeriet
Source: orbit
Source-ID: 276916
Publication: Research › Report – Annual report year: 2011

Diversifying the uses of the Danish Discard data collection programme

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Feekings, J. P. (Intern), Madsen, N. (Intern), Frandsen, R. (Intern)
Publication date: 2010
Event: Poster session presented at ICES Annual Science Conference 2010, Nantes, France.
Main Research Area: Technical/natural sciences
Electronic versions:
Poster - Diversifying the uses of the Danish Discard data collection programme.pdf
Links:
http://www.ices.dk/products/CMdocs/CM-2010/R/R2710.pdf

Bibliographical note
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Source: orbit
Source-ID: 266873
Publication: Research › Poster – Annual report year: 2010

DTU Aqua tester fleksible sorteringsriste

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Feekings, J. P. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern)
Pages: 7
Publication date: 2010
Publication information
The impact of management regulations on fishers’ behaviour: A case study using a satellite-based vessel monitoring system

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Swedish Board of Fisheries
Authors: Feekings, J. P. (Intern), Skjöld, M. (Ekstern), Bartolino, V. (Ekstern), Lövgren, J. (Ekstern)
Publication date: 2010
Event: Poster session presented at Fishery Dependent Information Conference, Galway, Ireland,
Main Research Area: Technical/natural sciences
Electronic versions:
Poster - The impact of management regulations on fishers’ behaviour.pdf
Source: orbit
Source-ID: 266872
Publication: Research › Poster – Annual report year: 2010

Projects:

Industry lead gear selectivity improvements, its strenghts and weakness in the new CFP

National Institute of Aquatic Resources
Period: 15/12/2015 → 29/03/2019
Number of participants: 4
Phd Student:
Malta, Tiago Alexandre Matias da Veiga (Intern)
Supervisor:
Feekings, Jordan P. (Intern)
Gislason, Henrik (Intern)
Main Supervisor:
Krag, Ludvig Ahm (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
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.

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National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Aalborg University
Danish Fishermen's Association
SINTEF

**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:
Seekings, Jordan P. (Intern)

**Project 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

**IFREMER**
Instituto Español de Oceanografía
University of Bergen
Strathclyde University
University of Copenhagen
Université de Bretagne Occidentale
Sea Fish Industry Authority
Marine Scotland Science
Development of a by-catch excluder for the Danish and European trawl fisheries (39265)

The project aims to develop and test a widely usable gear that effectively sorts out unwanted species and sizes of fish during trawling. This objective should be seen in light of a future discard ban for the EU—a ban which, in Denmark and in other European countries, will result in a growing demand for technical solutions that can increase the sorting of fish in the gear during fishing.
The development work of the project is based on a so-called "Excluder system" that can be integrated into most standard trawl gears. The "Excluder system" is developed for the North American market by Tor-Mo Trawl in Hirtshals in collaboration with the Green Line Fishing Gear. The Excluder is used today on a voluntary basis by approximately 15 large fishing vessels in Alaska, but is not directly applicable in Danish and European fisheries because the species composition, trawl size and type of vessel is significantly different in fisheries in Alaska.

The project's main result will be the development, testing and documentation of an Excluder system, which is targeted the Danish and European trawl fisheries.

In light of the political development in EU, a very large market potential is expected to appear for such an Excluder and the redemption of this market potential will result in 1) more successful implementation of the discard ban, 2) more selective and sustainable fisheries, and 3) increased growth and revenue for companies in the project.

This project is coordinated by Denmark's Pelagic Producer Organisation.

The project is funded by the Danish Ministry of Food, Agriculture and Fisheries through the Green Development and Demonstration Program (GUDP).

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Denmark's Pelagic Producer Organisation
Greenline Fishing Gear
Tor-mo trawl ApS
HG62 Beinur
Period: 01/01/2015 → 31/12/2016
Number of participants: 5
Research areas: Fisheries Management & Fisheries Technology
Project participant:
Krag, Ludvig Ahm (Intern)
Berg, Casper Willestofte (Intern)
Thaarup, Flemming (Intern)
Feekings, Jordan P. (Intern)
Project Manager, academic:
Eigaard, Ole Ritzau (Intern)

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)
Seekings, Jordan P. (Intern)
Dalskov, Jørgen (Intern)
Storr-Paulsen, Marie (Intern)
Qvist Eliasen, Søren (Intern)

Project Coordinator:
Ulrich, Clara (Intern)

Economically sustainable fishery for Nephrops in Skagerrak and Kattegat (ØBJ-FISK) (38865)

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

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

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

The project was coordinated by DTU Aqua.

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

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Institute of Marine Research
Lund University
Improving the selectivity for cod in Danish trawl fisheries (38887)

The aim of the project was to develop and test more selective fishing gear for three major Danish fisheries:
- The demersal trawl fishery in the North Sea (120 mm)
- The demersal trawl fishery in Kattegat and Skagerrak (90 mm)
- Improve the selection range (SR) in the BACOMA codend used in the Baltic Sea

The new and more selective fishing gears were developed under consideration of the economy in the fishery. The project delivered three new selective gear solutions of which two were tested during experimental fishery. Technical descriptions of the new designs were delivered. Furthermore, an economical model to quantify the economic consequences of using the new selective fishing gears compared to existing standards was developed. Experiments were conducted in the Baltic Sea cod fishery demonstrating that the selection range (SR) could be reduced by using a larger diamond mesh in the lower sheet of the BACOMA design. Further the project demonstrated the efficiency of legal selective escape panels in Skagerrak/Kattegat and the effect of varying design parameters in both the panel section and the trawl body. Finally the project demonstrated that active stimulating fish behavior around selective escape panels significantly can improved the escape panels' selectivity.

The project was coordinated by DTU Aqua.

The project was funded by the Danish Ministry of Food, Agriculture, and Fisheries and the European Fisheries Fund (EFF).
Main Supervisor:
Madsen, Niels (Intern)
Examiner:
Wieland, Kai (Intern)
Kennelly, Steven James (Ekstern)

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

Activities:

ICES - Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak - WGNSSK (External organisation)
Period: 2015
Jordan P. Feekings (Participant)
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Degree of recognition: International

Related external organisation
ICES - Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak - WGNSSK
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

ICES - Working Group on the Ecosystem Effects of Fishing Activities - WGECO (External organisation)
Period: 2015
Jordan P. Feekings (Participant)
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Degree of recognition: International

Related external organisation
ICES - Working Group on the Ecosystem Effects of Fishing Activities - WGECO
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

ICES - Benchmark Workshop on Nephrops Stocks - WKNEPH (External organisation)
Period: 2013 → …
Jordan P. Feekings (Participant)
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Degree of recognition: International

Related external organisation
ICES - Benchmark Workshop on Nephrops Stocks - WKNEPH
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

ICES - Working Group on Nephrops Surveys - WGNEPS (External organisation)
Period: 2013 → …
Jordan P. Feekings (Participant)
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Degree of recognition: International

Related external organisation

ICES - Working Group on Nephrops Surveys - WGNEPS
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar

ICES - Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak - WGNSSK (External organisation)
Period: 2013 → …
Jordan P. Feekings (Participant)
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Degree of recognition: International

Related external organisation

ICES - Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak - WGNSSK
Activity: Membership › Membership of committees, commissions, boards, councils, associations, organisations, or similar