Codend selectivity in a commercial Danish anchor seine

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

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Aalborg University
Publication date: 2017
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences
Development and testing of a separator frame in a Norway lobster Nephrops norvegicus fishery

Norway lobster Nephrops norvegicus fisheries are often characterized by high bycatch and discard rates. However, fisheries species exhibit differences in vertical behaviour that can be used to develop selective devices. We developed a separator frame that can be inserted into the forward part of a cod-end to divide it into a bottom cod-end and a top cod-end. In the top cod-end we inserted a 3-m-long window constructed of 274-mm mesh. The separator frame was tested from a commercial vessel in the Kattegat and Skagerrak area. Small mesh net bags were used to collect the catch going through the separator frame and ending up in the bottom cod-end, the top cod-end, or penetrating the window. The majority of Norway lobster and flatfish entered the bottom cod-end, and most gadoids entered the top cod-end. A relatively high proportion of gadoids and flatfish that entered the top cod-end penetrated the window. The separation was size dependant for some of the investigated species.

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Aalborg University, University of Oslo
Authors: Madsen, N. (Intern), Holst, R. (Ekstern)
Pages: 929-938
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Science
Volume: 83
Issue number: 6
ISSN (Print): 0919-9268
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.9 SJR 0.349 SNIP 0.725
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.376 SNIP 0.578 CiteScore 0.7
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.483 SNIP 0.778 CiteScore 1.04
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.521 SNIP 0.838 CiteScore 0.99
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.515 SNIP 0.819 CiteScore 0.99
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.498 SNIP 0.743 CiteScore 0.94
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.471 SNIP 0.702
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.432 SNIP 0.719
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.519 SNIP 0.798
Scopus rating (2007): SJR 0.481 SNIP 0.763
Scopus rating (2006): SJR 0.482 SNIP 0.681
Scopus rating (2005): SJR 0.48 SNIP 0.753
Scopus rating (2004): SJR 0.495 SNIP 0.718
Development and test of selective sorting grids used in the Norway lobster (Nephrops norvegicus) fishery

Due to generally high discard rates in Norway lobster (Nephrops norvegicus) fisheries, a discard ban coming up and to the cod recovery plan in several areas, selective sorting grids have been tested in many areas and are specified by legislation for use in the Kattegat and Skagerrak area bordering Norway, Denmark and Sweden. Grids are very selective, but they can lead to loss of landable Norway lobster and valuable fish species. To improve retention of these species, we developed three new grids using made by polyurethane to make them flexible: One grid had horizontal bars, one had vertical bars, and one had vertical bars and a guiding funnel in front of the grid. Four unselective net bags were used to collect the catch escaping through different parts of the grid or escaping without passing through the grid. Water flow around the grid bars was measured in a flume tank. The three grids were tested from a commercial trawler in the Kattegat and Skagerrak area. Underwater filming was conducted to assess grid performance and fish behavior. Results showed that a bottom hole in the lower part of the grid allowed species in the lower part of the gear to pass and retained in the bag behind the hole. More flatfish passed the grid with horizontal bars compared to that with vertical bars, but the retention rate was still low. Use of the guiding funnel increased the contact with the grid considerably for both target and unwanted species. In all three grid designs, there were losses of Norway lobster above minimum landing size.

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

Publication information
Journal: Fisheries Research
Volume: 185
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
Effect of fisher's soak tactic on catch pattern in the Danish gillnet plaice fishery

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

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Aalborg University
Estimating escapement of fish and invertebrates in a Danish anchor seine

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

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Management Systems, Section for Monitoring and Data, Aalborg University, Thünen Institute of Baltic Sea Fisheries
Authors: Noack, T. (Intern), Madsen, N. (Intern), Mieske, B. (Ekstern), Frandsen, R. (Intern), Wieland, K. (Intern), Krag, L. A. (Intern)
Pages: 2480-2488
Publication date: 2017
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 74
Issue number: 9
ISSN (Print): 1054-3139
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.63
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 2.18
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 2.62
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 2.46
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
Fishing profiles of Danish seiners and bottom trawlers in relation to current EU management regulations

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

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

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Savina, E. (Intern), Karlsen, J. D. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern), Kristensen, K. (Intern), Madsen, N. (Intern)
Pages: 310-317
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Food Control
Volume: 70
ISSN (Print): 0956-7135
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.86 SJR 1.462 SNIP 1.719
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.509 SNIP 1.72 CiteScore 3.65
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.389 SNIP 1.718 CiteScore 3.27
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.273 SNIP 1.745 CiteScore 3.14
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Behavior of different trawl codend concepts

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

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, SINTEF Fisheries and Aquaculture
Authors: Madsen, N. (Intern), Hansen, K. (Ekstern), Madsen, N. A. (Ekstern)
Pages: 571-577
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information

Postprint
DOI: 10.1016/j.foodcont.2016.05.044
Publication: Research - peer-review › Journal article – Annual report year: 2016
Danish seine – ecosystem effects of fishing

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

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

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

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

Electronic versions:
Publishers_version
Source: PublicationPreSubmission
Source-ID: 117700321
Publication: Research › Poster – Annual report year: 2015

Discard overlevelse

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Aquaculture, Section for Marine Living Resources
Authors: Madsen, N. (Intern), Methling, C. (Intern), Eskelund, M. (Intern), Nielsen, A. B. (Ekstern), Skov, P. V. (Intern)
Number of pages: 24
Publication date: 2015

Publication information
Publisher: Miljø- og Fødevareministeriet
Original language: Danish
Main Research Area: Technical/natural sciences
Publication: Research › Report – Annual report year: 2015

DTU Aqua kigger på discard overlevelse

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Aquaculture
Authors: Madsen, N. (Intern), Methling, C. (Intern), Skov, P. V. (Intern)
Pages: 17
Publication date: 2015

Publication information
Pages (from-to): 17
Newspaper: Fiskeritidende
Volume: 22
No.: 13
Ratings:
ISI indexed (2013): ISI indexed no
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), Eliasen, S. Q. (Ekstern), Goni, R. (Ekstern), Madsen, N. (Intern), Palialexis, A. (Ekstern), Uhlmann, S. S. (Ekstern), Vassilopoulou, V. (Ekstern), Feekeings, J. P. (Intern), Rochet, M. (Ekstern)
Pages: 366-374
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Marine Policy
Volume: 51
ISSN (Print): 0308-597X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.7 SJR 1.335 SNIP 1.182
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.591 SNIP 1.397 CiteScore 3.07
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.438 SNIP 1.56 CiteScore 3.09
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.472 SNIP 1.635 CiteScore 2.71
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.339 SNIP 1.495 CiteScore 2.54
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.406 SNIP 1.263 CiteScore 2.07
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.289 SNIP 1.483
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.947 SNIP 1.142
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.838 SNIP 1.417
Improving the performance of a grid used in Norway lobster fisheries

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

Publication information
Journal: Journal of Applied Ichthyology
Volume: 31
Issue number: 3
ISSN (Print): 0175-8659
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 0.94
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 0.84
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 1.06
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 0.99
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): CiteScore 0.99
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): CiteScore 1.04
Live and let die: The rapid development of research to assess survival of discards in European fisheries

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Aquaculture
Authors: Catchpole, T. (Ekstern), Marlen, B. V. (Ekstern), Uhlmann, S. S. (Ekstern), Theunynck, R. (Ekstern), Randall, P. (Ekstern), Nilsson, H. (Ekstern), Mehault, S. (Ekstern), Kopp, D. (Ekstern), Wilms, I. (Ekstern), van der Reijden, K. (Ekstern), Molenaar, P. (Ekstern), Madsen, N. (Intern), Methling, C. (Intern), Breen, M. (Ekstern)
Publication date: 2015
Event:
Main Research Area: Technical/natural sciences
Electronic versions:

Bibliographical note
ICES CM 2015/L:23

Sustainable development of the Nephrops fishery in the Kattegat-Skagerrak region

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Management Systems, Section for Marine Living Resources, Section for Marine Ecology and Oceanography, Institute Management, Swedish University of Agricultural Sciences, Institute of Marine Research, Danish Fishermen's Producers' Organization, Aalborg University
Number of pages: 23
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Publication information
Place of publication: Charlottenlund
Publisher: National Institute of Aquatic Resources, Technical University of Denmark
ISBN (Electronic): 978-87-7481-209-8
Original language: English

Series: DTU Aqua Report
Number: 298-2015
ISSN: 1395-8216
Main Research Area: Technical/natural sciences
Electronic versions:

Publishers_version
Publication: Research › Report – Annual report year: 2015
Danish seine - An environmental friendly fishing method?

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

The present study aims at increasing the knowledge on Danish seining including its effect on the benthic ecosystem. The study starts with a comparison of existing catch data for Danish seines and trawls and continues with several substudies: Detailed description of all stages of the seining process to get a basis for the following investigations. Selectivity trials to support existing data, whereby both economically valuable and economically non-valuable species will be regarded. Estimation of potential interactions of the gear with the sea bottom. Assessment of survival chance of discarded animals. Observation of fish behavior during capture process. Combination of all single parts to provide an overall picture of effects of the Danish seine fishery on the marine environment.

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

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

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, Matis 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
Discards of Danish set nets fisheries in the Kattegat

General information
State: Published
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), Feeckings, J. P. (Intern), Madsen, N. (Intern), Palialexis, A. (Ekstern), Vassilopoulou, V. (Ekstern), Valeiras, J. (Ekstern), Garcia, T. (Ekstern), Nikolic, N. (Ekstern), Rochet, M. (Ekstern)
Pages: 1277-1285
Publication date: 2014
Main Research Area: Technical/natural sciences
Publication information
Journal: ICES Journal of Marine Science
Volume: 71
Issue number: 5
ISSN (Print): 1054-3139
Ratings:
BFI (2018): BFI-level 1
Værdioptimering af fiskefangsten i dansk blandet fiskeri (VærdiFisk) - forbedret kvalitet og selektion som følge af redskabssudvikling

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources; Danmarks Fiskeriforening Producent Organisation, Clausen & Sønner, Strandby Fiskeeksport, Strandby Net A/S, Strandby Fiskeauktion, Fiskernes Samlecentral, Strandby Fiskeriforening
Authors: Karlsen, J. D. (Intern), Krag, L. A. (Intern), Lund, H. S. (Ekstern), Lewy, P. (Intern), Albertsen, C. M. (Intern), Kajgaard, L. (Ekstern), Clausen, B. (Ekstern), Thomsen, F. (Ekstern), Jensen, L. P. (Ekstern), Kajgaard, J. (Ekstern), Kusk, M. (Ekstern), Pedersen, C. (Ekstern), Madsen, N. (Intern), Frandsen, R. (Intern)
Number of pages: 60
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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)
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Event: Poster session presented at DanFish International Fisheries Exhibition, Aalborg, Denmark.
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Publication: Research › Poster – Annual report year: 2013

Development of sorting grids for Norway lobster fisheries

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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
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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)
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Main Research Area: Technical/natural sciences

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Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2016): CiteScore 1.98 SJR 0.932 SNIP 0.931
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.008 SNIP 1.007 CiteScore 2.09
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.977 SNIP 1.024 CiteScore 2.15
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.928 SNIP 1.098 CiteScore 2
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Dokumentation af selektiv effekt af SELTRA 180: 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), Poulsen, M. (Ekstern), Vinther, M. (Intern), Herrmann, B. (Ekstern), Madsen, N. (Intern), Frandsen, R. (Intern), Karlsen, J. D. (Intern)
Number of pages: 48
Publication date: 2013

Forsøgsfiskeri med jomfruhummertejner i det permanent lukkede område i Kattegat

General information
State: Published
Modelling towing and haul-back escape patterns during the fishing process: a case study for cod, plaice, and flounder in the demersal Baltic Sea cod fishery

The survival likelihood of fish escaping through trawl codends may depend on when they escape. It is therefore relevant to investigate when during the fishing process fish actually attempt to escape and do escape from trawl codends. This subject is addressed by modelling data collected during a specially designed experiment. Results demonstrate that the escape process during towing cannot be described sufficiently by a traditional logistic model or something similar. Instead, a model is required that explicitly considers that not all fish necessarily contact the codend netting to attempt escape during the towing phase. A model that accounts for such behaviour is applied and it is demonstrated that this model can adequately describe the size selection process during towing. The overall escape process, which consists of the attempt probability, partial escape during towing, and partial escape during the haul-back phase, is also modelled. This proposed model sufficiently described the observed escape pattern for cod (Gadus morhua), plaice (Pleuronectes platessa), and flounder (Platichthys flesus). For all three species, a significant percentage of the individuals entering the codends during fishing first attempt to escape during the haul-back operation.
SELTRA selektionspaneler i Kattegat og Skagerrak

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

Technical study: Identification, design and testing of technical designs

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Madsen, N. (Intern), Stepputtis, D. (Ekstern), Santos, J. (Ekstern), Feekings, J. P. (Intern), Nilsson, H. (Ekstern)
Pages: 23-57
Publication date: 2013

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Applicant: European Commission
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Main Research Area: Technical/natural sciences
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Tejnefiskeri efter jomfruhummer - et alternativ til trawl?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Frandsen, R. (Intern), Feekings, J. P. (Intern), Madsen, N. (Intern)
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

Tejnefiskeri efter jomfruhummer. Et litteraturstudie

The Danish quota for Norway lobster is fished by use of trawl. In the past 5 years, between 10 and 70 % of the quota has not been exploited. This is partly on account of restricted quotas on some of the other species that are targeted in this mixed species fishery. Furthermore, in order to protect cod, trawling is banned in some areas including areas known as Norway lobster grounds. Creels are highly selective gears both with regards to sizes and species and they lead to high quality landings. Compared to trawling, stationary gears such as creels also have much less impact on the benthic habitat and reduce fuel consumption. Commercial creeling for Norway lobster is for example found in Sweden, Norway, Scotland, and the Faroe Islands. However, all available literature report low catch rates and the viability of the fishery therefore depends upon fuel savings and the opportunity to achieve a premium price reflecting the high quality of the landings. The fleet consists of vessels up to 12 m with a crew of one to two man. Working with creels requires a spacious deck and an advantageous arrangement in order to set and haul a large number of creels. Creeling for Norway lobster is seasonal and off season either other species are targeted (e.g. common lobster and edible crab) or the vessel is rigged for trawling or set netting. The design of creels varies but generally they have two entrances and entice Norway lobster to the creel by use of bait e.g. salted herring. The low catch rates are primarily due to:
• Norway lobster have difficulty locating the entrance.
• Norway lobster are aggressive and the first ones being caught displays aggressive behavior towards newcomers.
• The creel is an alien element on the seabed and in itself might scare Norway lobster from entering. The design of the creels and the type of bait contribute to the high selectivity and low by-catch rates of the fishery. It has thus been estimated that approximately 24 % of the catch by weight is discarded in the Swedish fishery and of this 56 % is
Norway lobster below minimum landing size and 16% is juvenile cod. The catch as well as the by-catch is generally undamaged and in a good condition and due to short handling time on deck, survival of the discard is expected to be high. As the creels are very species selective, the risk of lost creels continuing to fish (ghost – fishing) is regarded to be low. Creeling for Norway lobster is considered to have potential as a commercial fishery in Danish waters if the catch rates are optimized and a market for the high quality live Norway lobsters is ensured.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management
Authors: Frandsen, R. (Intern), Krag, L. A. (Intern), Andersen, B. S. (Intern), Madsen, N. (Intern)
Number of pages: 18
Publication date: 2013

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

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Marine Living Resources
Authors: Feekings, J. (Intern), Lewy, P. (Intern), Madsen, N. (Intern)
Pages: 534-542
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Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
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Scopus rating (2016): CiteScore 2.56 SJR 1.322 SNIP 1.163
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.

**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)
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**Behaviour of marine fishes: Capture processes and conservation challenges: Book review**

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- State: Published
- Organisations: National Institute of Aquatic Resources, Section for Management Systems
- Authors: Madsen, N. (Intern)
- Pages: 1789-1790
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  - BFI (2017): BFI-level 1
  - Web of Science (2017): Indexed yes
  - BFI (2016): BFI-level 1
  - Scopus rating (2016): CiteScore 1.57 SJR 0.741 SNIP 0.882
  - Web of Science (2016): Indexed yes
  - BFI (2015): BFI-level 1
  - Scopus rating (2015): SJR 0.951 SNIP 0.935 CiteScore 1.64
  - Web of Science (2015): Indexed yes
  - BFI (2014): BFI-level 1
  - Scopus rating (2014): SJR 0.944 SNIP 0.934 CiteScore 1.76
  - Web of Science (2014): Indexed yes
  - BFI (2013): BFI-level 1
  - Scopus rating (2013): SJR 1.049 SNIP 1.118 CiteScore 1.98
  - ISI indexed (2013): ISI indexed yes
  - Web of Science (2013): Indexed yes
  - BFI (2012): BFI-level 1
  - Scopus rating (2012): SJR 0.93 SNIP 1.035 CiteScore 1.88
  - ISI indexed (2012): ISI indexed yes
  - Web of Science (2012): Indexed yes
  - BFI (2011): BFI-level 1
  - Scopus rating (2011): SJR 0.895 SNIP 0.946 CiteScore 1.66
  - ISI indexed (2011): ISI indexed yes
  - Web of Science (2011): Indexed yes
  - BFI (2010): BFI-level 1
  - Scopus rating (2010): SJR 0.774 SNIP 0.834
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 several European Union member states, given the many differences between national onboard observer programmes sampling schemes, protocols, details of data recorded, and data storage formats. This first step paves the way towards a future better integration of national onboard observer programmes. The second approach was to conduct stakeholder interviews and expert consultation, which was meant to complement the data analyses with fishers perspectives on the discard issue, and to provide an integrated approach toward management.

Both approaches lead to the following two broad conclusions:

•Discard patterns exhibited high diversity across regions, countries, gear types, vessel sizes, and species, with variability being more pronounced among regions. Thus, discard management approaches might be devised at a regional level – consistent with the proposed regionalization of the currently discussed reform of the European Union Common Fisheries Policy.

•Discards amounts, patterns, and composition, are determined by a multitude of interacting natural and human (economic and social) factors in a given place and time, and usually no simple explanations can suffice. The latter affects the effectiveness of mitigation measures, and solutions are to be found down at a very detailed level such as the fishing operation, fishing trip, or vessel, which suggests that a bottom-up, or results-based approach seems to be the most advisable form to tackle the discards problem. Then, effective discard management strategies should be devised at
various scales, from individual fishers implementation of detailed species-, gear- and area-specific tools, to producer organizations, member states, regional levels, and the broad European Union.

The project has developed a number of tools, distinguished in three categories ie. selectivity related tools (including a modelling tool to estimate gear selectivity based on fish morphology, and preliminary indicators of fishing selectivity at the fleet and ecosystem scales), tools to appraise and understand the discarding issue in a given region, area or fishery (including modelling tools to establish catch and discard maps and devise spatial approaches to the management of discards, based on onboard observer data; a series of discard indicators embedded in a discard indicator dashboard, to monitor and manage the discards in a given fishery; a generic model to determine the relative importance of inferred discard drivers; a list of factors to be used in semi-structured stakeholder interviews, and interview methodology), and tools that can be used to assist in devising management strategies at various scales (including a framework to develop a fishery-specific mitigation strategy based on inferred drivers of discarding behaviour; a detailed evaluation of 12 discard mitigation measures, alone and in combination).

It should be underlined, however, that BADMINTON findings suggest that as discarding is in most cases an unavoidable consequence of a series of constraints on the fishing activities and production, managing discards implies taking account of the whole fishery management system. Hence, a discard management strategy should not include only a combination of discard mitigation measures; if discards are to be reduced, appropriate and consistent incentives need to be mended together.

**Comparing selectivity of a standard and turned mesh T90 codend during towing and haul-back**

In this study, we compared the size selectivity of a T90 codend (netting turned by 90 degrees) with that of a standard codend made of similar netting. Sea trials were conducted in a Norway lobster directed fishery in the Kattegat-Skagerrak area, where there is a need for improved selectivity because of a severe discard problem. The codends were tested by fishing simultaneously with them in a twin trawl rig. Codend covers mounted with Minisamplers were used, which made it possible to catch individuals escaping during towing and haul-back separately. Herein we proposed a model to assess the sequential selection during towing and haul back. This model takes into account the parameter \( C_{tow} \), which can be interpreted as the proportion of fish that comes into contact with the codend meshes during towing and, thereby, has a chance of escape. Compared to the standard codend, the T90 codend retained fewer Norway lobster both below and above the legal minimum landing size (40 mm, cephalothorax length), thereby causing a reduction of commercial catch. The difference was mainly due to a significantly higher escape rate during towing for the T90 codend. For plaice below minimum landing size (27 cm), the retention was slightly but significantly higher for the T90 codend compared to the standard codend. A model developed for both codends showed that not all plaice are able to attempt escapement during the towing process. For cod, the results indicated an increased \( L_{50} \) (the length at which 50% of this species is caught) for the T90 codend, but the effect was not statistically significant, probably due to the limited number of cod retained during the sea trials. The results demonstrated that, for all three species, a significant proportion did escape during haul-back in both codends.
Designoptimering af SELTRA 180 mm

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Management Systems, Section for Monitoring, SINTEF
Authors: Krag, L. A. (Intern), Karlsen, J. (Intern), Hermann, B. (Ekstern), Madsen, N. (Intern), Lundgren, B. (Intern)
Number of pages: 33
Development and test of a remotely operated Minisampler for discrete trawl sampling

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Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Hansen, K. E. (Ekstern), Frandsen, R. (Intern), Krag, L. A. (Intern)
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.985 SNIP 1.065
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
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.
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.
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)
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Publisher: Nova Science Publishers, Incorporated
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Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 314175
Publication: Research - peer-review › Book chapter – Annual report year: 2012

Improving the effectiveness of escape windows in directed Norway lobster Nephrops norvegicus trawl fisheries

A substantial improvement in the bycatch selectivity of Norway lobster Nephrops norvegicus trawls is required, particularly with respect to cod Gadus morhua, whose stocks are at low levels in several areas. Conventional escape windows are not adequate to properly release cod and other bycatch species caught in the trawls. To address this issue, we developed a novel sorting box concept consisting of a four-panel section with a window on the top in order to improve the escape of cod and other bycatch species through an escape window while retaining the target catch of Norway lobster. The concept was tested on a commercial trawler in Kattegat and Skagerrak. Two different window mesh sizes and two different sorting box heights were tested using a traditional codend cover and a dual codend cover. We observed greatly reduced bycatches of both cod and other fish species compared to a standard codend. The reduction in bycatch decreased with decreasing mesh size and increasing height of the sorting box. Escape of Norway lobster through the escape window was limited. A modified version of the sorting box concept was implemented in the Kattegat fishery from 2009 onwards.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Management Systems
Authors: Madsen, N. (Intern), Holst, R. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern)
Inferring the drivers of discarding practices from observer data to identify appropriate fishery-specific solutions

Discard patterns are affected initially by catch compositions, which are determined by environmental factors, the fishing gear used, and fishing tactics, and finally by fishers, when they decide which parts of the catch to retain. An understanding of the drivers of discard practices is essential in developing successful discard mitigation measures. A simple model is applied to 6 Abstracts–Theme Session C European observer data to infer the main causes of discarding by partitioning the discards into four categories based on the length at which the fish are discarded and principal legislative restrictions. These are: (i) fish below the legal minimum landing size (MLS); (ii) fish with no
associated legal MLS that are below the minimum length landed (includes protected species and non-commercial species; (iii) fish with no associated quota that are above the MLS or minimum length landed; (iv) fish with associated quota that are above the MLS or minimum length landed. The model is applied to data from the full English observer programme and to French, Danish, Greek, and Spanish case study métiers. The proportionate contribution of the different categories is determined, the differences between métiers and areas established as well as any changes over time. The results are used to assess the most appropriate discard mitigation reduction strategies in each case, such as selectivity improvements, markets developments, and aligning fishing opportunities with quota availability.

**General information**

**State:** Published  
**Organisations:** National Institute of Aquatic Resources, Section for Management Systems  
**Authors:** Catchpole, T. (Ekstern), Rochet, M. (Ekstern), Madsen, N. (Intern), Nikolic, N. (Ekstern), Palialexis, A. (Ekstern), Garcia, T. (Ekstern), Vassilopoulou, V. (Ekstern)  
**Publication date:** 2012  
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**Optimization of fisheries resource exploitation in the Skagerrak (Oskar)**

**General information**

**State:** Published  
**Organisations:** Section for Population Ecology and Genetics, National Institute of Aquatic Resources, Section for Monitoring, Section for Management Systems, Department of Informatics and Mathematical Modeling, DTU Data Analysis, Section for Ocean Ecology and Climate  
**Authors:** Beyer, J. (ed.) (Intern), Pedersen, E. M. (ed.) (Intern), Wieland, K. (ed.) (Intern), Andersen, N. G. (ed.) (Intern), Andersen, B. S. (Intern), Hansen, J. H. (Intern), Hüsey, K. (Intern), Kristensen, K. (Intern), Madsen, N. (Intern), Mariani, P. (Intern), Stage, B. (Intern)  
**Publication date:** 2012  
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Work package contributions from Bo S. Andersen, Jakob H. Hansen, Karin Hüsey, Kasper Kristensen, Niels Madsen, Patrizio Mariani and Bjarne Stage  
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**Spatiotemporal variability of North Sea cod discards**

**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, A. (Ekstern), Catchpole, T. (Ekstern), Rochet, M. (Ekstern), Pout, A. (Ekstern), Ulleweit, J. (Ekstern), Vandemaele, S. (Ekstern), Ulrich, C. (Intern), Kempf, A. (Ekstern)  
**Publication date:** 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

Size selection of haddock (Melanogrammus aeglefinus) in square mesh codends: A study based on assessment of decisive morphology for mesh penetration

In the past, experimental fishing with square mesh codends was conducted with the expectation that this would lead to a better defined size selection indicated by a smaller selection range (SR) of haddock (Melanogrammus aeglefinus) and other gadoid species compared to that provided by traditional diamond mesh codends. However, experimental results demonstrated considerable between-haul variations in the selection parameters (L50 and SR). It was speculated that these results could be linked to differences in morphology of individual haddock of the same length. In the present study we assessed which measures of haddock morphology are important for size selection through meshes. We quantified between-individual variation in morphology and used simulation techniques to estimate that this variation can account for less than 28% (range 15–28%) of the SR values found during experimental fishing. By including a realistic range of mesh openings when simulating the fishing process of a square mesh codend, we were able to explain most of the experimental results. Additionally, we used our method to better understand the seasonal variation in size selectivity reported in the literature and to predict the basic selective properties for haddock for other mesh shapes. Finally, we found that the conditions of our model, which describes mesh penetration for haddock based on assessment of morphology, is very similar to the conditions previously applied in the literature to study size selection of haddock in diamond mesh codends.

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Krag, L. A. (Intern), Herrmann, B. (Intern), Madsen, N. (Intern), Frandsen, R. (Intern)
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Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
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BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
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Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
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Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
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BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.985 SNIP 1.065
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.938 SNIP 1.142
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.022 SNIP 1.075
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.025 SNIP 1.274
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.906 SNIP 1.134
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.944 SNIP 1.023
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.076 SNIP 1.314
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.299 SNIP 1.22
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.934 SNIP 0.891
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.611 SNIP 0.836
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Original language: English
Haddock (Melanogrammus aeglefinus), Morphology, Mesh penetration, Square mesh codend, FISHSELECT, Size selectivity
DOIs:
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Source: orbit
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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)
A simulation-based attempt to quantify the morphological component of size selection of Nephrops norvegicus in trawl codends

The selectivity for Nephrops (Nephrops norvegicus) in trawl codends generally is poor and the lack of steepness of the selection curve results in high discard rates and/or loss of legal-sized catch. This poor codend selectivity often is attributed to the irregular shape of Nephrops, which to some extent characterizes the problem as insoluble. In the present study, the FISHSELECT methodology was used to examine the selection process of the species in order to identify ways to improve selectivity. The use of three different modes of orientation for contact (contact modes) with the codend meshes explained most of the characteristics of the selection curves for Nephrops obtained experimentally. The contact mode with the smallest cross-section was optimal for mesh penetration and, when evaluated against experimental data, 87.5% of all Nephrops encountering the gear were estimated to meet the netting in this contact mode. The range of configurations of the meshes (e.g., opening angles in the diamond mesh netting) was determinative for the selectivity, and the selective process for Nephrops was found to take place along the entire length of the codend. Simulating selectivity in a diamond mesh codend in which the closed meshes in the forward part of the codend were replaced by more open meshes revealed that the selectivity for Nephrops can be efficiently improved. (C) 2009 Elsevier B.V. All rights reserved.
Development and test of a remotely operated Minisampler for discrete trawl sampling

General information
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Authors: Madsen, N. (Intern), Hansen, K. E. (Ekstern), Frandsen, R. (Intern), Krag, L. A. (Intern)
Publication date: 2010
Event: Poster session presented at Fsam 2010 : Fish Sampling with Active Methods, September 8-11, Ceske Budejovice, Czech Republic, 
Main Research Area: Technical/natural sciences
Electronic versions:
Poster FSAM.pdf
Source: orbit
Source-ID: 252306
Publication: Research - peer-review › Journal article – Annual report year: 2010

Trawl, Norway lobster, Morphology, Nephrops norvegicus, Selectivity, FISHSELECT
DOIs:
10.1016/j.fishres.2009.09.017
Source: orbit
Source-ID: 266754
Publication: Research › Poster – Annual report year: 2010
Development of new concepts for escape windows to minimise cod catches in Norway lobster fisheries

Gear selectivity with regard to cod (Gadus morhua) needs to be improved in the Kattegat and Skagerrak Norway lobster (Nephrops norvegicus) fishery. One way to achieve this goal is to improve the selectivity of an escape window (henceforth window) in the gear. Our gear development focused particularly on moving the window further back, gaining more stability in the codend to avoid loss of Norway lobster through the window, making a relatively narrow section where the window is located, and testing larger mesh sizes in the window. We designed a four panel sorting section—the sorting box—where a 300 mm window is placed at the top section at about 3–6 m from the codline. Acoustic release technology was used to avoid catch loss during gear retrieval. Sea trials were conducted in the Skagerrak and Kattegat from a commercial trawler. The sorting box yielded a high reduction of the cod catch, but no improvement was observed for cod that came into contact with the window after reducing the distance from the window to the codline. The sorting box also showed a high reduction of flatfish and other roundfish species. The retention of Norway lobster above minimum landing size in the sorting box was higher compared to a general selection model.

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Web of Science (2017): Indexed yes
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Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.985 SNIP 1.065
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)
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Main Research Area: Technical/natural sciences

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DTU Aqua tester fleksible sorteringsriste

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Authors: Madsen, N. (Intern), Feekings, J. P. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern)
Pages: 7
Publication date: 2010
Improving selectivity of the Baltic cod pelagic trawl fishery: Experiments to assess the next step

Due to declining cod (Gadus morhua) stocks, the Baltic Sea was one of the first areas regulated by the European Communities where selective escape windows were implemented to improve the exploitation pattern. Increasing discard rates and the potential for a significant increase of the spawning stock and the yield of the fishery are important reasons to further improve the selectivity of the fishery and to assess the potential next step in this process. In this study, we tested three relatively different design concepts, in the Baltic cod pelagic trawl fishery, that are relevant to past or present legislation and that were developed to meet requirements of increased selectivity performance. A standard nominal 135 mm diamond mesh codend, a codend with two nominal 125 mm bottom windows, and a codend with a nominal 125 mm nominal top window were tested using the covered codend method. A Danish and a Swedish commercial vessel were used for the sea trials to account for potential differences between vessels. Potential differences among the three gear variants were assessed by a two-step mixed effects model. The codend catch weight was found to have a significant effect on the selectivity in some cases. We assessed the actual effect of the selectivity performance on the immediate reductions of the proportions of cod being retained below and above the present minimum landing size (MLS) and a potential increased MLS.
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
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BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.985 SNIP 1.065
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.938 SNIP 1.142
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.022 SNIP 1.075
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.025 SNIP 1.274
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.906 SNIP 1.134
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.944 SNIP 1.023
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.076 SNIP 1.314
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.299 SNIP 1.22
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.934 SNIP 0.891
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.611 SNIP 0.836
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.546 SNIP 0.865
Original language: English
Trawl, Gadus morhua, Escape windows, Baltic Sea, Cod, Size selectivity
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Source-ID: 258063
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Report of the Study Group on Turned 90° Codend Selectivity, focusing on Baltic Cod Selectivity (SGTCOD)

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Original language: English
Series: ICES CM 2010
Number: FTC:05
Selective haddock (Melanogrammus aeglefinus) trawling: Avoiding cod (Gadus morhua) bycatch

The critical condition of the North Sea cod stocks has resulted in restrictions on not only cod, but also haddock and other species that are caught together with cod. Thus full exploitation of the haddock stock is unachievable unless cod can be excluded from the haddock catch. We designed a selective trawl based on the behavioral differences between haddock and cod as they enter a trawl, i.e., cod stay close to the seabed whereas haddock rise above it. The trawl's fishing line is raised similar to 60 cm above the seabed to allow cod to escape beneath the trawl while haddock are retained. To collect the escapees, three sampling bags were attached beneath the raised fishing line. The selective haddock trawl reduced the total catch of cod by 55% during the day and 82% at night, and 99% of the marketable haddock was caught during the day and 89% at night. Cod escape rates were highly length dependent: smaller cod escaped the trawl in greater numbers than did larger individuals. Whiting, saithe, lemon sole, and plaice were included in the analysis. (C) 2009 Elsevier B.V. All rights reserved.

General information
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Authors: Krag, L. A. (Intern), Holst, R. (Intern), Madsen, N. (Intern), Hansen, K. (Ekstern), Frandsen, R. (Intern)
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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
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BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
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Selectivity and escapement behaviour of five commercial fishery species in standard square- and diamond-mesh codends

General information
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Authors: Frandsen, R. (Intern), Madsen, N. (Intern), Krag, L. A. (Intern)
Pages: 1721-1731
Publication date: 2010
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES Journal of Marine Science
Volume: 67
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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
Studies and pilot projects for carrying out the common fisheries policy. Topic: LOT 3, Scientific advice concerning the impact of the gears used to catch plaice and sole - Open call for tenders FISH/2007/7 - Final report: Section A: Compliance with TORs, exec. summary and summ. by task

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Authors: Polet, H. (Ekstern), Depestele, J. (Ekstern), Van Craeynest, K. (Ekstern), Andersen, B. S. (Intern), Madsen, N. (Intern), Marlen, B. V. (Ekstern), Buisman, E. (Ekstern), Piet, G. (Ekstern), Hal, R. V. (Ekstern), Tidd, A. (Ekstern), Catchpole, T. (Ekstern)
Number of pages: 25
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Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 268585
Use of selective devices in trawls to support recovery of the Kattegat cod stock: a review of experiments and experience

The spawning-stock biomass of cod (Gadus morhua) in the Kattegat area is at a historically low level. Throughout the past decade considerable efforts have been devoted to research on improving both species and size selectivity of the trawls used in the mixed demersal fishery in the area, because this provides a valuable management tool for reducing the bycatch of cod and reducing mortality, and thus helping to rebuild the depleted stock. Gear research in the area has been focused on devices that allow for continued exploitation of the Norway lobster (Nephrops norvegicus) and flatfish, but minimizing the bycatch. We review the results of previous and continuing experiments with various codend mesh sizes, mesh configurations, escape windows, sorting grids, sorting frames, and separator panels, but also changes in whole-trawl designs. Based on our review, we compare and discuss the gear-related technical measures and their effectiveness in maintaining a commercial fishery on viable stocks, yet protecting cod. We discuss the results in relation to changes in legislation and experience with implementation of new selective devices in recent years. We also discuss ways to create stronger incentives for fishers to participate in gear research and to increase acceptance of more selective gears.

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State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Valentinsson, D. (Ekstern)
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Publication information
Journal: I C E S Journal of Marine Science
Volume: 67
Issue number: 9
ISSN (Print): 1054-3139
A study of fish behaviour in the extension of a demersal trawl using a multi-compartment separator frame and SIT camera system

A rigid separator frame with three vertically stacked codends was used to study fish behaviour in the extension piece of a demersal trawl. A video camera recorded fish as they encountered the separator frame. Ten hauls were conducted in a mixed species fishery in the northern North Sea. Fish behaviour was analysed using the camera observations from several of these hauls by assigning seven descriptive attributes and also using catch data. Gadoids, in particular haddock (Melanogrammus aeglefinus), whiting (Merlangius merlangus), and saithe (Pollachius virens), were caught in the upper codend, whereas Nephrops (Nephrops norvegicus) were caught in the lower codends. Catches of flatfish were more uniformly distributed among the three codends. Unlike the flatfish, gadoids reacted to the presence of the separator frame. The camera method and the separator frame yielded different information about fish behaviour within the trawl, and
together the two methods provided a more complete picture of the catching process. Behavioural observations, vertical
distribution, and the methodology are discussed, as is the potential for improving species separation in demersal trawls.

General information
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Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
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Main Research Area: Technical/natural sciences

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Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
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BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.985 SNIP 1.065
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.938 SNIP 1.142
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.022 SNIP 1.075
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.025 SNIP 1.274
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.906 SNIP 1.134
Bruger vi de mest optimale maskefaconer og størrelser i dansk fiskeri?

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Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Krag, L. A. (Intern), Madsen, N. (Intern), Frandsen, R. (Intern), Lundgren, B. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences
Electronic versions:
FISHSELECT_DanFish.pdf
Source: orbit
Source-ID: 251365
Publication: Research › Poster – Annual report year: 2009

Can codend selectivity of Nephrops be explained by morphology?
Selectivity of Nephrops in trawl codends is in general poor with resulting high discard rates and / or loss of legal sized catch. In the present study, the FISHSELECT methodology has been used to attain a profound understanding of the selection process of the species in order to identify means to improve the selectivity. It was found the size selection of Nephrops in trawl codends can be explained by combining contributions resulting contacts with the meshes for three different modes of orientations of the Nephrops.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Frandsen, R. (Intern), Herrmann, B. (Intern), Madsen, N. (Intern)
Publication date: 2009
Event: Poster session presented at ICES Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Ancona, Italy.
Main Research Area: Technical/natural sciences
Electronic versions:
FTFB_FishSelect_NEP.ppt
Source: orbit
Source-ID: 243591
Publication: Research › Poster – Annual report year: 2009

Computersimulering - et værktøj for fiskeriforvaltningen?
General information
State: Published
Evaluation of three levels of selective devices relevant to management of the Danish Kattegat-Skagerrak Nephrops fishery

This study illuminates a range of technological options relevant to present legislation for regulating fish by-catch in a small-meshed Nephrops fishery. The selection of cod, haddock, hake, lemon sole, Nephrops, plaice, saithe, witch, and whiting were evaluated using the twin-trawl technique for: (i) a 90 mm diamond mesh codend (standard codend); (ii) a standard codend with a 120 mm square mesh panel (SMP); and (iii) a standard codend with a 35/80 mm grid mounted in the extension piece to hinder access to the codend for large individuals. We used selection models to estimate selection parameters by species and confidence bands to compare the selective properties of different gear types. For cod, haddock, hake, Nephrops, plaice, and whiting we obtained estimates for all three gear variants, whereas we obtained estimates for lemon sole and witch only with the standard and the SMP codends and for saithe only for the SMP codend. The SMP significantly (p <0.05) improved selectivity of haddock in terms of releasing more individuals below minimum landing size (MLS). For a narrow size range of plaice below MLS, the SMP retained more individuals than did the standard codend. No effect of the SMP was detected for any of the other species. The grid codend significantly reduced catches of all fish species above MLS, but the codend also had an increased retention of cod and haddock below MLS. Furthermore, the grid resulted in a 17% loss of marketable Nephrops.
Improving selectivity of the Baltic cod trawl fishery: Experiments to assess the next step

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Tschernij, V. (Ekstern), Holst, R. (Intern)
Publication date: 2009
Event: Poster session presented at ICES/PICES/UNCOVER Symposium 2009 on Rebuilding Depleted Fish Stocks, Warnemünde/Rostock, Germany.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 252377
Publication: Research - peer-review › Journal article – Annual report year: 2009

Kullertrawl fanger færre torsk

General information
Modelling escapement during the fishing process as a dual sequence - Introducing SELNET

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Madsen, N. (Intern), Sistiaga, M. (Ekstern), Grimaldo, E. (Ekstern)
Publication date: 2009
Event: Poster session presented at ICES Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Ancona, Italy.
Main Research Area: Technical/natural sciences
Electronic versions:
SELNET_Surface.ppt
Modelling escapement during the fishing process as a dual sequence.doc

Bibliographical note
Poster presentation with abstract
Source: orbit
Source-ID: 243589
Publication: Research › Poster – Annual report year: 2009

Prediction of selectivity from morphological conditions: Methodology and a case study on cod (Gadus morhua)

The FISHSELECT methodology, tools, and software were developed and used to measure the morphological parameters that determine the ability of cod to penetrate different mesh types, sizes, and openings. The shape of one cross-section at the cod's head was found to explain 97.6% of the mesh penetration results obtained in a laboratory experiment. Design guides predicting the 50% retention length (L50) of different mesh types, sizes, and openings were produced and compared with results from sea trials. Results show that the morphology-based simulations can be used to explain both the within-haul and the between-haul variations previously reported from sea trials. Finally, based on the results obtained, ideas to improve the size selection of cod in towed gear are presented.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern), Lundgren, B. (Intern), Stærk, K. (Intern)
Pages: 59-71
Publication date: 2009
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
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Issue number: 1-2
ISSN (Print): 0165-7836
Morphology, Mesh penetration, FISHSELECT, Atlantic cod Gadus morhua, Size selectivity
Quantification of species selectivity by using separating device at different locations in two whitefish demersal trawls

**General information**

State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Holst, R. (Intern), Ferro, R. (Ekstern), Krag, L. A. (Intern), Kynock, R. (Ekstern), Madsen, N. (Intern)
Pages: 2052-2061
Publication date: 2009
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 66
Issue number: 12
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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
- Web of Science (2008): Indexed yes
Selectivity and escape percentages during three phases of the towing process for codends fitted with different selection systems

We investigated the selectivity of cod (Gadus morhua) and haddock (Melanogrammus aeglefinus) escaping from three different selection systems (a conventional diamond-mesh codend, a codend fitted with escape windows, and a codend fitted with a sorting grid) using the covered codend technique. By using a MultiSampler attached to the codend cover to partition the collection of escaping fish, we were able to determine the partitioned selectivity of each of these devices at different phases during the towing process: at depth, during the haul back, and at the surface. The percentages of escaping fish at depth from the diamond-mesh codend were significantly lower than those estimated for the escape windows and sorting grid codends: almost 62% of cod and 79% of haddock escaping from the diamond-mesh codend did so at depth, whereas approximately 75% of cod and 93% of haddock escaped from the other two systems at depth. The partitioned selectivity parameters, 150 and SR, were estimated and modelled for each of the three phases of the towing process and used to compare the selective properties of the three selection systems. A comparison was also made with a traditional whole haul selectivity analysis. Finally, bulk catch was added to the model as an explanatory variable and its effect upon selectivity was measured in both, partitioned and whole haul estimates. (C) 2008 Elsevier B.V. All rights reserved.
Studies and pilot projects for carrying out the common fisheries policy: Topic: LOT 3, Scientific advice concerning the impact of the gears used to catch plaice and sole: Interim report

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Polet, H. (Ekstern), Depestele, J. (Ekstern), Craeynest, K. V. (Ekstern), Andersen, B. S. (Intern), Madsen, N. (Intern), Marlen, B. V. (Ekstern), Buisman, E. (Ekstern), Piet, G. (Ekstern), Hal, R. V. (Ekstern), Tidd, A. (Ekstern), Catchpole, T. (Ekstern)
Number of pages: 82
Publication date: 2009

Test of improved escape window concepts to minimise cod catches in Norway lobster fisheries

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Frandsen, R. (Intern), Holst, R. (Intern), Krag, L. A. (Intern)
Publication date: 2009
Event: Poster session presented at Rebuilding Depleted Fish Stocks - Biology, Ecology, Social Science and Management Strategies 3 – 6 November, Warnemünde/Rostock, Germany
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 252381
Publication: Research › Poster – Annual report year: 2009

The vertical separation of fish in the aft end of a demersal trawl

Two multi-compartment separator frames were used to study the vertical separation of some commercially important fish species in the aft end of a trawl, with the aim of separating cod (Gadus morhua) from other species. A non-linear multinomial model with random effects was used to analyse the data and to compare the performance of the two frames. The vertical distribution of cod in the aft end of the trawl was close to uniform, whereas haddock (Melanogrammus aeglefinus), whiting (Merlangius merlangus), plaice (Pleuronectes platessa), and lemon sole (Microstomus kitt) showed more uneven distributions. The use of guiding bars in the separator frame significantly (p <0.05) increased the catch of cod, plaice, and lemon sole in the upper compartment. The vertical separation of cod was density-dependent; high densities of fish resulted in a more uniform distribution of cod. The species separations found differ from those reported from the studies of species separation in the region of the trawl mouth.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Use of selective devices in trawls to support recovery of the Kattegat cod - a review on experiments and experience

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Valentinsson, D. (Ekstern)
Publication date: 2009
Event: Poster session presented at ICES/PICES/UNCOVER Symposium 2009 on Rebuilding Depleted Fish Stocks, Warnemünde/Rostock, Germany.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 252380
Publication: Research › Poster – Annual report year: 2009

Comparison of selective properties for nettings when used in normal direction versus in 90 degrees turned direction

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Krag, L. A. (Intern), Madsen, N. (Intern)
Publication date: 2008
Event: Poster session presented at ICES Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Tórshavn, Faroe Islands.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 232407
Publication: Research › Poster – Annual report year: 2008

Evaluation of a simple means to reduce discard in the Kattegat-Skagerrak Nephrops (Nephrops norvegicus) fishery: Commercial testing of different codends and square-mesh panels
Discarding of fish species in the Kattegat-Skagerrak Nephrops directed fisheries remains at high levels. In this work we have tested four sets of codends pair-wise with the catch comparison technique under full commercial conditions to assess their potential in reducing the catch of undersized commercial species, in particular cod. We investigate the position of a 90åmm square-mesh panel (SMP), the effect of increasing the mesh size from 90 to 120åmm in the SMP, the effect of inserting a 90åmm SMP in an 80åmm codend and the effect of increasing the codend mesh size from 90 to 120åmm in a total of 89 hauls. Inserting the SMP 3-6åm from the codline compared to 6-9åm from the codline, reduced catches of cod above the minimum landing size (MLS) and Nephrops above and below the MLS. Increasing the mesh size in the SMP from 90 to 120åmm increased the catch of cod above the MLS in weight with an overall increase of 12% in the revenue. The effect of installing a 90åmm SMP 6-9 m from the codline in a nominal 80åmm codend had no effect on the catch of cod. Increasing the nominal codend mesh size from 90 to 120åmm reduced the catch of all species below the MLS, except monkfish. Catches of Nephrops above the MLS were, however, reduced by approximately one third and the total loss in revenue was 21%

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern)
Pages: 175-186
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 91
Issue number: 2-3
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Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Selectivity and escape percentages during three phases of the towing process for a diamond-mesh codend, a codend with Exit Windows and a codend fitted with a sorting grid

Selectivity in a trawl codend during haul-back operation: An overlooked phenomenon
The selectivity of a 99amm trawl codend was assessed using a codend cover fitted with a MultiSampler, which was acoustically triggered to take separate samples at three different phases of the haul. The first sample was collected during towing, the second during haul-up and the third at the surface. A total of 18 hauls were conducted with a commercial fishing vessel west of Scotland. It was demonstrated that escapes take place not only during the tow but also in the short period when the trawl is hauled back from the seabed and when the codend is at the surface. For haddock (Melanogrammus aeglefinus), whiting (Merlangius merlangus) and Norway lobster (Nephrops norvegicus), respectively, the mean percentages escaping at the surface were 16, 12 and 38% of the total escape while 17, 8 and 28% escaped during the haul-up phase. Compared to towing, the escape rate (no./min) increased for haddock by a factor 2.7 during haul-up and by a factor 1.7 at the surface, whereas the escape rates of whiting were similar for the three phases. The escape rate of Norway lobster increased by a factor of approximately 7 for both the haul-up and surface phases, compared to the towing phase. The selectivity parameters L50 (50% retention length) and SR (selection range=L75-L25) were estimated and compared for the three different phases and for the whole haul for haddock, whiting and Norway lobster. For all three species there was no significant (P>0.05) difference in L50 between the three phases of the haul. There was also no significant difference for whiting and Norway lobster when comparing the SR of the three phases, whereas the SR was significantly lower for haddock when comparing the surface phase with towing and haul-up. The estimate of L50 when towing was about 6cm lower for haddock and whiting and 9mm for Norway lobster compared to the selection curve estimated conventionally for the whole haul. Finally, the effect of sea state, duration and codend catch on the selectivity parameters were estimated for the individual phases and for the whole haul. A significant effect of at least one variable was found in all phases.

Selectivity in a trawl codend during haul-back operation: An overlooked phenomenon
The selectivity of a 99amm trawl codend was assessed using a codend cover fitted with a MultiSampler, which was acoustically triggered to take separate samples at three different phases of the haul. The first sample was collected during towing, the second during haul-up and the third at the surface. A total of 18 hauls were conducted with a commercial fishing vessel west of Scotland. It was demonstrated that escapes take place not only during the tow but also in the short period when the trawl is hauled back from the seabed and when the codend is at the surface. For haddock (Melanogrammus aeglefinus), whiting (Merlangius merlangus) and Norway lobster (Nephrops norvegicus), respectively, the mean percentages escaping at the surface were 16, 12 and 38% of the total escape while 17, 8 and 28% escaped during the haul-up phase. Compared to towing, the escape rate (no./min) increased for haddock by a factor 2.7 during haul-up and by a factor 1.7 at the surface, whereas the escape rates of whiting were similar for the three phases. The escape rate of Norway lobster increased by a factor of approximately 7 for both the haul-up and surface phases, compared to the towing phase. The selectivity parameters L50 (50% retention length) and SR (selection range=L75-L25) were estimated and compared for the three different phases and for the whole haul for haddock, whiting and Norway lobster. For all three species there was no significant (P>0.05) difference in L50 between the three phases of the haul. There was also no significant difference for whiting and Norway lobster when comparing the SR of the three phases, whereas the SR was significantly lower for haddock when comparing the surface phase with towing and haul-up. The estimate of L50 when towing was about 6cm lower for haddock and whiting and 9mm for Norway lobster compared to the selection curve estimated conventionally for the whole haul. Finally, the effect of sea state, duration and codend catch on the selectivity parameters were estimated for the individual phases and for the whole haul. A significant effect of at least one variable was found in all phases.
Simulering af selektivitet i fiskeredskaber

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Monitoring
Authors: Herrmann, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Lundgren, B. (Intern), Madsen, N. (Intern), Stæhr, K. (Intern)
Trawl skal slippe torsk fri af hummerfiskeriet

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Frandsen, R. (Intern), Holst, R. (Intern), Krag, L. A. (Intern)
Pages: 18
Publication date: 2008

Publication information
Pages (from-to): 18
Newspaper: Fiskeri Tidende
Volume: 15
No.: 50
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 249851
Publication: Communication › Newspaper article – Annual report year: 2008

Udvikling af selektive trawl til danske fiskerier - SELTRA

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Frandsen, R. (Intern), Krag, L. A. (Intern), Herrmann, B. (Intern), Holst, R. (Intern), Lundgren, B. (Intern)
Number of pages: 47
Publication date: 2008

Publication information
Place of publication: Hirtshals
Publisher: DTU Aqua, Institut for Akvatiske Ressourcer, Sektion for Fiskeriteknologi
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
SELTRA_Rapport.pdf

Bibliographical note
Finansieret af EU's fiskerisektorprogram FIUF og Fødevareministeriet
Source: orbit
Source-ID: 233085
Publication: Research › Report – Annual report year: 2008

Undermålshummere sorteres fra

General information
Assessing the survival of fish escaping from trawls

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Huse, I. (Ekstern), Breen, B. (Ekstern), Madsen, N. (Intern), Flintegård, H. (Ekstern)
Publication date: 2007

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Links:
Source: orbit
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Publication: Research › Sound/Visual production (digital) – Annual report year: 2007

Danish Final Rapport - EU project RECOVERY Q5RS-2002-00935

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Krag, L. A. (Intern), Madsen, N. (Intern), Holst, R. (Intern)
Number of pages: 293
Publication date: 2007

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Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259243
Publication: Research › Report – Annual report year: 2007

FISHSELECT - Development of methodology

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Lundgren, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern), Stæhr, K. (Intern)
Publication date: 2007
FISHSELECT - Study of cod (Gadus morhua)

**General information**  
State: Published  
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources  
Authors: Krag, L. A. (Intern), Herrmann, B. (Intern), Frandsen, R. (Intern), Stæhr, K. (Intern), Madsen, N. (Intern), Lundgren, B. (Intern)  
Publication date: 2007  
Event: Poster session presented at Presented at ICES/FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Dublin, April, Dublin, .

Main Research Area: Technical/natural sciences

**Bibliographical note**  
Poster  
Source: orbit  
Source-ID: 226299  
Publication: Research › Poster – Annual report year: 2007

FISHSELECT - Study of plaice (Pleuronectes platessa)

**General information**  
State: Published  
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources  
Authors: Frandsen, R. (Intern), Herrmann, B. (Intern), Krag, L. A. (Intern), Stæhr, K. (Intern), Lundgren, B. (Intern), Madsen, N. (Intern)  
Publication date: 2007  
Event: Poster session presented at Presented at ICES/FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB), Dublin, April, Dublin, .

Main Research Area: Technical/natural sciences

**Bibliographical note**  
Poster  
Source: orbit  
Source-ID: 225447  
Publication: Research › Poster – Annual report year: 2007

Projekt SURVIVAL – en undersøgelse af overlevesen hos fisk der undslipper gennem maskerne på trawl

**General information**  
State: Published  
Organisations: Section for Management Systems, National Institute of Aquatic Resources  
Authors: Breen, M. (Ekstern), Huse, I. (Ekstern), Ingolfsson, O. (Ekstern), Madsen, N. (Intern), Soldal, A. (Ekstern)  
Publication date: 2007  

Main Research Area: Technical/natural sciences

**Bibliographical note**  
Abstract  
Source: orbit  
Source-ID: 259077  
Publication: Research › Conference abstract for conference – Annual report year: 2007

Selectivity of fishing gears used in the Baltic Sea cod fishery

**General information**  
State: Published  
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources  
Authors: Madsen, N. (Intern)  
Pages: 517-544  
Publication date: 2007  
Main Research Area: Technical/natural sciences

**Publication information**  
Journal: Reviews in Fish Biology and Fisheries
Sluttrapport TEMAS (Technical measures - development of evaluation model and application in danish fisheries)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Management Systems, Section for Fisheries- and Monitoring Technology

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Ratings:
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Scopus rating (2016): CiteScore 3.6 SJR 1.691 SNIP 1.675
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.449 SNIP 1.453 CiteScore 2.57
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.071 SNIP 1.496 CiteScore 2.46
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.091 SNIP 1.578 CiteScore 2.3
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.241 SNIP 1.591 CiteScore 2.8
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.374 SNIP 1.803 CiteScore 2.84
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.478 SNIP 1.403
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.13 SNIP 1.325
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.243 SNIP 1.524
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.754 SNIP 1.723
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.89 SNIP 1.143
Scopus rating (2005): SJR 0.53 SNIP 0.562
Scopus rating (2004): SJR 0.706 SNIP 0.829
Scopus rating (2003): SJR 1.098 SNIP 1.274
Scopus rating (2002): SJR 1.343 SNIP 1.991
Scopus rating (2001): SJR 1.982 SNIP 1.777
Scopus rating (2000): SJR 1.927 SNIP 2.376
Scopus rating (1999): SJR 1.946 SNIP 2.44
Original language: English
DOIs:
10.1007/s11160-007-9053-y
Source: orbit
Source-ID: 226578
Publication: Research - peer-review › Journal article – Annual report year: 2007
SURVIVAL: An assessment of mortality in fish escaping from trawl codends and its use in fisheries management. EU final report

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Breen, M. (Ekstern), Huse, I. (Ekstern), Ingolfsson, I. (Ekstern), Madsen, N. (Intern), Soldal, A. (Ekstern)
Number of pages: 300
Publication date: 2007

Assessment of vertical preferences of commercial species in a mixed species gear: A methodological study

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Krag, L. A. (Intern), Holst, R. (Intern), Madsen, N. (Intern)
Publication date: 2006
Event: Poster session presented at Fishing technology in the 21st century, Boston, MA, United States.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 237043
Publication: Research › Poster – Annual report year: 2006

Demonstration af selektive jomfruhammertrawl

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Krag, L. A. (Intern), Madsen, N. (Intern), Frandsen, R. (Intern)
Number of pages: 30
Publication date: 2006

Bibliographical note
DFFE rapport
Source: orbit
Development and testing of a species-selective flatfish ottertrawl to reduce cod bycatches

The objective of this project was to develop a trawl suitable for directed fisheries for flatfish that would reduce cod bycatch. A selective flatfish trawl was developed and tested in a flume tank. A sea trial was conducted in the Danish plaice fishery in the Skagerrak and two sea trials were run on the Baltic sea flounder fishery. The catches from the selective flatfish trawl were compared to catches made with a conventional flatfish trawl. The selective flatfish trawl caught more plaice and reduced the cod bycatch, particularly those smaller than the minimum landing size in the Skagerrak sea trials, compared to the conventional flatfish trawl. The selective flatfish trawl caught more flounder and reduced cod bycatch during two sea trials in the Baltic sea. Hence, this selective flatfish trawl appears to be a useful management tool to substantially reduce bycatch of cod in a directed plaice or flounder fishery. (c) 2006 Elsevier B.V. All rights reserved.
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.938 SNIP 1.142
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.022 SNIP 1.075
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.025 SNIP 1.274
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.906 SNIP 1.134
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.944 SNIP 1.023
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.076 SNIP 1.314
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.299 SNIP 1.22
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.934 SNIP 0.891
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 0.611 SNIP 0.836
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.546 SNIP 0.865

Original language: English
DOIs: 10.1016/j.fishres.2006.01.002
Source: orbit
Source-ID: 226569
Publication: Research - peer-review › Journal article – Annual report year: 2006

Forsøg med 140 mm kvadratmaske panel

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Pedersen, E. M. (Intern), Madsen, N. (Intern)
Number of pages: 16
Publication date: 2006

Publication information
Publisher: [s.n.]
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
Forsøg med 140 mm kvadratmaske panel.pdf

Bibliographical note
Rapport til DFFE
Source: orbit
Source-ID: 227024
Publication: Research › Report – Annual report year: 2006

Forsøg med to typer selektive konsumtrawl

General information
State: Published
Organisations: Section for Population- and Ecosystem Dynamics, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Pedersen, E. M. (Intern), Madsen, N. (Intern)
Number of pages: 18
Publication date: 2006
Gear technological approaches to reduce un-wanted by-catch in commercial Norway pout fishery in the North Sea

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Nielsen, J. R. (Intern), Madsen, N. (Intern)
Pages: 1-11
Publication date: 2006

Host publication information
Title of host publication: ICES C.M.
Volume: ACFM:35
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Conference: Meeting in Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, 01/01/2006
Source: orbit
Source-ID: 238645
Publication: Research › Article in proceedings – Annual report year: 2006

Gill net selectivity for perch (Perca fluviatilis) from the Szczecin lagoon, Poland

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Psuty-Lipska, I. (Ekstern), Madsen, N. (Intern), Draganić, B. (Ekstern), Blady, W. (Ekstern)
Pages: 339-344
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 80
Issue number: 2-3
ISSN (Print): 0165-7836
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
Modelling the effect of interaction between fish morphology and mesh shapes on discard levels in mixed fisheries

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Management Systems
Authors: Lundgren, B. (Intern), Herrmann, B. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Madsen, N. (Intern), Stæhr, K. (Intern), Eigaard, O. R. (Intern)
Publication date: 2006
Event: Poster session presented at Fishing technology in the 21. century, Boston, MA, .
Main Research Area: Technical/natural sciences
Simulation of catch and discard for a fishing gear - demonstrating the PRESEMO software

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Herrmann, B. (Intern), Madsen, N. (Intern), Krag, L. A. (Intern), Frandsen, R. (Intern), Lundgren, B. (Intern), Priour, D. (Ekstern), O'Neill, B. (Ekstern)
Publication date: 2006
Event: Poster session presented at Fishing technology in the 21st century, Boston, MA, United States.
Main Research Area: Technical/natural sciences

The selectivity and survival of fish escaping from a trawl codend at depth and at the surface

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Breen, M. (Ekstern), Madsen, N. (Intern), Soldal, A. (Ekstern), Huse, I. (Ekstern), Ingolfsson, O. (Ekstern)
Publication date: 2006
Event: Poster session presented at Fishing technology in the 21st century, Boston, MA, United States.
Main Research Area: Technical/natural sciences

Forsøg med selektive jomfruhummer trawl

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Krag, L. A. (Intern), Madsen, N. (Intern)
Pages: 15
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: Fiskeritidende
Volume: 12
Issue number: 4/5
ISSN (Print): 0909-7325
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: Danish
Source: orbit
Source-ID: 226300
Publication: Research › Journal article – Annual report year: 2005

Selectivity experiments to estimate the effect of escape windows in the Skagerak roundfish fishery
The objectives were to measure roundfish selectivity and to test if square-mesh windows inserted in the codend could improve the selectivity. Sea trials were conducted with a commercial trawler in the Skagerak area. Three codend types were tested: (1) a standard codend with 104 mm meshes; (2) a standard 104 mm codend with two 85 mm square-mesh side windows; (3) a standard 104 mm codend with an 85-mm square-mesh top window. The twin-trawl method was used
where one side of the rig had a 35-mm (nominal mesh size) control codend. Hauls of each codend were fitted simultaneously in a fixed- and random-effects model. In total, 24 and 30 hauls of haddock and cod, respectively, were included in the final selectivity analysis. This indicated that insertion of a top window in a standard codend improved the selectivity resulting in a lower selectivity ratio (SR/L50) and a higher L50 for cod and haddock, whereas insertion of side windows gave a lower selectivity ratio for both species, but a higher L50 for cod only. The results suggest that the recent mesh size increase to 120 mm in a standard codend is not sufficient to reduce the probability of discards to a negligible level with the existing minimum landing sizes. (C) 2004 Elsevier B.V. All rights reserved.

**General information**

State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Stæhr, K. (Intern)
Pages: 241-245
Publication date: 2005
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Fisheries Research
Volume: 71
Issue number: 2
ISSN (Print): 0165-7836
Ratings:
- BFI (2018): BFI-level 1
- Web of Science (2018): Indexed yes
- BFI (2017): BFI-level 1
- Web of Science (2017): Indexed yes
- BFI (2016): BFI-level 1
- Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 1
- Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 1
- Web of Science (2014): Indexed yes
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
- ISI indexed (2011): ISI indexed yes
- Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 1.041 SNIP 1.1
- Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 1
- Scopus rating (2009): SJR 0.985 SNIP 1.065
- Web of Science (2009): Indexed yes
- BFI (2008): BFI-level 2
- Scopus rating (2008): SJR 0.938 SNIP 1.142
- Web of Science (2008): Indexed yes
- Scopus rating (2007): SJR 1.022 SNIP 1.075
Escape windows to improve the size selectivity in the Baltic cod trawl fishery

A rapid decrease of the stock of Baltic cod (Gadus morhua) has provided the incentive to improve the size selectivity in the trawl fishery. Use of escape windows is permitted in the legislation to give means of improving the size selectivity of cod as an alternative to a traditional standard codend. The history of the use of escape windows in the Baltic Sea cod fishery is reviewed. The present escape windows do not function optimally. The objective of this new experiment was to compare an improved design of escape window, which is placed in the upper panel, with that of standard codend. Three standard codends, with 105, 120 and 140 mm nominal mesh size, and three window codends, with 110, 125 and 135 mm window nominal mesh size, were tested during sea trials conducted in June and July from a commercial trawler using a twin trawl rig and the covered codend technique. A fixed and random effects model of the codend selectivity was formulated to analyse the results and determine the effects of codend type, mesh size and other recorded variables. L50 and SR increased significantly with the mesh size. L50 was significantly increased and SR significantly reduced for a window codend with the same window mesh size (WMS) as that of a standard codend. The L50 of the standard codends decreased with catch weight. An unexplained port-starboard effect was found for the window codends where the L50 depended on which of the two trawls the codend was attached to. The potential of these escape windows as a management tool to improve the size selectivity in the Baltic cod fishery is discussed. (C) 2002 Elsevier Science B.V. All rights reserved.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Holst, R. (Intern), Foldager, L. (Ekstern)
Pages: 223-235
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 57
Issue number: 3
ISSN (Print): 0165-7836
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
Sea trials were carried out on a Danish commercial vessel measuring the size selectivity and fishing power of gill nets used to catch Baltic cod (Gadus morhua). A comparison was made of two different twine thicknesses at two different times of the year. Nominal mesh sizes of 70-130 mm were used. Method of capture, condition factor and girths were measured for sub-samples of the cod caught. A model of the size selectivity of the gill nets was adapted to the experimental conditions where two gears were fished on the same population. This model was fitted to the catch data for each set. Subsequently a model was fitted for the mean selectivity taking between-set variation into account. The selectivity Curve that fitted the data best was given by the sum of two normal distributions. It was found that twine thickness and trials period had relatively little effect upon the shape of the selectivity curve. Twine thickness had a substantial effect upon the fishing power of the nets. (C) 2002 Elsevier Science B.V. All rights reserved.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Holst, R. (Intern), Wileman, D. (Ekstern), Madsen, N. (Intern)
Pages: 303-312
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 56
Issue number: 3
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Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Danish experiments with a grid system tested in the North Sea shrimp fishery

Grids have been proven successful worldwide as bycatch reducers in shrimp fisheries but have never been tested in the North Sea shrimp fishery. The objectives of this experiment were to develop and test a flexible grid system for the Danish Fladen Ground shrimp (Pandalus borealis) fishery, which can retain marketable catches of roundfish and Norway lobster...
(Nephrops norvegicus). The grid system was made of polyamide with a fish escape hole at the top and a Norway lobster escape hole at the bottom. Hinges made the grid flexible. The grid system was developed acid tested in a flume tank and during sea trials. Two experiments were conducted with a commercial trawler at the Fladen Ground. A standard shrimp codend was compared to a codend with the grid system simultaneously in a twin trawl rig. There was a relatively large and significant reduction in the grid codend of cod (Gadus morhua), haddock (Melanogrammus aeglefinus), whiting (Merlangius merlangus), saithe (Pollachius virens), Norway pout (Trisopterus esmarki), Norway lobster, herring (Clupea harengus) and witch (Glyptocephalus cynoglossus) but no significant difference in weight of shrimp and monkfish (Lophius piscatorius) in the first experiment. The grid system was altered in experiment 2 resulting in no significant difference in the catch of cod and saithe above the minimum landing size while the catch of Norway lobster and shrimp improved significantly. Experiments with collecting bags indicated that most fish went through the top fish escape hole, shrimp and Norway pout through the grid or the bottom Norway lobster hole and Norway lobster mainly through the Norway lobster hole. (C) 2001 Elsevier Science B.V. All rights reserved.
Improving and estimating the selectivity of codends for the pelagic Baltic cod fishery

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Tscernij, V. (Ekstern), Holst, R. (Intern)
Publication date: 2001

Host publication information
Title of host publication: Paper from Fishing Technology and Fish Behaviour Working Group, Seattle, USA 23-27 April
Place of publication: Seattle, USA
Main Research Area: Technical/natural sciences
Conference: Fishing Technology and Fish Behaviour Working Group, Seattle, USA 23-27 April, 01/01/2001
Source: orbit
Source-ID: 239136
Publication: Research › Article in proceedings – Annual report year: 2001

Improving and estimating the selectivity of codends for the pelagic Baltic cod fishery. Final report for the Commission

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Tscernij, V. (Ekstern), Holst, R. (Intern)
Publication date: 2001

Publication information
Place of publication: Charlottenlund
Publisher: Danmarks Fiskeriundersøgelser
Original language: English

Series: EU Study Contract
Number: 98/001
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 226573

General information
State: Published
Organisations: Institute Management, National Institute of Aquatic Resources, Section for Fisheries Advice, Section for Fisheries- and Monitoring Technology
Number of pages: 45
Publication date: 2001

Report of the scientific meeting on technical measures for the fisheries on Baltic cod, Brussels 20-24 August 2001

General information
State: Published
Organisations: Institute Management, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Dahm, E. (Ekstern), Kirkegaard, E. (Intern), Lassen, H. (Ekstern), Netzel, J. (Ekstern), Larsen, L. (Ekstern), Plökshs, M. (Ekstern), Madsen, N. (Intern), Hagström, O. (Ekstern), Gasyukov, P. (Ekstern), Larsson, P. (Ekstern), Ernst, P. (Ekstern), Suuronen, P. (Ekstern), Aps, R. (Ekstern), Toliusis, S. (Ekstern), Reeves, S. (Ekstern)
Number of pages: 60
Publication date: 2001

Scientific expert meeting on future research in relation to additional improvement of the exploitation pattern of demersal species in the North Sea, 9-10 October, 2001 Brussels

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources, Section for Fisheries Advice
Number of pages: 12
Publication date: 2001
Selectivity of square mesh top and side panels in the North Sea whitefish fisheries

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources, Section for Monitoring
Authors: Madsen, N. (Intern), Stæhr, K. (Intern)
Number of pages: 81
Publication date: 2001

Publication information
Place of publication: Bruxelles
Publisher: European Commission
Volume: Danish contribution
Original language: English

Series: EU Study
Number: 99/007
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259121
Publication: Research › Report – Annual report year: 2001

Sorteringsriste reducerer bifangsten af fisk i rejefiskeriet

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Hansen, K. (Ekstern)
Pages: 2-9
Publication date: 2001
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisk og Hav
Issue number: 52
ISSN (Print): 0105-9211
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: Danish
Links:
http://www.difres.dk/dk/publication/files/22122003$FH52.pdf
Source: orbit
Source-ID: 226580
Publication: Research › Journal article – Annual report year: 2001

The kite cover: a new concept for covered codend selectivity studies

The covered codend method is that most commonly used for estimating the size selectivity of codends for towed fishing gears. A codend cover held open by kites has been developed to improve the performance and handling properties compared to the hooped covers normally used. The new cover can be wound directly onto the net drum as the catch is hauled. The development and testing of the cover in a flume tank, where it was compared to a hooped cover, are described as well as the practical experience obtained when using the cover at sea. (C) 2001 Elsevier Science B.V. All rights reserved.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Hansen, K. (Ekstern), Moth-Poulsen, T. (Ekstern)
Pages: 219-226
Publication date: 2001
Main Research Area: Technical/natural sciences
Development and testing of grids for the North Sea and Skagerak shrimp fishery

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Hansen, K. (Ekstern)
Number of pages: 34
Publication date: 2000

Publication information
Place of publication: Bruxelles
Publisher: European Commission
Original language: English
Series: EU Study
Number: 96/004
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259120
Publication: Research › Report – Annual report year: 2000

Experimental adjustments of the escape window position in trawl codends - implication for Baltic Sea cod fishery

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern)
Pages: 38-56
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Meddelande från Havfiskelaboratoriet, Lysekil
Volume: 329
ISSN (Print): 1103-4777
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: English
Source: orbit
Source-ID: 226571
Publication: Research - peer-review › Journal article – Annual report year: 2000

Methods to estimate and improve the selectivity of trawls and gill nets

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern)
Number of pages: 73
Publication date: 2000

Publication information
Publisher: Environmental Engineering Laboratory, Aalborg University
Size selectivity and relative fishing power of Baltic cod gill nets

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Wileman, D. (Ekstern), Tscernij, V. (Ekstern), Madsen, N. (Intern), Holst, R. (Intern)
Pages: 110-148
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Havsfiskelaboratoriet. Meddelande
Volume: 329
ISSN (Print): 1103-4777
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: English
Source: orbit
Source-ID: 227803
Publication: Research - peer-review › Journal article – Annual report year: 2000

Statistical modelling and analysis of gill net size selectivity data

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Holst, R. (Intern), Wileman, D. (Ekstern), Tscernij, V. (Ekstern), Madsen, N. (Intern)
Pages: 149-188
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Meddelande från Havsfiskelaboratoriet, Lysekil
Volume: 329
ISSN (Print): 1103-4777
Ratings:
ISI indexed (2013): ISI indexed no
ISI indexed (2012): ISI indexed no
ISI indexed (2011): ISI indexed no
Original language: English
Source: orbit
Source-ID: 225791
Publication: Research - peer-review › Journal article – Annual report year: 2000

The effect of twine thickness in Cod gill nets

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Holst, R. (Intern), Wileman, D. (Ekstern), Madsen, N. (Intern)
Publication date: 2000

Host publication information
Title of host publication: ICES C.M.
Volume: J:06
Alternative methods to improve the selectivity of trawls: Ph.D.-papers in technology and science, autumn 1999

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern)
Number of pages: 56
Pages: 7-9
Publication date: 1999

Host publication information
Title of host publication: Report by Faculty of engineering and Science, Aalborg University
Place of publication: Aalborg, Denmark
Publisher: Aalborg University
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259129
Publication: Research › Book chapter – Annual report year: 1999

Gillnet selectivity for North Sea Atlantic cod (Gadus morhua): model ambiguity and data quality are related
Gillnet selectivity curves for North Sea Atlantic cod (Gadus morhua) were fitted to catch data obtained with six different mesh sizes. The selectivity curves investigated included frequently used selectivity models following the normal, lognormal, and gamma distributions. Another group of selectivity models that take the method of capture (gilled, maxillae, or "randomly" enmeshed) into consideration was also included. The best description of the selection data was found for the latter models. Therefore, the capture processes and girth measurements should be recorded as a matter of routine and such data used when constructing and evaluating gillnet selectivity models. The shape of the selectivity curve for those size intervals where there were satisfactory catch information was well defined, while the selection curve was ambiguous outside the interval with adequate data. Ambiguities in the shape of the selectivity curve can be diminished by choosing an appropriate range in mesh sizes and ensuring that the mesh sizes match the size distribution of the population fished. It is furthermore suggested that the estimated length distribution of the fish encountering the nets be robust to misspecification of the selectivity model.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Hovgård, H. (Intern), Lassen, H. (Ekstern), Madsen, N. (Intern), Poulsen, T. (Ekstern), Wileman, D. (Ekstern)
Pages: 1307-1316
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Canadian Journal of Fisheries and Aquatic Sciences
Volume: 56
Issue number: 7
ISSN (Print): 0706-652X
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 2.56 SJR 1.322 SNIP 1.163
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.256 SNIP 1.051 CiteScore 2.22
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.443 SNIP 1.379 CiteScore 2.6
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.421 SNIP 1.081 CiteScore 2.25
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.324 SNIP 1.196 CiteScore 2.29
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.423 SNIP 1.09 CiteScore 2.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.425 SNIP 1.118
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.451 SNIP 1.196
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.589 SNIP 1.379
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.621 SNIP 1.236
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.354 SNIP 1.267
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.558 SNIP 1.553
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.744 SNIP 1.542
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 2.097 SNIP 1.622
Scopus rating (2002): SJR 1.909 SNIP 1.457
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.769 SNIP 1.46
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.5 SNIP 1.464
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.928 SNIP 1.436
Original language: English
Source: orbit
Source-ID: 225805
Publication: Research - peer-review › Journal article – Annual report year: 1999

Selectivity experiments with escape windows in the North Sea Nephrops (Nephrops norvegicus) trawl fishery

**General information**

State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Moth-Poulsen, T. (Ekstern), Holst, R. (Intern), Wileman, D. (Ekstern)
Pages: 167-181
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 42
Issue number: 1-2
ISSN (Print): 0165-7836
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.041 SNIP 1.1
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.985 SNIP 1.065
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.938 SNIP 1.142
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.022 SNIP 1.075
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.025 SNIP 1.274
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.906 SNIP 1.134
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.944 SNIP 1.023
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.076 SNIP 1.314
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.299 SNIP 1.22
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.934 SNIP 0.891
Size selectivity of sole gill nets fished in the North Sea

The size selectivity of sole nets was measured indirectly on a Danish commercial gill net vessel in the North Sea by using nets made in seven different mesh sizes fished simultaneously. Maximum likelihood procedure was used to fit different forms for the selection curve to the catch data for sole, plaice and cod for each setting of the gear. It was found that a hyperbola normal form for the selection curve gave the best fits. Mean selection curves were then estimated by combining sets using a model of between-set variation. The ratio between length of maximum retention and mesh size was estimated to be 3.28 for sole, 2.60 for plaice and 4.56 for cod. Selection curves were also fitted to the catch data pooled over all sets. The model deviance for the sole and plaice data indicated lack of fit when pooling the catch data. (C) 1999 Elsevier Science B.V. All rights reserved.

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Holst, R. (Intern), Wileman, D. (Ekstern), Moth-Poulsen, T. (Ekstern)
Pages: 59-73
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: Fisheries Research
Volume: 44
Issue number: 1
ISSN (Print): 0165-7836
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.21 SJR 1.12 SNIP 1.136
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.067 SNIP 1.133 CiteScore 2.01
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.105 SNIP 1.312 CiteScore 2.17
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.037 SNIP 1.173 CiteScore 1.85
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.93 SNIP 1.177 CiteScore 1.78
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.154 SNIP 1.135 CiteScore 1.7
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
The escape window as a management option to improve the size selectivity of the Baltic cod fishery

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Holst, R. (Intern), Foldager, L. (Ekstern)
Publication date: 1999
Main Research Area: Technical/natural sciences

Publication information
Journal: ICES CM 1999/
Volume: R:01
Original language: English

Bibliographical note
Stockholm 19/9-02/10
Source: orbit
Source-ID: 226581
Publication: Research › Conference article – Annual report year: 1999
Udvikling og afprøvning af riste til Nordsøens rejefiskeri

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Hansen, K. (Ekstern)
Number of pages: 35
Publication date: 1999

Publication information
Place of publication: København
Publisher: Ministeriet for Fødevarer, Landbrug og Fiskeri
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259119
Publication: Research › Report – Annual report year: 1999

Selectivity experiments with window codends fished in the Baltic Sea cod (Gadus morhua) fishery

General information
State: Published
Organisations: Section for Fisheries- and Monitoring Technology, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Moth-Poulsen, T. (Ekstern), Lowry, N. (Ekstern)
Pages: 1-14
Publication date: 1998
Main Research Area: Technical/natural sciences

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Journal: Fisheries Research
Volume: 36
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Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.21 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
Selektion i fiskeredskaber

**General information**

State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Hansen, U. J. (Ekstern), Madsen, N. (Intern), Moth-Poulsen, T. (Ekstern), Lowry, N. (Ekstern)
Pages: 33-48
Publication date: 1998
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Fisk og hav
Issue number: 48
ISSN (Print): 0105-9211
Development and testing of a species selective flatfish ottertrawl

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. ( Intern), Hansen, K. (Ekstern), Tschernij, V. (Ekstern), Larsson, P. (Ekstern)
Number of pages: 34
Publication date: 1997

Publication information
Place of publication: Bruxelles
Publisher: European Commission
Original language: English

Series: EU Study
Number: 95/45
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259117
Publication: Research › Report – Annual report year: 1997

Experiments with contrast colours and estimates of the selectivity in window codends fished in the Baltic Sea cod (Gadus morhua) fishery

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. ( Intern), Moth-Poulsen, T. (Ekstern), Lowry, N. (Ekstern)
Publication date: 1997

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Title of host publication: ICES C.M.
Volume: FF:01
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259074
Publication: Research › Article in proceedings – Annual report year: 1997

Kvadratmaskpaneler i makrelisher

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. ( Intern), Moth-Poulsen, T. (Ekstern)
Number of pages: 11
Publication date: 1997

Publication information
Place of publication: København
Publisher: Ministeriet for Fødevarer, Landbrug og Fiskeri
Original language: Danish
Size selectivity and relative fishing power of Baltic cod gill nets

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Wileman, D. (Ekstern), Madsen, N. (Intern), Tschernij, V. (Ekstern), Holst, R. (Intern)
Number of pages: 37
Publication date: 1996

Publication information
Place of publication: Bruxelles
Publisher: European Commission
Original language: English
Series: EU Study
Number: 96/005
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259114
Publication: Research › Report – Annual report year: 1996

Comparisons of Danish and Swedish windows fished in cod trawls in the Baltic Sea

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Moth-Poulsen, T. (Ekstern), Knudsen, L. (Ekstern), Madsen, N. (Intern)
Number of pages: 18
Publication date: 1995

Publication information
Place of publication: Copenhagen, Denmark
Publisher: Ministry of Agriculture and Fisheries
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259124
Publication: Research › Report – Annual report year: 1995

Fangst og opbevaring af krabber

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern)
Report on evaluation of recent Nephrops selectivity trawl experiments

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Moth-Poulsen, T. (Ekstern), Madsen, N. (Intern), Polet, H. (Ekstern), Robertson, J. (Ekstern), Ulmestrand, M. (Ekstern), Holst, R. (Intern)
Publication date: 1995

Publication information
Place of publication: København
Publisher: Ministeriet for Landbrug og Fiskeri
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259123
Publication: Research › Report – Annual report year: 1995

Sammenligning af danske og svenske vinduer i torsketrawl i Østersøen

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Moth-Poulsen, T. (Ekstern), Knudsen, L. (Ekstern), Madsen, N. (Intern)
Number of pages: 18
Publication date: 1995

Publication information
Place of publication: København
Publisher: Ministeriet for Landbrug og Fiskeri
Original language: Danish
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259115
Publication: Research › Report – Annual report year: 1996

Alternative methods to improve selectivity of towed fishing gears: Report for the European Commission, DG 14

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern)
Publication date: 1994

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 281528
Publication: Research › Report – Annual report year: 1994
Measurements of the selectivity of Nephrops and demersal roundfish species in conventional and square mesh panel codends in the northern North Sea

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Moth-Poulsen, T. (Ekstern)
Publication date: 1994

Host publication information
Title of host publication: ICES C.M.
Volume: B:14
Place of publication: Copenhagen
Publisher: International Council for the Exploration of the Sea
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 259073
Publication: Research › Article in proceedings – Annual report year: 1994

Selectivity in Danish conventional and square mesh panel codends during Nephrops sea trials in the northern North Sea

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Madsen, N. (Intern), Moth-Poulsen, T. (Ekstern)
Publication date: 1994

Host publication information
Title of host publication: Proceedings
Main Research Area: Technical/natural sciences
Conference: ICES FTFB meeting, Montpellier, France, 01/01/1994
Source: orbit
Source-ID: 281524
Publication: Research › Article in proceedings – Annual report year: 1994

Selectivity in standard and square mesh Nephrops trawls: Report for the Commission

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Moth-Poulsen, T. (Ekstern), Madsen, N. (Intern)
Publication date: 1993

Publication information
Original language: English
Series: EEC study
Number: 1992/4
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 281529
Publication: Research › Report – Annual report year: 1993

Selectivity in standard and square mesh Nephrops trawls

General information
State: Published
Organisations: Section for Management Systems, National Institute of Aquatic Resources
Authors: Moth-Poulsen, T. (Ekstern), Madsen, N. (Intern)
Number of pages: 35
Publication date: 1992

Publication information
Discard survival (DISCO) (39152)
This project has developed methods and accumulated competencies and facilities, to be able to estimate discard survival and generate knowledge about the factors that affect this. The focus was on two commercially important species, plaice and Norway lobster. These species are relevant because there is a likelihood of a substantial survival.

The first trial was conducted from November to March from a less commercial trawler with Hirtshals as port. There was fishing for plaice with a consumption trawls and towed time was 3 hours. Test plaice were collected at four different time periods exposed to air on the deck, with a half-hour intervals up to one and a half hour. Furthermore, control plaice were collected from hauls with short duration. Plaice was stored in tanks on the vessel and transported to storage tanks on land at the North Sea Science Park in Hirtshals. Here, they were observed for 10 days. On the vessel were also carried out tests of reflexes and damage. The overall mortality rate increased by residence time on the deck of 0% and up to 24% after one and a half hours on the deck. The total mortality was estimated to 11%. Most plaice was above the minimum landing size. Reflexes decreased with increased time on the deck. There was no mortality in the control group. There were also carried out measurements of physiological stress indicators comparing with a reference group.

Another plaice study was conducted in Norway lobster fishing from Skagen in June and July from the same vessel. The plaice was stored in the same way at the vessel as the first experiment, and was transported in a pickup from Skagen to observation side in Hirtshals. Most plaice was below the minimum size. Mortality was totally 86% for test plaice and 0 % to 16 % for the control groups.

A final test was conducted to determine the mortality of lobsters. It was estimated to be from 100 % to 52 % of the individual hauls. Overall the mortality was 84% after 8 days here except experiments where the refrigertated container was not functioning. Had these individuals been included, the mortality would have been lower. However, there were also deaths in the control group (total 18%) and generating more uncertainty for the estimates.

This 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).

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Period: 01/03/2014 → 23/05/2015
Number of participants: 3
Research areas: Fisheries Technology & Aquaculture
Project participant:
Methling, Caroline (Intern)
Skov, Peter Vilhelm (Intern)
Project Coordinator:
Madsen, Niels (Intern)
Project

Environmentally friendly fisheries (Skånfisk) (39161)
The project consists of two sub-projects:

Ecosystem Approach to Danish gill- and trammel nets
Although the fleet has reduced since the mid-1990s, Danish gill- and trammel nets are still of importance and are likely to gain increasing interest as environmentally friendly practices. However, such a development may only happen if the ecosystem approach is guaranteed. There is limited knowledge about ecosystem impacts, such as for example physical damage to habitats or discards, and their minimization may require development of alternative practices. With regard to the upcoming challenges of an Ecosystem Approach to Fisheries, the project aims at (1) studying the sweeping behavior of nets and their effect on the seabed; (2) quantifying invertebrates and fish discards and understanding how the capture
process can influence discard behavior; (3) developing technical innovation that could improve catch quality and therefore maximize the production. Trials are conducted on gill- and trammel nets within the Danish coastal waters.

**Danish seine - ecosystem effects of fishing**

The amount of scientific studies on Danish seining is rather low. Therefore, the current study “Danish seine – Ecosystem effects of fishing” investigates various topics to increase the knowledge of impacts, Danish seines have on the environment and further to give advices to potentially improve selectivity characteristics and efficiency of the gear. We compared catch profiles of Danish seines and bottom trawls based on a perennial observer dataset. Furthermore, we carried out two sets of experimental trials on commercial vessels. The first set in 2014 looked at codend selectivity as well as direct interactions the gear has on the benthic and demersal fauna. The second set of trials in 2015 allowed us to create detailed descriptions of the fishing process in terms of geometry and forces acting between net and ropes and furthermore, to evaluate the behavior of fish in relation to the gear and to evaluate impacts of the gear on the sea bottom.

This project is coordinated by DTU Aqua.

The project is funded by the Danish Ministry of Food, Agriculture and Fisheries through a special governmental Funding for sustainable fisheries (”Bæredygtighedspuljen”).

**National Institute of Aquatic Resources**

Section for Ecosystem based Marine Management  
Period: 01/01/2014 → 31/03/2017  
Number of participants: 4  
Research area: Fisheries Technology  
Project participant:  
Krag, Ludvig Ahm (Intern)  
Phd Student:  
Savina, Esther (Intern)  
Noack, Thomas (Intern)  
Project Coordinator:  
Madsen, Niels (Intern)  
Project

**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 Nephorps 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).
Efficient and low impact gear in the Danish fishery for industrial species (GUDP Tobis) (38849)

The aim of the project was to ensure the future of the Danish industrial fisheries in the increasing demands for reduced environmental impact. The Danish industrial fisheries amount to around 800 million DKK a year in first value. The industrial fishing for sandeel, was seen threatened by a potential ban against bottom trawling in the main fishing areas at Dogger Bank in the North Sea, due to appointment of a large Natura 2000 area by UK, the Netherlands and Germany where bottom trawl could be considered to affect the conservation status of the sand habitat negatively. In addition profitability was threatened by the high vessel operating cost, considering fuel prices at the time.

The objective was to develop and document a fishing method for industrial fisheries (sandeel, Norway pout and sprat) where the trawl doors don't have bottom contact and where modern materials are used in the gear and for the wire. Thus, compared to traditional gear, an overall energy saving of minimum 30% on each kg fish caught was expected, and also the damages on the benthic fauna was expected to be reduced or eliminated.

The new pelagic gear was constructed according to specifications. It behaved as intended and could easily be operated on Dogger Bank. The new gear consisting of pelagic doors and Dynema equipped trawl has attracted considerable attention among fishers and can be considered a business success. Catch volumes (tons/hour) did not differ between the experimental and standard trawl under parallel fishing. Sandeel behavioral differences could not be identified from sonar and UV-camera recordings, and size and oil content of sandeels was not systematically different between the two gears. Calibration experiments demonstrated 24 % lower fuel consumption in the new trawl.

Bottom surveys were carried out annually from 2012 to 2014 in the North-eastern part of Dogger Bank (in the Dutch/NL EEZ) at approximately 35 meters depth. Sediment analyses showed a grain size composition dominated by fine sand mixed with small amounts of gravel, whereas fine particles comprises 1 % maximum ideal as a sandeel habitat. Grain size composition was not altered by trawling or time.

Bottom impact with new gear is estimated to be 30 % reduced compared to a similar trawl using conventional doors. Based on the side-scan sonar recordings it was not possible to distinguish differences between the two trawl types in sediment depth penetration. The foot prints left by both sandeel trawls in one year were not discernible in subsequent years. Results from the video record analyses showed especially conch and hermit crabs were more abundant soon after trawling compared to before impact. The sediment analyses revealed nearly 100 different invertebrate species many of which lives burrowed or tube building in the sand. Overall diversity did not differ significantly between transects trawled by the two gears and the non-trawled transect. Detailed analyses showed, however, that some species (fragile sea anemones, polychaetes and echinoderms) were less abundant after impact from the conventional trawl compared with the newly-designed trawl and the control transect. A few species were more abundant in the transect trawled by the conventional trawl, including some smaller crustaceans. These results suggest the newly-designed sand eel trawl has a lower impact on benthic fauna than the conventional trawl and we expect the final analyses will support these results.

The project is coordinated by DTU Aqua.

The project was funded by the Danish Ministry of Food, Agriculture and Fisheries through the Green Development and Demonstration Program (GUDP).
Collaboration between the scientific community and the fishing sector to minimize discards in Baltic cod fisheries (38918)

The main aim of this study was to identify technical solutions, both economically and biologically sustainable, to mitigate the discards of cod in the Baltic Sea cod fishery.

The aim of the project was divided into three main tasks:

- Assessing the present knowledge on discards and causes of discards in the Baltic cod fishery, and exploring the temporal and spatial distribution patterns of discard sensitive size classes of cod and of the fishery effort.
- Identifying technical solutions and suggesting final technical measures to further mitigate discards in the trawl fishery for Baltic Sea cod.
- Evaluating the possible impacts of the proposed technical solutions and technical measures on the stock and on the economy of the fisheries concerned.

These tasks were undertaken through a desktop study, a technical study and an impact study.

In order to engage trawl fishermen in the project, a questionnaire was sent in spring 2012 to active fishermen in Sweden, Denmark, Germany and Poland. The aim was to establish a dialogue with the industry on selectivity, gear selection, discard patterns and management options, and to collect their views, problems and potential solutions to mitigate discards. This questionnaire was the basis for further discussions with the industry during a workshop.

This project was coordinated by Swedish University of Agricultural Sciences.

The project was funded by EU, Calls for proposals/tenders (Mare/2010/11 LOT 1 programme).

Design optimization of SELTRA 180 (38908)

After implementation, the industry was concerned that a newly developed selective codend (SELTRA codend) was causing relative large losses of the economically important Nephrops. The aim of the project was to optimize the geometry
of a 2-panel and 4-panel version of the SELTRA codend through extensive monitoring of their global geometry in the flume tank in Hirtshals. The global geometry was monitored with optic stereo-system techniques over a gradient of catch weights. The final design was demonstrated in the flume tank for the industry for further discussion. The project delivered detailed design specifications for the Nephrops fishery in Kattegat. Further, the test conducted in the project delivered a detailed understanding of the effect of changing design parameters like panel construction, sevegedes, codend construction (number of panels, meshes in circumference, tension lines during the catch build-up).

The changes in the design is today implemented in the technical legislation in the Kattegat and Skagerrak and there were no problems or difficulties raised by the industry during the commercial take-up process.

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).
Management of fisheries in harbour porpoise (Phocoena phocoena) marina protected areas

National Institute of Aquatic Resources
Period: 01/05/2010 → 02/09/2015
Number of participants: 7
PhD Student:
Kindt-Larsen, Lotte (Intern)
Supervisor:
Northridge, Simon (Ekstern)
Stage, Bjarne (Intern)
Main Supervisor:
Larsen, Finn (Intern)
Examiner:
Madsen, Niels (Intern)
Macleod, Kelly (Ekstern)
Read, Andrew Justin (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: 1/3 FUU, 1/3 inst 1/3 Andet
Project: PhD

Bycatch and discards: Management indicators, trends and location (BADMINTON) (38714)
In the EU there is intensive data collection of by-catch and discard onboard commercial vessels, but until now there have been few attempts to describe the general patterns in these data, and still less to understand the factors that determine what and how much is discarded. However, the latter step is key if we are to develop operational indicators and propose mitigation tools for fisheries management. There is especially a need to investigate the effectiveness of mitigation methods that have been implemented in the past, primarily as technical regulations, including gear modification. This has to be done at the scale of the fishery: many gear modifications showed to make a difference in field trials, however there have been few studies about the way fishers used these modified gears, and the real impact it had on catch and discards on the fleet scale.

The project developed along five main steps:
- A descriptive analysis of total catch in terms of species and size composition, based on the data collected onboard EU vessels under the Data Collection Regulation. This included a quantification of spatial and temporal distribution and abundance of discards.
- The development of indicators of discard issues: indicators of discard state (amounts and characteristics of discards), of the pressures that determine discards (selectivity of fishing), and of the management responses to this issue.
- An analysis of the factors that determine discard amounts, including environmental settings, year-class strength, community composition, and fishing practices. This included an examination of the efficiency of technical regulations currently in force, and retrospective analyses of the efficiency of such measures in the past.
- An analysis of socio-economic and institutional drivers and incentives that influence fishers’ behaviour in regard to selectivity and discard.
- Based on all previous steps, the elaboration of potential mitigation measures. Beyond technical measures, integrated approaches that will remove or at least reduce incentives to discard were explored.

The project was coordinated by Hellenic Centre for Marine Research, Greece.

The project was funded by EU, MariFish, ERA-NET.
Development and test of a sorting grid for the fishery on Norway lobster (38742)

Goal of the project was to develop and test a sorting grid for the Norway lobster fishery in Kattegat and Skagerrak, with the aim to improve both the size selectivity for Norway lobster and allow high escapement of cod. A second requirement was, that the sorting can be deployed from smaller vessels and is easy to handle.

Within the project, a flexible sorting grid was developed which can be hauled directly on the net-drum and can be handled on small fishing vessels. The grid was designed and tested with different set-up of bars and colors.

As an alternative for a sorting grid, a sorting frame was developed to be inserted in the upper panel of the cod end was tested in comparison.

The project is coordinated by DTU Aqua.

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

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

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

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

The project is coordinated by DTU Aqua.
National Institute of Aquatic Resources
Section for Marine Ecology and Oceanography

Danish Fishermen's Association
Period: 01/01/2010 → 30/09/2012
Number of participants: 13
Research area: Marine Populations and Ecosystem Dynamics
Project participant:
Andersen, Niels Gerner (Intern)
Pedersen, Eva Maria (Intern)
Andersen, Bo Sølgaard (Intern)
Hüsey, Karin (Intern)
Kristensen, Kasper (Intern)
Nielsen, Anders (Intern)
Stage, Bjarne (Intern)
Mosegaard, Henrik (Intern)
Christensen, Asbjørn (Intern)
Mariani, Patrizio (Intern)
Madsen, Niels (Intern)

Project Manager, academic:
Beyer, Jan (Intern)
Wieland, Kai (Intern)

Project Selective trawls for the North Sea (38740)
The goal of the project was to design, develop and test a selective trawl, which reduces the by-catch of cod, while still retaining high catch rates of flatfish, Norway lobster and anglerfish. A second requirement was that the trawl should be simple and fast to deploy and recover.

The project tested different possibilities to improve the selectivity of a cod end with a 140 mm sorting panel, as implemented in the fishing regulations. This included changes in mesh size of the panel and changes in panel position.

For different combinations of panel mesh sizes and panel positions, size selectivity functions were determined, to allow for designing the optimal configuration for different mixed fisheries.

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).
National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Danish Fishermen's Association
SINTEF
Cosmos Trawl A/S
Period: 01/01/2010 → 31/12/2011
Number of participants: 1
Research area: Fisheries Technology
Project Manager, academic:
Madsen, Niels (Intern)

Project Discard and identification of possible mitigation tools
National Institute of Aquatic Resources
Test and demonstration of a selective topless trawl (38699-1)
The cod stock in Kattegat was at a critical level and ICES recommended a 0-TAC for cod. In the economically important fishery for primary Nephrops and flatfish in Kattegat cod were caught as by-catch. The aim of the project was to develop and test a cod selective topless trawl design in the Nephrops directed fishery in Kattegat to allow an economically feasible fishery with a minimal by-catch of cod. The design idea was based on utilizing behavioral differences between the species, specifically that most fish stay low in the trawl, whereas gadoids like cod raise further aft in the gear and therefore can escape above the cut-back headline. The top of the trawl was cut 10-20 meters back, which allowed cod to escape above the headline. The catch of flatfish and Nephrops were not expected to be affected by the change in design due to their strong preference for the lower part of the gear. The results of the project led to the implementation of a topless trawl design into the technical legislation in Kattegat. 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).

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Danish Fishermen's Association
Period: 01/01/2009 → 31/12/2010
Number of participants: 3
Research area: Fisheries Technology
Project participant:
Madsen, Niels (Intern)
Jensen, Jan (Intern)
Krag, Ludvig Ahm (Intern)

Development of fisheries with minimized emission of greenhouse gases (38686)
Identification of methods and prioritization of areas for actions of minimizing greenhouse gas emissions, optimizing fuel consumption and, thus, improve the economy and reducing the environmental effects of fishing on marine habitats. The focus is on fishing with trawls. Two different strategies (work packages) are considered in the project:

1) Development of new and more energy efficient trawls: This work package targets the development of trawl design with improved relationship between capture efficiency and/or catch value in relation to energy use for towing the gear. In this work package we apply an internationally developed computational model based on fluid mechanics and finite element methods and models to predict the capture efficiency of trawl. Through computer simulations we investigate the predicted ratio between catch value and fuel consumption for different trawl designs. These simulations are accordingly applied to identify the most favorable trawl design with optimized value of the catch in relation to the fuel consumption to tow the trawl. Through international cooperation, we also experimentally examine the consequences on catch efficiency of applying high strength thin twine netting with low drag in sections of trawls.

2) Fisheries tactics and management in relation to energy efficiency in fisheries effort allocation for different fisheries: This work package analyze management options for different types of fisheries, to investigate opportunities and incentives to
achieve the same value (and catch) in fisheries with less effort or re-allocation of effort and consequently less fuel consumption. Advanced computer based bio-economic fisheries simulation models are developed and used in fleet and stock-based scenario analyses for energy efficiency in fishery by integrated evaluation of fishing effort, catch, catch composition and utilization, economics, and fuel consumption under given effort allocation schemes. This involves development and implementation of a generic bio-economic Individual Based Model (IBM) that works on individual vessel basis and which can simulate multi-stock-multi-fleet (mixed) fisheries and evaluate on a scale of very high resolution in time and space. This computer based management evaluation tool and simulation model can evaluate economic cost-benefits, biological impacts according to fish stock sustainability, as well energy efficiency according to catch in weight and value per fuel volume consumed and/or in relation to total fuel costs for different management scenarios. The implementation of the IBM model involves additionally development of advanced statistical and computer based models and methods for coupling information from logbook databases with information from VMS tracking (satellite monitoring) databases on vessel and fishing trip basis. Furthermore, it involves development of a web-based questionnaire and platform to obtain information from the Danish fishery on cost dynamics with focus on fuel costs and effort allocation.

The project is coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
IFREMER
Johann Heinrich von Thünen-Institute
Technical University of Denmark
Period: 01/01/2008 → 31/12/2012
Number of participants: 7
Research area: Fisheries Technology & Fisheries Management
Project participant:
Krag, Ludvig Ahm (Intern)
Bastardie, Francois (Intern)
Andersen, Bo Sølgaard (Intern)
Eigaard, Ole Ritzau (Intern)
Madsen, Niels (Intern)
Project Manager, academic:
Herrmann, Bent (Intern)
Nielsen, J. Rasmus (Intern)

Scientific advice concerning the impact of the gears used to catch plaice and sole (GUPS) (38115)
The aim of the project was to:
- collect information on the fishing fleets that target plaice and sole in the North Sea
- collect information on the main fish stocks and ecosystems impacted by these fleets
- evaluate the performance of these fleets in terms of economic, ecological and social sustainability
- list the problem fisheries-list alternatives that reduce adverse impacts
- estimate the improvement in economic, ecological and social terms caused by adopting these alternatives.

The work program was structured into four tasks:

In Task 1, basic data were collected on fleets and effort, fish stocks, discards and selectivity. The scientific and grey literature, project reports and existing databases was consulted to collect the basic information. This information was aggregated along a common methodology. Sub-fleets or métiers were defined and an evaluation was made of the performance of the different fleets in economic, ecological and social terms.

In Task 2, the critical effects on the marine environment was identified for the different fisheries evaluated in Task 1. Based on comparative indicator tables, the problem areas were listed in order to best focus the review and selection of alternative gears and vessels.

In Task 3 a review was made of possible ways to reduce the adverse effects by fisheries selected in Task 2. These were technical alterations to existing gears, alternative fishing methods for vessels designed for a specific method or fishing methods not yet applied on a large scale in the North Sea.

In Task 4, predictions were made on the effects of a possible modification of existing sole and plaice fisheries in the North Sea based on the following criteria:
- possible reduction in discards through an improved selectivity-benefits for the spawning stock biomass and the landings
- reduction in the environmental impact of the fishing activity
improvement of the socio-economic performance of fishing fleets.

Based on the results obtained in Task 4, conclusions and recommendations were formulated on the feasibility and effectiveness of the alternatives for existing fisheries targeting sole and plaice in the North Sea.

The project was coordinated by Institute for Agricultural and Fisheries Research (ILVO), Belgium.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Institute for Agricultural and Fisheries Research
Cefas
Wageningen IMARES
Agricultural Economics Research Institute

**Development of selective trawls for important Danish fisheries (4313)**

The project was structured in following sub-projects:

1) Development of a North Sea haddock trawl: to design a trawl with reduced by-catches of cod.
2) Improved size-selection of the Norway lobster trawl used in Kattegat: to reduce the catch of undersized Norwegian lobster.
3) Improved species-selection in Norway lobster trawl used in Kattegat: to design a trawl that selectively catches Norway lobsters while letting cod and other unwanted by-catch escape.
4) Improved size selection in Baltic cod trawls: test of T90 meshes in the cod end in comparison to BACOM trawl.

The cod stock in the North Sea is on a low level, with little signs of recovery during the most recent 20 years. By-catch of cod in different fisheries is a problem at this low stock size and therefore technological modifications of gears used in fishing fleets with significant by-catch of cod are requested. Sub-project 1 aimed at the development of a haddock trawl with reduced catchability of cod. Making use of the different behavior of haddock and cod during the catching process, modifications of the trawl groundrope were tested for their effect on cod catchability.

The Norway lobster population in the Kattegat is doing well, and the Norway lobster fishery is the most economically important fishery in the Kattegat. However, there is a substantial catch of undersized Norway lobster in the fishery and improving the size selectivity of the trawl in use was the goal of sub-project 2. This included designing and testing of different mesh sizes and sorting mechanisms.

In contrast to Norway lobster, the cod population in Kattegat has declined severely in the last 20-30 years. Without reducing the by-catch of cod through a more selective trawl, the Norwegian lobster fishery would have to be reduced significantly in order to protect the cod. Within sub-project 3, the aim was to develop a trawl with significantly improved selectivity, allowing enhanced escapement of cod. The traditional round cod end was replaced with a cod end shaped like a square mesh box. This box proved to be more stable in the water enabling to take advantage of the different behavior of cod and Norway lobster. While cod tend to move up-wards in the tunnel of a cod-end, Norway lobster remains passive at the bottom. Placing a 180 mm escape panel into the upper panel of the box, allowed to improved escapement of cod.

A simple way to increase the mesh opening in a cod-end is to turn the mesh 90° (T-direction, henceforth T90) because the knots will determine the initial mesh bar angle. A T90 cod end was introduced in the legislation for the Baltic Sea cod fishery and the aim of sub-project 4 was to test for differences in cod selectivity in comparison to the standard BACOM (having a sorting window in the top-panel of the cod end).

The project was coordinated by DTU Aqua.

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

Different fishing companies and net producers

**Project**
Management plans and Danish fishery (2245)
The objectives of the project were with reference to the EU Commissions proposals on multi-annual management plans, to deliver high quality advice on management of the fishing effort in Danish fisheries in the Baltic Sea, the North Sea, the Skagerrak and the Kattegat.

To be able to deliver the advice the project addressed the need for detailed and accurate data on catches, effort and economical performance in the main demersal Danish fisheries in the concerned areas and the need for accurate stock assessment of the economically most important fish and shellfish stocks. The project also developed a systematic method to give a qualified prediction of the selectivity of a trawl based on information on the trawl design.

The project included seven work packages: (i) Description of development in catches, fishing effort and economical performance of the main demersal Danish fisheries including creation of a single database; (ii) Develop a reference fleet system to collect detailed information on catches and fishing effort; (iii) Development of a software to be used to simulate trawl selectivity; (iv) Establish a fisheries independent monitoring survey on Norway lobster in the Skagerrak and the Kattegat; (v) Provide advice on a fishing effort management system for the demersal fisheries in Kattegat including proposal for enhancement of the cod selectivity in trawl fisheries; (vi) Provide advice on fishing effort in form of days at sea by métier; and (vii) Evaluate the impact of the effort management system in the Baltic Sea on the Danish fishery and the stocks.

The project was coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
University of Copenhagen
Period: 01/01/2006 → 31/12/2008
Number of participants: 13
Research areas: Fisheries Management & Fisheries Technology
Project participant:
Munch-Petersen, Sten (Intern)
Madsen, Niels (Intern)
Bastardie, Francois (Intern)
Pedersen, Eva Maria (Intern)
Christensen, Steen (Ekstern)
Project Manager, academic:
Kirkegaard, Eskild (Intern)
Andersen, Bo Sølgaard (Intern)
Jørgensen, Ole A. (Intern)
Herrmann, Bent (Intern)
Storr-Paulsen, Marie (Intern)
Dalskov, Jørgen (Intern)
Nielsen, J. Rasmus (Intern)
Krag, Ludvig Ahm (Intern)

Nephrops and cetacean species selection information and technology (NECESSITY) (38623)
The project objectives were to develop effective and acceptable:
- gear modifications (by-catch reduction devices) and alternative fishing tactics in cooperation with the fishing industry to reduce the by-catch and mortality of non-target fish species in European Nephrops fisheries, and determine the biological effects and socio-economic repercussions of using these.
- gear modifications (by-catch reduction devices and acoustical deterrents) and alternative fishing tactics in cooperation with the fishing industry to reduce the by-catch and mortality of cetaceans in European pelagic fisheries, and determine the biological effects and socio-economic repercussions of using these.

With specific objectives:
- To develop novel species-selective gear prototypes and alternative fishing tactics in cooperation with the fishing industry for use in the European Nephrops fisheries.
- To review the current status of knowledge of cetacean by-catches in pelagic fisheries, using existing data sources and oncoming data collection programmes, and to collect additional biological data (age, year of maturity, causes of death) of landed cetaceans.
- To develop novel species-selective gear prototypes and alternative fishing tactics in cooperation with the fishing industry
for pelagic trawl fisheries where cetaceans by-catch may occur (pair trawling on bass, pair trawling on albacore, single boat and pair pelagic trawling on herring, mackerel and horse mackerel, fishery with high opening bottom trawls and midwater pair trawls on hake).
- To compare the effectiveness of commercial available acoustic deterrents (pingers) on cetaceans.
- To develop an interactive pinger in cooperation with a manufacturer.
- To evaluate the potential biological and economic impacts of the technologies and tactics developed above.
- To disseminate the results to relevant sectors in the fishing industry, and contribute to implementation of the technologies and tactics developed above.

In total there are 22 partners in the project. The project is coordinated by Wageningen University, The Netherlands.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Period: 01/01/2004 → 31/12/2007
Number of participants: 1
Research area: Fisheries Technology
Project Manager, academic:
Madsen, Niels (Intern)

Test and demonstration of a selective Nephrops trawl (4307)
This aim of this project was testing a newly developed and more selective fishing gear onboard a smaller vessel in the Danish Nephrops directed fishery in Kattegat and Skagerrak. The selective effect of different selective devices can vary with the type and size of the vessels using the gear. The Danish fleet operating in Kattegat and Skagerrak covers very different vessels, both with regards to size and type. The aim of this project was to test the applicability of a selective sorting panel, developed and tested on larger vessels using larger trawls, on a small vessel and compare selective effect across different vessel sizes.

The project was coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Danish Fishermen's Association
Period: 01/01/2004 → 31/12/2005
Number of participants: 3
Research area: Fisheries Technology
Project participant:
Madsen, Niels (Intern)
Frandsen, Rikke (Intern)
Project Manager, academic:
Krag, Ludvig Ahm (Intern)

Research on effective cod stock recovery measures (RECOVERY) (4304)
The cod stock in some European waters is at critical levels. The project aimed at developing more selective gears for the three most relevant fisheries that take cod with the highest number of discards and total catches. The otter trawl (and seine) fishery has the highest catches of cod and greatest level of discard of all fisheries, followed by the beam trawl fishery. The Nephrops fishery has a high discard rate and this is a fishery which the fleet often will switch to when fisheries for fish species are restricted. The main objective was to develop novel species-selective gear prototypes for the three prominent mixed-species demersal trawl fisheries in the North and Irish Sea, where cod is an important catch component. The development of novel species selective fishing gears is intended to reduce the fishing mortality rate on cod of all ages/sizes, to enhance the recovery of cod stock, and at the same time permit the continued exploitation of other species taken in the same fisheries as cod.

The project was coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management
Wageningen IMARES
Sea Fish Industry Authority
An assessment of mortality in fish escaping from trawl cod ends and its use in fisheries management (SURVIVAL) (4305)

The survival of fish escaping from towed fishing gears is essential if selective devices are to be used as a practical conservation tool. Several studies have attempted to test this principle and assess the mortality of escaping fish. Unfortunately, these early endeavours have been shown to be fundamentally flawed in methodology so there are currently no reliable estimates of escape mortality. This project developed methods for accurate assessment of escape mortality. The work covered development of techniques to sample fish escaping from a trawl cod end, without introducing biases into the mortality estimates. These techniques were then applied in the field to estimate mortality in cod and haddock under various circumstances including escape at depth and surface, in high intensity fisheries and at different times of the year.

The objectives of the project were:
- to develop sampling techniques that overcome current biases in escape mortality estimation
- to test these techniques directly against previous protocols in order to establish the validity of the new methods
- to develop a methodology to compare the cod end selectivity, and survival, of gadoid fish escaping at the surface in a side-trawler fishery with that of fish escaping at depth
- to estimate the number of repeated encounters with trawls on intensively fished grounds
- to study the effect of repeated gear encounters on escape mortality
- to determine if gadoid escape mortality varies throughout the year and identify its cause
- to report the project work and results to the fishing industry, the public and the European Commission.

The contribution of DTU Aqua centered around:
- testing the validation of the new cover design against previous designs
- investigating the seasonal variation in escape mortality of gadoids through surface selectivity
- investigating the seasonal variation in total escape mortality.

The project was coordinated by Institute of Marine Research, Norway.