Reducing the impact of blue mussel (Mytilus edulis) dredging on the ecosystem in shallow water soft bottom areas

Dredging blue mussels (Mytilus edulis) and thus removing structural elements, inducing resuspension of sediment as well as reducing filtration capacity, will inevitably affect the ecosystem. The study demonstrates that the impacts of fishing can be reduced through gear developments. A new light dredge was tested on commercial vessels using two different experimental setups. First, a twin haul experiment tested the standard gear (i.e., a Dutch dredge) against the light dredge by fishing the two gears side by side onboard the same vessel. Second, a single dredge experiment tested the absolute performance of the two gears by fishing in areas with a known blue mussel density. Results from the twin haul experiment demonstrate that the weight of sediment retained in the gear per square metre fished is 49% less in the light dredge compared with the Dutch dredge which will reduce resuspension of sediment at the surface. Also, the drag resistance of the light dredge was significantly less (177.1 vs. 202.7 kg m⁻¹). In the twin haul experiment no significant difference was found in the catch per unit effort (CPUE) of the two gears. The single dredge experiment, on the other hand, demonstrated a significant increase in CPUE exceeding 200% when using the light dredge. Seafloor tracks made by the two dredges could not be distinguished by use of side-scan sonar and the tracks were still detectable 2 months after fishing. It was concluded that replacement of the Dutch dredge with the light dredge would reduce the impact of the fishery on the ecosystem by (i) reducing resuspension of sediment, (ii) reducing fuel consumption, and (iii) potentially reducing energy transfer to the sediment through a reduced gear drag resistance. A potential increase in catch efficiency may reduce the area affected. Fishing with the light dredge is discussed in relation to management of Natura 2000 sites.
General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Shellfish Centre, Section for Marine Living Resources, Section for Maritime Service, NIRAS A/S, Orbicon
Authors: Frandsen, R. (Intern), Eigaard, O. R. (Intern), Poulsen, L. K. (Ekstern), Tørring, D. B. (Intern), Stage, B. (Intern), Lisbjerg, D. (Intern), Dolmer, P. (Ekstern)
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Scopus rating (2016): CiteScore 2.5 SJR 1.099 SNIP 1.018
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BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.983 SNIP 1.196 CiteScore 1.99
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.116 SNIP 1.009 CiteScore 1.95
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Scopus rating (2009): SJR 0.824 SNIP 0.903
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Scopus rating (2007): SJR 0.802 SNIP 0.948
Scopus rating (2006): SJR 0.833 SNIP 0.928
Scopus rating (2005): SJR 0.81 SNIP 0.981
Scopus rating (2004): SJR 0.634 SNIP 1.333
Scopus rating (2003): SJR 0.606 SNIP 0.656
Scopus rating (2002): SJR 0.566 SNIP 0.593
Scopus rating (2001): SJR 0.571 SNIP 0.753
Scopus rating (2000): SJR 0.757 SNIP 0.784
Scopus rating (1999): SJR 0.545 SNIP 0.94
Original language: English
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Fiskeriforvaltning i Natura 2000 områder

General information
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Fiskeriets påvirkning af naturtypen 'Rev' (1170) i Natura 2000 området i Lillebælt

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Research Secretariat, Danish Shellfish Centre
Authors: Christoffersen, M. O. (Intern), Dinesen, G. E. (Intern), Geitner, K. (Intern), Stenberg, C. (Intern), Lisbjerg, D. (Intern), Dolmer, P. (Intern)
Publication date: 2013
Event: Abstract from 17. Danske havforskermøde, Roskilde, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2013

Kulturbankeprojekt med udlægning af blåmuslinger produceret på langline

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Ecosystem based Marine Management, Research Secretariat, Section for Marine Living Resources, DHI Denmark, Danish Shellfish Centre, University of Copenhagen
Authors: Dolmer, P. (Intern), Christensen, H. T. (Intern), Christoffersen, M. O. (Intern), Hansen, F. T. (Ekstern), Møhlenberg, F. (Ekstern), Lisbjerg, D. (Intern), Stage, B. (Intern), Landes, A. (Intern), Nielsen, P. (Intern), Tørring, D. (Ekstern)
Number of pages: 29
Publication date: 2013

Design of integrated survey systems to provide high quality, low-cost data for marine management.

General information
State: Published
Organisations: Section for Vessels, National Institute of Aquatic Resources, Section for Management Systems
Authors: Stage, B. (Intern), Lundgren, B. (Intern), Lisbjerg, D. (Intern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 274923
Publication: Research › Poster – Annual report year: 2011

High-resolution geo-coded mapping of shallow-water benthic ecosystems using a towed video-array: A pilot experiment

General information
Habitat mapping as part of an ecosystem-based approach to management of coastal waters

General information
State: Published
Organisations: Research Secretariat, National Institute of Aquatic Resources, Section for Fisheries- and Monitoring Technology
Authors: Lisbjerg, D. (Intern), Pham, A. H. (Intern), Stæhr, K. (Intern), Stage, B. (Intern), Lundgren, B. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 253074
Publication: Research › Poster – Annual report year: 2009

Biologiske effekter af råstofindvinding på epifauna

General information
State: Published
Organisations: National Environmental Research Institute
Authors: Lisbjerg, D. (Intern), Petersen, J. K. (Intern), Dahl, K. (Ekstern)
Number of pages: 56
Publication date: 2002

Publication information
Publisher: Danmarks Miljøundersøgelser Miljøministeriet
Original language: Danish
Series: Faglig rapport fra DMU
Number: 391
Main Research Area: Technical/natural sciences
Publication: Research › Report – Annual report year: 2002

Biologiske effekter af råstofindvinding

General information
State: Published
Authors: Stage, B. (Intern), Lundgren, B. (Intern), Pedersen, E. M. (Intern), Lisbjerg, D. (Intern)
Publication date: 2011
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 274922
Publication: Research › Poster – Annual report year: 2011
Feeding activity, retention efficiency, and effects of temperature and particle concentration on clearance rate in the marine bryozoan *Electra crustulenta*

Various factors influencing clearance rate were elucidated on the bryozoan *Electra crustulenta* (Pallas). Measurements of clearance rates were performed using the algae *Rhodomonas* sp. (6 µm in diameter). Clearance rates were related to the area of the active zooids within the colonies in order to obtain area-specific clearance rates. Specific area was 42 % of the total colony area. Several replicates were performed with each colony to obtain maximum clearance rate (F-max). F-max increased with temperature from 90 ml h(-1) cm(-2) at 6 degreesC to 229 ml h(-1) cm(-2) at 22 degreesC. Clearance rate decreased at increasing algal cell concentration from 1600 to 19 000 cells ml(-1). The decrease in clearance corresponded to a maximum ingestion rate at particle concentrations > 8500 *Rhodomonas* sp. cells ml(-1). *E. crustulenta* zooids are capable of retaining and ingesting particles in the range from ca 5 to ca 30 pm in diameter. Smaller particles are less efficiently retained due to the structure of the feeding apparatus, the lophophore and larger particles due to the size of the mouth (30 pm in diameter). Feeding activity was observed on single zooids and it was found that zooids have periodical retraction of the lophophore. At low particle concentrations (ca 1500 cells of *Rhodomonas* sp, ml(-1)) the lophophore is retracted 5 x h(-1) for periods of 38 s. Zooidal activity measured as the time of protruded lophophore thus leads to an activity of 95 % of the total time. At high algae concentrations, zooidal feeding activity decreased to 70 % as the lophophore was retracted more frequently (10 x h(-1)) and for longer periods of time (107 s). Despite the decreased activity at high algae concentration, this could only account for 50 % of the decrease in clearance rate. Thus, regulatory mechanisms of the clearance rate other than retraction of the lophophore must be considered in bryozoans.
Clearance capacity of Electra bellula (Bryozoa) in seagrass meadows of Western Australia

Filtration rates were measured as the clearance of algal cells (Rhodomonas sp.) in the laboratory for the bryozoan Electra bellula (Hincks). The colony clearance rates were related to both total and specific (active) area of the colony, and a closer correlation was obtained when relating clearance to specific area. All results were therefore related to specific colony area. On average 49% of total colony area had active zooids. Clearance rates were measured at temperatures ranging from 16 to 24 degrees C. Maximum specific clearance rates (F-max) were from the 2-3 replicates with the highest specific clearance rates out of 3-8 experiments performed with each colony. F-max varied from 69 ml h(-1) cm(-2) at 16 degrees C to 107 ml h(-1) cm(-2) at 24 degrees C. Highest F-max of 115 ml h(-1) cm(-2) was measured at 20 degrees C. Dry weight (DW) related to total area by W-DW = 5.15 mg cm(-2) and ash-free dry weight (AFDW) by W-AFDW = 1.15 mg cm(-2). F-max = 9.5 1h(-1) g(-1) DW and 43 1h(-1) g(-1) AFDW at 22 degrees C. The clearance capacity of bryozoan communities in seagrass meadows of Western Australia is estimated by use of these results. (C) 2000 Elsevier Science B.V. All rights reserved.

General information
State: Published
Organisations: National Environmental Research Institute
Authors: Lisbjerg, D. (Intern), Petersen, J. K. (Intern)
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Main Research Area: Technical/natural sciences

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Journal: Journal of Experimental Marine Biology and Ecology
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BFI (2018): BFI-level 1
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Web of Science (2017): Indexed Yes
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Scopus rating (2016): CiteScore 2.03 SJR 0.937 SNIP 0.914
Web of Science (2016): Indexed yes
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Scopus rating (2015): SJR 1.043 SNIP 0.823 CiteScore 1.87
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.145 SNIP 1.045 CiteScore 2.41
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.294 SNIP 1.08 CiteScore 2.45
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.186 SNIP 1.021 CiteScore 2.27
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<td>Scopus rating (1999):</td>
<td>SJR 1.562 SNIP 1.12</td>
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<td>Original language:</td>
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10.1016/s0022-0981(99)00147-1
Source: FindIt
Source-ID: 48152659
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Organisations: Danmarks Miljøundersøgelser
Number of pages: 124

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**Marine områder - Fjorde, kyster og åbent hav: Vandmiljøplanens Overvågningsprogram 1996**

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Projects:

**Fisheries management in NATURE 2000 areas (38797)**
Approximately 17% of the Danish sea territory is appointed as Nature 2000 areas. Many of these areas are also very important for fishery. To allow fishery to continue in Nature 2000 sites, it must be demonstrated that the fishery does not negatively impact the basis for appointment for the site. The project aims to establish the science base for development of a concept for Environmental Impact Assessments (EIA) for fishery and aquaculture in Nature 2000 areas, as well as establish interactions between the mussel fishery and the basis for appointment of Nature 2000 areas. The results generated will provide input to the EIA conducted by DTU Aqua and to other advisory issues related to mussel fishery, and to improve the environment in Nature 2000 areas. The approach is a combination of field experiments, model development and theoretical work. Through the project, knowledge will be generated on eelgrass, macrophyte and blue mussel ecology and abundance and interactions with mussel fishery. Development of the oyster fishery in the Wadden Sea will be developed with focus on the Nature 2000 site N89. Seabed mapping of the stone reefs in the Little Belt Sea will include an analysis of the impact of blue mussel fishery on these habitats. Finally the project will establish knowledge base for interactions between aquaculture and Nature 2000 areas.

The project is coordinated by DTU Aqua.

National Institute of Aquatic Resources
Section for Ecosystem based Marine Management

Danish Shellfish Centre
Period: 01/01/2010 → 30/09/2012
Number of participants: 7

Research areas: Ecosystem Based Marine Management & Observation Technology

Project participant:
Dinesen, Grete E. (Intern)
Stage, Bjarne (Intern)
Lisbjerg, Dennis (Intern)
Rasmussen, Richard Skott (Intern)

Project Manager, academic:
Dolmer, Per (Intern)
Christoffersen, Mads (Intern)
Poulsen, Louise K. (Intern)

**Towards an integrated marine and maritime science community (MARCOM+) (38881)**
The Aberdeen plus interest group joined forces with the Venice Platform group to take further steps in integrating the marine, maritime and coastal research sectors in Europe. The goal is to establish a sustainable and long-lasting partnership forum (European Marine and Maritime Science and Technology Forum), based on shared interests and shared leadership, and to test it on regional seas and pan-European basis. The process will contribute to developing interactions between partners (the research community, industry, regional authorities, civil society and other stakeholders) starting from regional scales to broader issues shared with EU-neighboring countries.

In the project DTU Aqua is representing the European Fisheries and Aquaculture Organization (EFARO).
The project is coordinated by International Council for the Exploration of the Sea (ICES).

National Institute of Aquatic Resources
Research Secretariat
International Council for the Exploration of the Sea
Coastal and Marine Union
European Council for Maritime Applied R&D Association (representing the Waterborne Technology Platform)
Marine Board – European Science Foundation
European Aquaculture Technology and Innovation Platform
Hellenic Centre for Marine Research
Royal Netherlands Academy of Arts and Sciences (representing the European Network of Marine Research Institutes and Stations MARS)
Community of European Shipyards Associations

Mediterranean Science Commission
Period: 01/01/2010 → 15/04/2012
Number of participants: 2
Research area: Ecosystem Based Marine Management
Project participant:
Köster, Fritz (Intern)
Lisbjerg, Dennis (Intern)
Project