Resilience in moving water: Effects of turbulence on the predatory impact of the lobate ctenophore Mnemiopsis leidyi: Mnemiopsis leidyi feeding in turbulence

Despite its delicate morphology, the lobate ctenophore Mnemiopsis leidyi thrives in coastal ecosystems as an influential zooplankton predator. Coastal ecosystems are often characterized as energetic systems with high levels of natural turbulence in the water column. To understand how natural wind-driven turbulence affects the feeding ecology of M. leidyi, we used a combination of approaches to quantify how naturally and laboratory generated turbulence affects the behavior, feeding processes and feeding impact of M. leidyi. Experiments using laboratory generated turbulence demonstrated that turbulence can reduce M. leidyi feeding rates on copepods and Artemia nauplii by >50%. However, detailed feeding data from the field, collected during highly variable surface conditions, showed that wind-driven turbulence did not affect the feeding rates or prey selection of M. leidyi. Additional laboratory experiments and field observations suggest that the feeding process of M. leidyi is resilient to wind-driven turbulence because M. leidyi shows a behavioral response to turbulence by moving deeper in the water column. Seeking refuge in deeper waters enables M. leidyi to maintain high feeding rates even under high turbulence conditions generated by wind driven mixing. As a result, M. leidyi exerted a consistently high predatory impact on prey populations during highly variable and often energetic wind-driven mixing conditions. This resilience adds to our understanding of how M. leidyi can thrive in a wide spectrum of environments around the world. The limits to this resilience also set boundaries to its range expansion into novel areas.
Adsorptive performance of granular activated carbon in aquaculture and aquaria: a simplified method

A principle concern for aquaculturists and aquarium hobbyists is the control and removal of dissolved organic matter. Granular activated carbon is a well-established medium for the adsorption of dissolved organic substances associated with these issues. The selection of activated carbon for aquaria and aquaculture is not well-established due to innate heterogeneity of these waters. The means to completely characterize adsorption between carbon sources are generally not available to end users provided their level of expertise and/or resources at their disposal. This study introduces a relatively simple method for characterizing activated carbon quality and filter performance utilizing readily available and relatively safe indicator compounds to test adsorptive capabilities between different sources of granular activated carbon. Methylene blue and a commercial mix of humic and tannic substances were used to comparatively test adsorptive performance between two filter groups (i.e., sources of granular activated carbon) by tracking spectral absorbance with non-linear regression statistics, and validating removal trends against mature aquaculture water. Greater adsorptive capacities were consistently observed in one filter group throughout the indicator testing battery. Similar findings were observed between the two indicator tests, thereby confirming the method. This method can be adopted by commercial aquaculture operations or aquarists to assist in comparatively screening particular types, particle sizes, and sources of granular activated carbon for specific water quality and engineering requirements.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Virginia Polytechnic Institute and State University
Authors: Taylor, D. (Intern), Kuhn, D. D. (Ekstern), Smith, S. (Ekstern)
Pages: 291-306
Publication date: 2017
Main Research Area: Technical/natural sciences
Community cascades in a marine pelagic food web controlled by the non-visual apex predator Mnemiopsis leidyi

Trophic cascades are a ubiquitous feature of many terrestrial and fresh-water food webs, but have been difficult to demonstrate in marine systems with multispecies trophic levels. Here we describe significant trophic cascades in an open coastal planktonic ecosystem exposed to an introduced top predator. The ctenophore Mnemiopsis leidyi was monitored for an 8-year period concurrent with measures of the food web structure of the plankton and strong trophic cascades were evident. In the 5 years when M. leidyi were found, their target prey (grazing copepods) were reduced 5-fold and the primary producers doubled their biomass when released from the grazing pressure. The increased phytoplankton biomass could unequivocally be assigned to grazing release since concurrent measurements of primary production did not differ between years with or without M. leidyi. Copepod biomass prior to the mass occurrence of the ctenophore was important. The years without M. leidyi had significantly higher biomass of copepods in July, the month preceding the outburst of the ctenophore. The profound changes of the pelagic ecosystem faced with a non-selective apex predator shows that marine communities are not exceptions from trophic cascade mechanisms.
 Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.92 SJR 1.098 SNIP 0.848
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.025 SNIP 0.796 CiteScore 1.77
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.095 SNIP 1.255 CiteScore 2.24
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.289 SNIP 1.109 CiteScore 2.39
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.557 SNIP 1.101 CiteScore 2.43
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.158 SNIP 1.045 CiteScore 1.99
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.186 SNIP 0.98
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.922 SNIP 1.046
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.174 SNIP 1.037
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.31 SNIP 1.225
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.19 SNIP 1.118
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.116 SNIP 1.068
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.035 SNIP 1.101
Scopus rating (2003): SJR 1.315 SNIP 1.299
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.239 SNIP 1.068
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.234 SNIP 1
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Scopus rating (2000): SJR 1.226 SNIP 1.049
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Original language: English
Ecology: environmental biology - General and methods, Ecology: environmental biology - Bioclimatology and
biometeorology, Ecology: environmental biology - Plant, Ecology: environmental biology - Animal, Botany: general and
systematic - Floristics and distribution, Animal distribution, Invertebrata: comparative, experimental morphology,
Crude fucoidan content in two North Atlantic kelp species, Saccharina latissima and Laminaria digitata - seasonal variation and impact of environmental factors

Fucoidans are sulphated fucose-rich polysaccharides predominantly found in the cell walls of brown algae. The bioactive properties of fucoidans attract increasing interest from the medico-pharmaceutical industries and may drive an increase in demand of brown algae biomass. In nature, the biochemical composition of brown algae displays a seasonal fluctuation driven by environmental factors and endogenous rhythms. To cultivate and harvest kelps with high yields of fucoidans, knowledge is needed on seasonal variation and impact of environmental conditions on the fucoidan content of brown algae. The relations between the fucoidan content and key environmental factors (irradiance, nutrient availability, salinity and exposure) were examined by sampling natural populations of the common North Atlantic kelps, Saccharina latissima and Laminaria digitata, over a full year at Hanstholm in the North Sea and Aarhus in the Kattegat. In addition, laboratory experiments were carried out isolating the effects of the single factors. The results demonstrated that (1) seasonal variation alters the fucoidan content by a factor of 2–2.6; (2) interspecific differences exist in the concentrations of crude fucoidan (% of dry matter): L. digitata (11%) > S. latissima (6%); and (3) the effects of single environmental factors were not consistent between species or between different conspecific populations. The ambiguous response to single environmental factors complicates prospective directions for manipulating an increased content of fucoidan in a cultivation scenario and emphasizes the need for knowledge on performance of local kelp ecotypes.
Establishment of a taxonomic and molecular reference collection to support the identification of species regulated by the Western Australian Prevention List for Introduced Marine Pests

Introduced Marine Pests (IMP; non-indigenous marine species) prevention, early detection and risk-based management strategies have become the priority for biosecurity operations worldwide, in recognition of the fact that, once established, the effective management of marine pests can rapidly become cost prohibitive or impractical. In Western Australia (WA), biosecurity management is guided by the “Western Australian Prevention List for Introduced Marine Pests” which is a policy tool that details species or genera as being of high risk to the region. This list forms the basis of management efforts to prevent introduction of these species, monitoring efforts to detect them at an early stage, and rapid response should they be detected. It is therefore essential that the species listed can be rapid and confidently identified and discriminated from native species by a range of government and industry stakeholders. Recognising that identification of these species requires very specialist expertise which may be in short supply and not readily accessible in a regulatory environment, and the fact that much publicly available data is not verifiable or suitable for regulatory enforcement, the WA government commissioned the current project to collate a reference collection of these marine pest specimens. In this work, we thus established collaboration with researchers worldwide in order to source representative specimens of the species listed. Our main objective was to build a reference collection of taxonomically vouchered specimens and subsequently to generate species-specific DNA barcodes suited to supporting their future identification. To date, we were able to obtain specimens of 75 species (representative of all but four of the pests listed) which have been identified by experts and placed with the WA Government Department of Fisheries and, where possible, in accessible museums and institutions in Australasia. The reference collection supports the fast and reliable taxonomic and molecular identification of marine pests in WA and constitutes a valuable resource for training of stakeholders with interest in IMP recognition in Australia. The reference collection is also useful in supporting the development of a variety of DNA-based detection strategies such as real-time PCR and metabarcoding of complex environmental samples (e.g. biofouling communities). The Prevention List is under regular review to ensure its continued relevance and that it remains evidence and risk-based. Similarly, its associated reference collection also remains to some extent a work in progress. In recognition of this fact, this report seeks to provide details of this continually evolving information repository publicly available to the biosecurity management community worldwide.
Estimation of potential indirect effects of sediment transport from mussel seed fisheries on eelgrass beds

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University
Authors: Saurel, C. (Intern), Mohn, C. (Ekstern), Andersen, K. L. (Intern), Bak, F. (Intern), Barreau, P. D. A. (Intern), Petersen, J. K. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2017

GIS- og model-værktøj til forudsigelse af ålegræs retilabler sites

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Styrelsen for Vand & Naturforvaltning (SVANA), DHI Denmark, Syddansk Universitet
Publication: Research › Conference abstract for conference – Annual report year: 2017

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Department of Fisheries, Government of Western Australia, Chevron Australia, Museum and Art Gallery of the Northern Territory, Western Australian Museum, California Department of Fish and Wildlife, Hellenic Centre for Marine Research, NOAA, Cawthron Institute, Station Biologique de Roscoff, Alfred Wegener Institut-Helmholtz Zentrum für Polar- und Meeresforschung, National Research Council - Institute of Marine Sciences Ancona L.go fiera della pesca SNC -, Macquarie University, University of Louisiana at Lafayette, Italian National Institute for Environmental Protection and Research, Institut Pertanian Bogor, Romberg Tiburon Center, University of Lodz, University of Gdansk, Senckenberg am Meer, Dept. Marine Science, Zoological Institute, Russian Academy of Sciences, Stockholm University, University of Tartu, University of Aberdeen, Institute of Oceanography and Fisheries
Pages: 215-225
Publication date: 2017
Main Research Area: Technical/natural sciences
Hav-/fjordhaver i Danmark – Rekreative, ikke-kommercielle foreningsbaserede akvakulturaktiviteter til produktion af skaldyr og tang

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, NIRAS A/S, Limfjordsrådet
Authors: Andersen, P. (Ekstern), Jørgensen, T. B. (Ekstern), Nielsen, C. F. (Intern)
Publication date: 2017
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

How to increase mussel longline production in Denmark?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Saurel, C. (Intern), Andersen, L. K. (Intern), Barreau, P. D. A. (Intern), Boesen, H. (Intern), Petersen, J. K. (Intern)
Publication date: 2017
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

Identifying the optimal depth for mussel suspended culture in shallow and turbid environments
Bivalve aquaculture is commonly carried out in shallow water systems, which are susceptible to resuspension of benthic particulate matter by natural processes such as tidal currents, winds and wave action, as well as human activity. The resuspended material can alter the availability of food particles for cultured bivalves. The effect of resuspended material on bivalve bioenergetics and growth is a function of the quality and concentration of resuspended particles and background diet in the water column. Given the potential for positive or negative impacts on bivalve growth and consequently on farm productivity, farmers must position the cultured biomass at the appropriate depth to benefit from or mitigate the impact of this resuspended material. A combination of field measurements, a 1-D vertical resuspension model and a bioenergetic model for mussels based on Dynamic Energy Budget (DEB) theory has been carried out for a mussel farm in Skive Fjord, a shallow Danish fjord, with the aim of identifying the optimal depth for culture. Observations at the farm location revealed that horizontal advection is more important than vertical resuspension during periods with predominant Eastern winds. In addition, high background seston in the water column reduces the impact of resuspension on the available food for mussels. The simulation of different scenarios in terms of food availability suggested minimal effects of resuspension on mussel growth. Based on this finding and the fact that phytoplankton concentration, the main food source for mussels, is usually higher in the upper part of the water column, suspended culture in the top ~3m of the water column seems to be the optimal practice to produce mussels in Skive Fjord.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Dalhousie University
Authors: Filgueira, R. (Ekstern), Grant, J. (Ekstern), Petersen, J. K. (Intern)
Pages: 15-23
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Journal of Sea Research
Volume: 132
ISSN (Print): 1385-1101
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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Invasive skaldyr i Limfjorden

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Bergen, University of Copenhagen
Konsekvensvurdering af fiskeri efter blåmuslinger ved og øst for Horsens Fjord samt Endelave 2017

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data
Authors: Nielsen, P. (Intern), Canal-Vergés, P. (Intern), Nielsen, M. M. (Intern), Geitner, K. (Intern), Petersen, J. K. (Intern)
Number of pages: 46
Publication date: 2017

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Number: 319-2017
Main Research Area: Technical/natural sciences
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http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Research › Report – Annual report year: 2017

Muslinge- og østersfiskeri i Natura 2000 områder – en succeshistorie

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Nielsen, P. (Intern), Canal-Vergés, P. (Intern), Petersen, J. K. (Intern)
Publication date: 2017
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017
Mussel fishery in Natura 2000 sites - a success story from Denmark

General information
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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Nielsen, P. (Intern), Petersen, J. K. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
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Publication: Research › Conference abstract for conference – Annual report year: 2017

Optimization of mitigation mussel culture for nutrient extraction and animal feedstock replacement: An introduction.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Taylor, D. (Intern), Saurel, C. (Intern), Nielsen, P. (Intern), Petersen, J. K. (Intern)
Number of pages: 2
Publication date: 2017
Main Research Area: Technical/natural sciences
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Publication: Research › Conference abstract for conference – Annual report year: 2017

Palmaria palmata hatchery – from tetraspores to seedlings

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Schmedes, P. S. (Intern), Nielsen, M. M. (Intern), Reitan, K. (Ekstern), Petersen, J. K. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

P-E performances of four Danish S. latissima populations – Is low light traits persistent and traceable in the F1-generation?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Schmedes, P. S. (Intern), Nielsen, M. M. (Intern), Reitan, K. (Ekstern), Petersen, J. K. (Intern)
Publication date: 2017
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2017

Revealing the role of ocean currents for secondary invasions in a holoplanktonic species

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Marine Living Resources, GEOMAR - Helmholtz Centre for Ocean Research Kiel
Selection for life-history traits to maximize population growth in an invasive marine species

Species establishing outside their natural range, negatively impacting local ecosystems, are of increasing global concern. They often display life-history features characteristic for r-selected populations with fast growth and high reproduction rates to achieve positive population growth rates (r) in invaded habitats. Here, we demonstrate substantially earlier maturation at a 2 orders of magnitude lower body mass at first reproduction in invasive compared to native populations of the comb jelly Mnemiopsis leidyi. Empirical results are corroborated by a theoretical model for competing life-history traits that predicts maturation at the smallest possible size to optimize r, while individual lifetime reproductive success (R0), optimized in native populations, is near constant over a large range of intermediate maturation sizes. We suggest that high variability in reproductive tactics in native populations is an underappreciated determinant of invasiveness, acting as substrate upon which selection can act during the invasion process.
Mnemiopsis leidyi, comb jelly, evolution of life-history traits, evolutionary biology, global change, invasion ecology, jellyfish, reproduction and population growth.

Original language: English

Testing the potential for improving quality of sediments impacted by mussel farms using bioturbating polychaete worms

Biodeposits from farmed mussels severely influence the biogeochemistry of sediments by increasing the levels of organic matter (OM). Mitigation of such negative impacts is important for the development of sustainable aquaculture operations.
As a step towards developing methods for remediation of coastal sediments affected by mussel farming, the effects of the polychaete, Hediste diversicolor was evaluated experimentally. In a series of field- and laboratory experiments we tested hypotheses about the effects of polychaetes on sediment oxygen consumption, nutrient fluxes and sulphide pools under different polychaete densities and sedimentation regimes. The experimental results support the idea that polychaetes can mitigate negative effects on the benthic environment beneath mussel farms. H. diversicolor oxidized the sediment and generally enhanced the oxygen consumption, and thus the decomposition of OM. The accumulation of pore water sulphides were reduced and fluxes of nutrients across the sediment-water interface increased. Additional calculations suggest that the effects of polychaetes were mainly indirect and driven by increased microbial activity due to the borrowing activity of the polychaetes. Trends of increasing decomposition with increasing polychaete density suggest that the decomposition could be further enhanced by higher densities. Overall, we concluded that H. diversicolor is a potentially strong candidate for remediation of mussel farm sediments. The results show that sediments inhabited by H. diversicolor have high assimilative capacity of OM and oxygen conditions are significantly improved following the addition of polychaetes at naturally occurring densities. However, technological developments are needed in order to allow the approach to be used in practice.

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Gothenburg, University of Southern Denmark
Authors: Bergström, P. (Ekstern), Carlsson, M. S. (Ekstern), Lindegarth, M. (Ekstern), Petersen, J. K. (Intern), Lindegarth, S. (Ekstern), Holmer, M. (Ekstern)
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- Web of Science (2018): Indexed yes
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- Web of Science (2017): Indexed yes
- BFI (2016): BFI-level 1
- Scopus rating (2016): CiteScore 1.23 SJR 0.555 SNIP 0.926
- BFI (2015): BFI-level 1
- Scopus rating (2015): SJR 0.79 SNIP 1.1 CiteScore 1.37
- Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 1
- Scopus rating (2014): SJR 0.674 SNIP 0.943 CiteScore 1.23
- Web of Science (2014): Indexed yes
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 0.815 SNIP 0.984 CiteScore 1.43
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 0.77 SNIP 0.958 CiteScore 1.29
- ISI indexed (2012): ISI indexed yes
- Web of Science (2012): Indexed yes
- BFI (2011): BFI-level 1
- Scopus rating (2011): SJR 0.725 SNIP 0.964 CiteScore 1.37
- ISI indexed (2011): ISI indexed yes
- Web of Science (2011): Indexed yes
- BFI (2010): BFI-level 1
- Scopus rating (2010): SJR 0.645 SNIP 0.936
- Web of Science (2010): Indexed yes
- BFI (2009): BFI-level 1
The Limfjord stone reef project: Geological and biological investigations in Løgstør Bredning for stone reef restoration

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Geological Survey of Denmark and Greenland
Authors: Al-Hamdani, Z. K. (Ekstern), Nielsen, M. M. (Intern)
Publication date: 2017
Event: Abstract from Dansk Havforskermøde, Helsingør, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2015

The role of shellfish aquaculture in reduction of eutrophication in an urban estuary

Mitigating coastal eutrophication is a global challenge. In many places where land-based management has reduced nutrient discharges, coastal waterbodies remain impaired. This study examined 'bioextraction' of nutrients from the water by oyster aquaculture in Long Island Sound, Connecticut, as an example of how aquaculture might complement land-based measures in urban estuaries. Eutrophication status, nutrient removal, and ecosystem service value were estimated through eutrophication assessment, application of hydrologic, circulation, and local- and ecosystem-scale models, and economic valuation. System-scale modeling estimated that current oyster aquaculture, via sequestration into tissue and shell only, removes an equivalent of 1.31%, and expanded production could remove 2.68%, of total annual land-based nitrogen inputs by aquaculture alone. Up-scaled local-scale results were similar to results from the system-scale modeling, suggesting that this upscaling method could be useful in waterbodies without circulation models. The minimum value of the ecosystem service of nitrogen removed by oyster production was estimated by means of an avoided costs method, which uses the cost of alternative nutrient management measures such as wastewater treatment and urban Best Management Practices to estimate the value of the removed nitrogen, to be $8.5 million per year, with maximum value at expanded production of $470 million per year. Removal and value estimates are conservative because they do not include removal by clams in Connecticut due to the lack of a clam model, or by oysters and clams in New York due to data limitations, nor denitrification losses. If oyster associated removal from all Connecticut and New York lease acres (5% of bottom area) and denitrification losses for both states are included, nitrogen removal estimates increase to 10% – 30% of total annual inputs. The total N removal could be higher if removal by clams is included. Additional research is needed for inclusion of shellfish growers in nutrient trading programs. These optimistic results are specific to Long Island Sound but the modeling approach is transferable and can be used to evaluate possible contribution by shellfish aquaculture in other urban estuaries.

General information
State: Accepted/In press
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Blue carbon stocks in Baltic Sea eelgrass (Zostera marina) meadows

Although seagrasses cover only a minor fraction of the ocean seafloor, their carbon sink capacity accounts for nearly one-fifth of the total oceanic carbon burial and thus play a critical structural and functional role in many coastal ecosystems. We sampled 10 eelgrass (Zostera marina) meadows in Finland and 10 in Denmark to explore seagrass carbon stocks (C-org stock) and carbon accumulation rates (C-org accumulation) in the Baltic Sea area. The study sites represent a gradient from sheltered to exposed locations in both regions to reflect expected minimum and maximum stocks and accumulation. The C-org stock integrated over the top 25 cm of the sediment averaged 627 g C m⁻² in Finland, while in Denmark the average C-org stock was over 6 times higher (4324 g Cm⁻²). A conservative estimate of the total organic
carbon pool in the regions ranged between 6.98 and 44.9 t C ha\(^{-1}\). Our results suggest that the Finnish eelgrass meadows are minor carbon sinks compared to the Danish meadows, and that majority of the C-org produced in the Finnish meadows is exported. Our analysis further showed that >40% of the variation in the C-org stocks was explained by sediment characteristics, i.e. dry density, porosity and silt content. In addition, our analysis show that the root : shoot ratio of \(Z.\) marina explained >12% and the contribution of \(Z.\) marina detritus to the sediment surface C-org pool explained >10% of the variation in the C-org stocks. The mean monetary value for the present carbon storage and carbon sink capacity of eelgrass meadows in Finland and Denmark, were 281 and 1809 EUR ha\(^{-1}\), respectively. For a more comprehensive picture of seagrass carbon storage capacity, we conclude that future blue carbon studies should, in a more integrative way, investigate the interactions between sediment biogeochemistry, seascape structure, plant species architecture and the hydrodynamic regime.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Åbo Academy University, University of Southern Denmark
Authors: Rohr, M. E. (Ekstern), Bostrom, C. (Ekstern), Canal-Vergés, P. (Intern), Holmer, M. (Ekstern)
Pages: 6139-6153
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Main Research Area: Technical/natural sciences

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BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 4.25 SJR 2.328 SNIP 1.305
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 2.453 SNIP 1.324 CiteScore 4.04
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 2.194 SNIP 1.363 CiteScore 4.03
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 2.468 SNIP 1.425 CiteScore 4.21
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.366 SNIP 1.312 CiteScore 3.92
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.524 SNIP 1.178 CiteScore 3.86
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 2.36 SNIP 1.108
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.951 SNIP 1.197
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Coexistence of Pacific oyster Crassostrea gigas (Thunberg, 1793) and blue mussels Mytilus edulis Linnaeus, 1758 on a sheltered intertidal bivalve bed?

The invasive Pacific oyster, Crassostrea gigas Thunberg, 1793 was introduced in Denmark for aquaculture in the 1970s. Presently, feral populations are found in many parts of the country, with the largest populations established on existing beds of blue mussel, Mytilus edulis Linnaeus, 1758. This study was conducted in the Limfjord estuary, at Agger Tange, where C. gigas was introduced in 1972. The study site is a large cluster of raised intertidal bivalve beds inhabited by C. gigas and M. edulis in a sheltered part of the estuary. The two bivalves have some of the same living requirements, and as C. gigas have been present in the ecosystem for more than 40 years, we hypothesize that the presence of C. gigas has altered the spatial and temporal distribution of M. edulis by inducing a niche separation. The spatiotemporal development of the bivalve bed was determined using orthophotos. C. gigas and M. edulis were collected from the bivalve bed, shell lengths were converted into biomass, which were interpolated to create biomass contours and combined with modelled topography of the bivalve bed to study niche separation. The bivalve bed slowly extended northwards over a period of 11 years, where it also became more fragmented. The northern part of the bed was composed of mussel mats on top of soft sediment. This area was dominated by M. edulis, while areas in the south were dominated by C. gigas. In the southern part, the bivalve bed was composed of thick and compact sediment suggesting it represent the oldest part of the bivalve bed. There were no differences in the conditions of C. gigas and M. edulis from old or newly established areas, and there were no difference in the vertical distributions of the bivalve species. Thus, spatial and temporal separation of the two species is not pronounced at present, and thus unable to explain why they seemingly coexist.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Roskilde University, Orbicon, University of Copenhagen
Authors: Holm, M. (Ekstern), Davids, J. (Ekstern), Dolmer, P. (Intern), Holmes, E. (Forskerdatabase), Nielsen, T. (Ekstern), Vismann, B. (Ekstern), Hansen, B. (Ekstern)
Pages: 155-165
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Main Research Area: Technical/natural sciences

Publication information
Journal: Aquatic Invasions
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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
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Scopus rating (2016): SJR 0.981 SNIP 1.241 CiteScore 2.45
Web of Science (2016): Indexed yes
D3.2 - National Reports on the Consultation Protocol, EU Sea Change Project

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: McHugh, P. (Ekstern), Domegan, C. (Ekstern), Gotensparre, S. (Ekstern), Fauville, G. (Ekstern), Copejans, E. (Ekstern), Møller, L. F. (Intern), Papathanassiou, M. (Ekstern), Batista, V. (Ekstern), Chicote, C. (Ekstern), Lincoln, S. (Ekstern)
Number of pages: 379
Publication date: 2016

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Publisher: Whitaker Institute
Original language: English
Main Research Area: Technical/natural sciences
Publication: Research › Report – Annual report year: 2016

Ecosystem goods and services of blue mussel mitigation cultures

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Nielsen, P. (Intern)
Publication date: 2016
Event: Abstract from YOUMARES 17, Hamburg, Germany.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2016
Field clearance of an intertidal bivalve bed: relative significance of the co-occurring blue mussel *Mytilus edulis* and Pacific oyster *Crassostrea gigas*

At an approximately 12 000 m² sheltered intertidal bivalve bed in the western part of the Limfjord, Denmark, the Pacific oyster *Crassostrea gigas* co-occurs with the blue mussel *Mytilus edulis*. The relative significance of the impact of the 2 species on phytoplankton density during a tidal cycle was estimated by combining field measurements of clearance rates and modelling of the bivalve bed (topography, biomass distribution, temporal and spatial water coverage and depth). The average density of *C. gigas* and *M. edulis* was 35 ± 36 and 1001 ± 685 ind. m⁻², respectively. Therefore, *M. edulis* contributed 4 times as much as *C. gigas* to the bivalve bed’s clearance, and the 2 bivalves were estimated to clear the water volume 1.9 times during each tidal cycle. However, the estimated water column cleared during low tide is overestimated due to phytoplankton depletion. Hence, it is concluded that the bivalve bed clears the water close to 1 time each tidal cycle. This, together with a low dry weight of soft parts, indicates that the bivalve bed, in general, is food-limited.

**General information**

State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Copenhagen, Roskilde University, Oricon, Greenland Institute of Natural Resources
Authors: Vismann, B. (Ekstern), Holm, M. W. (Intern), Davids, J. (Ekstern), Dolmer, P. (Intern), Pedersen, M. F. (Ekstern), Blanda, E. (Ekstern), Christensen, H. T. (Intern), Nielsen, P. (Intern), Hansen, B. W. (Ekstern)
Pages: 107-119
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Main Research Area: Technical/natural sciences

**Publication information**

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Volume: 25
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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.847 SNIP 0.895 CiteScore 1.82
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.767 SNIP 0.713 CiteScore 1.41
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.681 SNIP 0.678 CiteScore 1.44
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.641 SNIP 0.618 CiteScore 1.34
ISI indexed (2013): ISI indexed no
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.814 SNIP 0.813 CiteScore 1.7
ISI indexed (2012): ISI indexed no
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.844 SNIP 0.848 CiteScore 1.79
ISI indexed (2011): ISI indexed no
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.899 SNIP 0.666
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.631 SNIP 0.483
BFI (2008): BFI-level 1
Fiskeri efter søstjerner i Limfjorden. Fagligt grundlag for en forvaltningsplan

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Ecosystem based Marine Management, Section for Monitoring and Data
Authors: Petersen, J. K. (Intern), Gislason, H. (Intern), Fitridge, I. (Intern), Saurel, C. (Intern), Degel, H. (Intern), Nielsen, C. F. (Intern)
Number of pages: 35
Publication date: 2016

Publication information
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
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Series: DTU Aqua-rapport
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Electronic versions:
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Gross morphology and cnidocysts of the Edwardsiella anemone and larva (Anthozoa, Edwardsiididae) from the Swedish West Coast - The larva is parasitic in the invasive Mnemiopsis leidyi (Ctenophora)

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Östman, C. (Ekstern), Møller, L. F. (Intern)
Publication date: 2016
Event: Abstract from International Jellyfish Blooms Symposium, Barcelona, Spain.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2016

Hvad ved vi om marine virkemidler?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University, DHI Hørsholm, University of Southern Denmark
Authors: Timmermann, K. (Ekstern), Erichsen, A. C. (Ekstern), Bruhn, A. (Ekstern), Fossing, H. (Ekstern), Petersen, J. K. (Intern), Flindt, M. (Ekstern)
Number of pages: 4
Pages: 141-144
Publication date: 2016
Main Research Area: Technical/natural sciences
Publication information
Journal: Vand & Jord
Volume: 23
Impact of environmental conditions on biomass yield, quality, and bio-mitigation capacity of Saccharina latissima

Seaweeds are attractive as a sustainable aquaculture crop for food, feed, bioenergy and biomolecules. Further, the non-value ecosystem services of seaweed cultivation (i.e. nutrient recapture) are gaining interest as an instrument towards sustainable aquaculture and for fulfilling the aims of the EU Marine Strategy Framework Directive. Environmental factors determine the yield and quality of the cultivated seaweed biomass and, in return, the seaweed aquaculture affects the marine environment by nutrient assimilation. Consequently, site selection is critical for obtaining optimal biomass yield and quality and for successful bio-mitigation. In this study, 5 sites for cultivation of Saccharina latissima were selected within a eutrophic water body to guide site selection for future kelp cultivation activities. Results were coupled to marine monitoring data to explore the relationship between environmental conditions and cultivation success. The biomass yields fluctuated 10-fold between sites due to local variations in light and nutrient availability. Yields were generally low, i.e. up to 510 g fresh weight (FW) per meter seeded line; however, the dry matter contents of protein and high-value pigments were high (up to 17% protein and 0.1% fucoxanthin). Growth performance, biomass quality and bio-mitigation potential was restricted by low availability of light and bioavailable phosphorus, and biofouling through juvenile suspension feeders was a critical factor at all cultivation sites. At specific sites, the tissue metal contents (Pb and Hg) exceeded the limit values for feed or food. Our results emphasize the importance of careful site selection before establishing large-scale cultivation, and stress the challenges and benefits of kelp cultivation in eutrophic waters.

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State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University, Danish Technological Institute
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Publication information
Journal: Aquaculture Environment Interactions
Volume: 8
ISSN (Print): 1869-215X
Ratings:
BFI (2018): BFI-level 1
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BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.19 SJR 0.945 SNIP 1.051
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.867 SNIP 0.867 CiteScore 2.25
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.861 SNIP 1.047 CiteScore 2.25
Web of Science (2014): Indexed yes
Investigation of hatchery techniques and cultivation systems for cost-efficient production of valued seaweeds

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Schmedes, P. S. (Intern), Canal-Vergés, P. (Intern), Nielsen, M. M. (Intern), Reitan, K. (Ekstern), Petersen, J. K. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2016

Konsekvensvurdering af fiskeri efter blåmuslinger ved og øst for Horsens Fjord samt Endelave 2016

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data
Authors: Nielsen, P. (Intern), Nielsen, C. F. (Intern), Geitner, K. (Intern), Petersen, J. K. (Intern)
Number of pages: 41
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Publication information
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Series: DTU Aqua-rapport
Number: 311-2016
Main Research Area: Technical/natural sciences
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http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Research › Report – Annual report year: 2016

Magnitude, spatial scale and optimization of ecosystem services from a nutrient extraction mussel farm in the eutrophic Skive Fjord, Denmark
Suspended mussel aquaculture has been proposed as a possible mechanism by which to remove excess nutrients from eutrophic marine areas. In this study, seasonal mussel growth and water clarification (through seston and phytoplankton depletion) were studied at a commercial-scale nutrient extractive mussel farm in a highly eutrophic Danish fjord. Spatial variations in mussel biomass were examined throughout the year and no significant differences were detected within the
Farm. Food depletion by mussels was examined at spatial scales ranging from individuals to the entire farm and surrounding area. Phytoplankton depletion on the scale of individual mussel loops, determined using the siphon mimic approach, indicated between 27 and 44% depletion of chlorophyll a (chl a). Farm-scale depletion was detected and visualized based on intensive 3D spatial surveys of the distribution of chl a and total suspended particulate matter concentrations both inside and outside the farmed area. Average reductions in food supply within the farm ranged from 13 to 31%, with some areas showing >50% food depletion. A food depletion model was developed to estimate the optimal mussel density required to maximize removal of excess phytoplankton. The model employed mussel clearance rate estimates derived from the observed magnitude of food depletion within the farm. Model results indicate that the mussel population filtration rate could be increased by 80 to 120% without any negative feedback on mussel growth. This could be accomplished by approximately doubling the standing stock of mussels in the farm, hence doubling the amount if nutrients removed at mussel harvest.

**General information**
- State: Published
- Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Bedford Institute of Oceanography, Aarhus University
- Authors: Nielsen, P. (Intern), Cranford, P. J. (Ekstern), Maar, M. (Ekstern), Petersen, J. K. (Intern)
- Pages: 311-329
- Publication date: 2016
- Main Research Area: Technical/natural sciences

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  - Web of Science (2018): Indexed yes
  - BFI (2017): BFI-level 1
  - Web of Science (2017): Indexed yes
  - BFI (2016): BFI-level 1
  - Scopus rating (2016): CiteScore 2.19 SJR 0.945 SNIP 1.051
  - Web of Science (2016): Indexed yes
  - BFI (2015): BFI-level 1
  - Scopus rating (2015): SJR 0.867 SNIP 0.867 CiteScore 2.25
  - Web of Science (2015): Indexed yes
  - BFI (2014): BFI-level 1
  - Scopus rating (2014): SJR 0.861 SNIP 1.047 CiteScore 2.25
  - Web of Science (2014): Indexed yes
  - BFI (2013): BFI-level 1
  - Scopus rating (2013): SJR 1.253 SNIP 1.495 CiteScore 2.45
  - ISI indexed (2013): ISI indexed yes
  - BFI (2012): BFI-level 1
  - Scopus rating (2012): SJR 0.729 SNIP 1.108 CiteScore 1.19
  - ISI indexed (2012): ISI indexed no
  - Web of Science (2012): Indexed yes
  - Scopus rating (2011): SJR 1.144 SNIP 1.167
  - Web of Science (2011): Indexed yes
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  - Publishers version
  - DOIs: 10.3354/aei00175
- Links:
  - Source: FindIt
  - Source-ID: 2292485366
- Publication: Research - peer-review › Journal article – Annual report year: 2016
Modelling stressors on the eelgrass recovery process in two Danish estuaries

Eelgrass (Zostera marina L.) depth limit is used as an environmental indicator in Danish coastal waters in the Water Framework Directive (WFD) to evaluate coastal waters and their ecological condition. Even after decades of reduced nutrient loadings the reestablishment of eelgrass has not yet succeeded. The mechanisms hindering/delaying eelgrass recovery were recently identified: 1) lack of sediment anchoring capacity, 2) resuspension created by drifting ephemeral macroalgae, 3) seedling uprooting created by current and wave forces, 4) ballistic stress from attached macroalgae and 5) burial of seeds and seedlings by lugworms. These processes were quantified and introduced to an ecological MIKE 3D model. The developed model was calibrated and validated on two Danish estuaries, Odense Fjord and Roskilde Fjord. Analyses of the simulations were performed on area distribution maps. The parameterized stressors impact has been investigated over a three-year period. The results indicate accumulated effects from multiple stressors weakening the capability of eelgrass to recolonize. Combining all stressors in the model decreased the total area covered by eelgrass 83.72% in Odense Fjord and 80.30% in Roskilde Fjord compared to simulation without stressors. Eelgrass peak biomass declined in both fjords from 33.4 to 4.55 ton C km\(^{-2}\) in Odense Fjord and from 24.42 to 5.58 ton C km\(^{-2}\) in Roskilde Fjord. Combining lugworm burial of seeds and seedlings with resuspension from macroalgae and wave forcing had the second strongest negative impact on eelgrass growth, area reduction of 78.31% and 73.14% in Odense and Roskilde Fjord was seen. Ballistic stress from attached macroalgae also reduced growth drastically. Light conditions, sediment organic content along with shear stress at the sediment surface impact the ability of eelgrass to cope with above mentioned stressors. The spatial resolution of the model setup made it possible to generate maps where eelgrass is exposed to lowest stress, revealing areas for potential eelgrass recovery. The developed eelgrass model is now used as a national tool to predict areas where eelgrass restoration effort may be initiated.
Mussel longline extension of the production season

General information
Nutrient compensation as management tool – Sugar kelp production in sustainable aquaculture
Integrated multi-trophic aquaculture (IMTA) is theoretically a sustainable production form, which minimizes waste products from e.g. fish farms, by the co-production of bivalves or/and seaweed. For the Danish fish farmers the extractive organisms could be the solution for increasing fish production, but do the principles of IMTA fully mitigate the nutrient impact from open net-pen fish production at realistic production scales?

In this project, commercial scale cultivation of sugar kelp (Saccharina latissima) was investigated with regard to operation, yield, biofilter capacity and mapping the biomass composition for one year incl. protein content, amino acid profiles, lipids and fatty acid composition, minerals and vitamins. Results were obtained from an IMTA site and compared to a reference site with no impact from the fish (175 t year⁻¹) and mussel farm, both located just outside Horsens Fjord, Denmark. The nitrogen content in sugar kelp varied between 0.5-3.7% of dw with the highest concentration in September 2013 with an estimated maximum yield of 5.1-7.1 tons ww ha⁻¹ year⁻¹. Potentially, a cultivation area of 204-340 ha would be needed to achieve 100% N recovery, based on the tonnage of the specific fish farm. The harvest contained protein (10%), lipids (3%) and vitamin A (34 mg/kg per dw), however with large seasonal variations. Sugar kelp increased the biodiversity by functioning as hanging reefs, but did not significantly affect the sediment by shading (5% in a scenario of 5 kg/meter dropper rope). During the project a number of improvements of the existing techniques for producing seaweed on suspended line systems were developed, however, further optimization of techniques for deployment, production as well as harvest is needed. This would also allow sugar kelp production as a viable and robust mitigation tool for nitrogen removal and hopefully allow for future expansion of sustainable marine fish production in Denmark.

Sea change - our European ocean conservations summary report

Shellfish and seaweed gardening: Danish experience
The use of shellfish for eutrophication control

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University
Authors: Petersen, J. K. (Intern), Saurel, C. (Intern), Nielsen, P. (Intern), Timmermann, K. (Ekstern)
Pages: 857-878
Publication date: 2016
Main Research Area: Technical/natural sciences

Publication information
Journal: Aquaculture International
Volume: 24
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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 1.34 SJR 0.563 SNIP 1.014
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.585 SNIP 0.763 CiteScore 1.08
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.553 SNIP 0.765 CiteScore 1.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.626 SNIP 0.796 CiteScore 1.17
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.599 SNIP 1.04 CiteScore 1.15
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.553 SNIP 0.857 CiteScore 0.99
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.533 SNIP 0.832
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.43 SNIP 0.775
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.488 SNIP 0.566
Scopus rating (2007): SJR 0.519 SNIP 0.73
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.603 SNIP 0.974
Scopus rating (2005): SJR 0.449 SNIP 0.536
Trophic cascades over three trophic levels in a coastal food web: an 8-year study of the ctenophore Mnemiopsis leidyi in the Gullmar Fjord

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Gothenburg
Authors: Tiselius, P. (Ekstern), Møller, L. F. (Intern)
Publication date: 2016
Main Research Area: Technical/natural sciences
Publication: Research - peer-review › Journal article – Annual report year: 2015

Using a GIS-tool to evaluate potential eelgrass reestablishment in estuaries

The lacking recovery of eelgrass (Zostera marina) has been observed in many coastal areas throughout the world. Through a strategic field project we managed to characterize and quantify the impact of new and already known stressors and their thresholds on the recovery process. The stressing mechanisms were 1) Physical stress from wave and current action 2) low sediment anchoring capacity facilitate uprooting of eelgrass seedlings; 3) benthic light intensity 4) ballistic stress from drifting macroalgae are damaging seedlings, 5) too frequent resuspension impoverishing the benthic light climate and dispersing seeds to deeper areas not sufficiently supported with light, 6) lugworms burial of seeds, and uprooting or burial of seedlings. Based on the field and supporting laboratory studies we present a GIS-tool that from data on a suite of stressors are able to predict potential areas for recovery of eelgrass by transplantation actions and seed broadcast. Input data may be field data or model simulation results. Here we have used model results. These input data were reclassified into 5 ranges, according to how much it impacted the eelgrass recovery process: 1) Optimal recovery, 2) Good recovery, 3) Threshold for recovery, 4) Poor recovery and 5) Very poor recovery. Afterward a weighed overlay function was performed, ending up with an accumulated value for stress impact on the eelgrass recovery process in all location in the Danish estuary, Odense Fjord. The GIS-tool is able to calculate and visualize areas of individual and/or multi-stress situations at specific locations. It also managed to identify potential recovery area at the present loading and after a 30% reduction of the external nitrogen loading of the system. Further validation by field activities is needed to verify the precision of the tool. (C) 2016 Elsevier B.V. All rights reserved.

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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Southern Denmark, DHI Hørsholm
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Main Research Area: Technical/natural sciences
Publication information
Journal: Ecological Modelling
Volume: 338
ISSN (Print): 0304-3800
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 2.43 SJR 0.941 SNIP 1.089
Web of Science (2016): Indexed Yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.087 SNIP 1.112 CiteScore 2.43
Web of Science (2015): Indexed Yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.135 SNIP 1.353 CiteScore 2.7
Web of Science (2014): Indexed Yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.153 SNIP 1.329 CiteScore 2.53
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed Yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.029 SNIP 1.229 CiteScore 2.28
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed Yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.183 SNIP 1.134 CiteScore 2.34
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed Yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.077 SNIP 1.132
Web of Science (2010): Indexed Yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.294 SNIP 1.26
Web of Science (2009): Indexed Yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.335 SNIP 1.312
Web of Science (2008): Indexed Yes
Scopus rating (2007): SJR 1.335 SNIP 1.363
Web of Science (2007): Indexed Yes
Scopus rating (2006): SJR 1.223 SNIP 1.548
Web of Science (2006): Indexed Yes
Scopus rating (2005): SJR 1.441 SNIP 1.327
Scopus rating (2004): SJR 1.046 SNIP 1.089
Web of Science (2004): Indexed Yes
Scopus rating (2003): SJR 1.174 SNIP 1.253
Scopus rating (2002): SJR 0.875 SNIP 1.099
Scopus rating (2001): SJR 0.965 SNIP 0.995
Scopus rating (2000): SJR 0.828 SNIP 0.913
Scopus rating (1999): SJR 0.884 SNIP 0.877
Original language: English
Ecological Modeling, Eelgrass, GIS-analysis, Recovery, Input output programs, Drifting macroalgae, Field activities, GIS analysis, Laboratory studies, Nitrogen loading, Recovery process, Specific location, Zostera marina, Anoxia, poor recovery , light climate, optimal recovery, good recovery, threshold for recovery
DOIs: 10.1016/j.ecolmodel.2016.07.005
Source: FindIt
Source-ID: 2307114797
Publication: Research - peer-review › Journal article – Annual report year: 2016
Validating GIS tool to assess eelgrass potential recovery in the Limfjorden (Denmark)

Eelgrass is a key indicator for the water quality in Europe (WFD, European Union, 2000). However, although water quality has been improved in most Danish water bodies, the eelgrass population does not seem to be recovering. In this study, we validate and further develop a GIS tool designed by Flindt et al. (2016), to evaluate the potential of eelgrass reestablishment in Danish waters. The GIS tool was tested in two large broads of the Limfjorden, Løgstør and Lovns broad (Denmark), where two scenarios are run. The first scenario was set up including modelled data, whereas the second scenario included both monitored and modelled data. All scenarios were validated with monitored data collected over a 5 years period in the two broads. The developed GIS tool highlights areas with eelgrass potential, both for vegetative growth and sexual reproduction, in accordance with those found in situ in the period 2009-2013, in the two investigated broads. A combination of modelled and monitored data was found to be optimal to achieve accurate predictions for eelgrass development in the Limfjorden using this GIS tool. In order to implement the current model or to use this GIS tool in other locations, it is needed to have detailed knowledge of the area in focus, especially on the controlling ecosystem parameters and pressures. This eelgrass GIS tool is been proven to be especially beneficial as site selection tool for marine spatial planning e.g. in relation to the implementation of the WFD and the ICZM directives (WFD, ICZM), to help assessing anthropogenic/targeted environmental impacts e.g. assessing mussel fisheries impacts and is as well a powerful tool to optimize monitoring cost efficiency. Finally, the described GIS tool, originally set for Odense fjord (Denmark) by Flindt et al. (2016), has been validated with data from Limfjorden, corroborating the efficiency of the studied tool in Danish waters.
Viktiga maneter behöver övervakas

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Swedish Meteorological and Hydrological Institute, University of Gothenburg
Authors: Johansen, M. (Ekstern), Tiselius, P. (Ekstern), Møller, L. F. (Intern)
Pages: 52-54
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Main Research Area: Technical/natural sciences
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Publication: Research › Report chapter – Annual report year: 2016

Analysis of production and environmental effects of Nile tilapia and white shrimp culture in Thailand
Two case studies from Southeast Asia are used to analyse production, environmental effects, and economic optimisation of Nile tilapia (Oreochromis niloticus) and white shrimp (Penaeus vannamei) pond culture. A projection of these data is made for the whole of Thailand. The results are analysed on a regional scale based on site selection using multi-criteria evaluation (MCE).

Farm-scale culture was simulated for (i) tilapia monoculture in Chiang Rai; (ii) shrimp monoculture in Chanthaburi; and (iii) Integrated Multi-Trophic Aquaculture (IMTA) of tilapia and shrimp in Chon Buri. Together, these provinces produced 17,500 tonnes of tilapia in 2012, with a significant proportion exported to North America and Europe.
Growth models for both species were developed, calibrated, and validated, and used to simulate population dynamics of cultivated animals, and sediment diagenesis and eutrophication in ponds. Co-cultivation stimulates nitrogen dissolution (134 kg N cycle−1), which is greater than in tilapia (96 kg N) or shrimp (52 kg N) monoculture, and doubles the NH4+ discharge to the environment (10.7 kg in tilapia monoculture, 20.5 kg in co-cultivation). However, eutrophication as a result of shrimp monoculture decreases sharplychlorophyll emissions fall from 0.17 kg to 0.02 kg. A modelled IMTA scenario including the green seaweed Ulva reduced NH4+ outflow to 0.32 kg cycle−1.

Scaling to the national level, for a 2010 production of 158,293 t y−1 (tilapia), and 553,899 t y−1 (shrimp), gives calculated emissions of 2,105,118 and 34,904 Population Equivalents (PEQ) respectively. Only part is a negative externality, because rural agro-aqua systems in Thailand reuse discharges in holding ponds, rice culture, etc.

Commercial tilapia and shrimp aquaculture have a value added share of total GDP of 0.38, and value added of 96.24, resulting in indirect impacts of the industry on the Thai economy of $35 million, and the creation of 16,000 additional jobs.

The MCE scenario analysis suggests sustainable expansion is possible for both species. The highly suitable class for tilapia would triple in the dry season, but halve in the rainy season. For shrimp the corresponding areas would decrease in both seasons. However, the suitable class is two orders of magnitude greater than the current level of tilapia farming, and shrimp could increase tenfold (limited by the rainy season due to low salinity). These projections which are constrained by competing land claims, will be further influenced by socio-economic factors, and would depend upon national or regional policy decisions.

These models, together with economic indicators developed for the aquaculture industry in Thailand, provide an overview of this important contributor to world aquaculture, which has a volume production greater than both the US and EU, and explore some of the lessons that may be learnt worldwide at both the local and national scales.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, New University of Lisbon, University of Stirling, Northern Economics, Chinese Academy of Fisheries Sciences, Department of Fisheries
Authors: Ferreira, J. (Ekstern), Falconer, L. (Ekstern), Kittiwanich, J. (Ekstern), Ross, L. (Ekstern), Saurel, C. (Intern), Wellman, K. (Ekstern), Zhu, C. (Ekstern), Suvanachai, P. (Ekstern)
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Scopus rating (2016): CiteScore 2.75 SJR 1.101 SNIP 1.524
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BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.103 SNIP 1.254 CiteScore 2.12
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.002 SNIP 1.34 CiteScore 2.16
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.136 SNIP 1.3 CiteScore 2.18
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
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Scopus rating (2012): SJR 1.212 SNIP 1.487 CiteScore 2.32
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
An integrated ecosystem approach for assessing the potential role of cultivated bivalve shells as part of the carbon trading system

The role of bivalve mariculture in the CO2 cycle has been commonly evaluated as the balance between respiration, shell calcium carbonate sequestration and CO2 release during biogenic calcification. However, this approach neglects the ecosystem implications of cultivating bivalves at high densities, e.g. the impact on phytoplankton dynamics and benthic-pelagic coupling, which can significantly contribute to the CO2 cycle. Therefore, an ecosystem approach that accounts for the trophic interactions of bivalve aquaculture, including dissolved and particulate organic and inorganic carbon cycling, is needed to provide a rigorous assessment of the role of bivalve mariculture in the CO2 cycle. On the other hand, the discussion about the inclusion of shells of cultured bivalves into the carbon trading system should be framed in the context of ecosystem goods and services. Humans culture bivalves with the aim of producing food, not sequestering CO2 in their shells, therefore the main ecosystem good provided by bivalve aquaculture is meat production, and shells should be considered as by-products of this human activity. This reasoning is key to split the CO2 released due to respiration between meat and shell when constructing a specific CO2 budget for shells for evaluating the potential of including bivalve shells, and not the whole organism, in the carbon trading system. Concluding, an integrated ecosystem approach as well as an understanding of the ecosystems goods and services of bivalve aquaculture are two essential requisites for providing a reliable assessment of the role of bivalve shells in the CO2 cycle.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Department of Fisheries and Oceans, University of New England, Bedford Institute of Oceanography, New University of Lisbon, Institute of Marine Research, University of New Brunswick, Centre for Agriculture research – Sea Fisheries Department, Dalhousie University
Anvendelse af blåmuslinger til husdyrfoder

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University
Authors: Petersen, J. K. (Intern), Nielsen, C. F. (Intern), Nørgaard, J. V. (Forskerdatabase), Steenfeldt, S. (Forskerdatabase), Fitridge, I. (Intern)
Number of pages: 28
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A targeted starfish fishery as predation management on relayed mussel beds

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Saurel, C. (Intern), Fitridge, I. (Intern), Nielsen, C. F. (Intern), Petersen, J. K. (Intern)
Publication date: 2015
Event: Abstract from Aquaculture Europe 2015, Rotterdam, Netherlands.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Bioaccumulation of metals (Cd, Cu, Ni, Pb and Zn) in suspended cultures of blue mussels exposed to different environmental conditions

Farming of suspended mussels is important for generating high protein food and animal feed or for removing nutrients in eutrophic systems. However, the harvested mussels must not be severely contaminated by pollutants posing a potential health risk for the consumers. The present study estimated the bioaccumulation of cadmium, copper, nickel, lead and zinc in suspended blue mussels (Mytilus edulis L.) in the Limfjorden, Denmark, based on observations and modelling. Modelling was used to assess the suitability of suspended blue mussels as animal feed and food products at sea water metal concentrations corresponding to Good Ecological Status (GES) in the European Union Water Framework Directive (WFD) and in future climate change scenarios (higher metal concentrations and higher temperatures). For this purpose, GES is interpreted as good chemical status for the metals using the Environmental Quality Standards (EQS) defined in the WFD priority substance daughter directives. Observations showed that suspended mussels were healthy with respect to metal pollution and generally less polluted than benthic mussels due to the smaller contact with the contaminated sediment. The model results showed that the WFD targets for Cd, Ni and Pb are not protective with respect to marine mussel production and probably should be reduced for marine waters. Climate changes may increase the metal contamination of mussels, but not to any critical level at the relatively unpolluted study sites. In conclusion, WFD targets should be revised to assure that the corresponding body burdens of metals in mussels are below the safety limits according to the EU Directives and the Norwegian classification for animal feed and food production.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University, Orbicon
Authors: Maar, M. (Ekstern), Larsen, M. M. (Ekstern), Tørring, D. B. (Intern), Petersen, J. K. (Intern)
Number of pages: 13
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Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.43 SJR 0.997 SNIP 1.127
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.107 SNIP 1.186 CiteScore 2.44
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.067 SNIP 1.257 CiteScore 2.28
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.323 SNIP 1.439 CiteScore 2.64
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.256 SNIP 1.419 CiteScore 2.52
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.383 SNIP 1.325 CiteScore 2.52
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.231 SNIP 1.202
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.169 SNIP 1.262
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.244 SNIP 1.302
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.114 SNIP 1.355
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.203 SNIP 1.365
Scopus rating (2005): SJR 0.92 SNIP 1.237
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.815 SNIP 1.044
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.934 SNIP 1.238
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.694 SNIP 1.25
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.038 SNIP 1.259
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.033 SNIP 1.39
Web of Science (2000): Indexed yes
Blue mussel (Mytilus edulis) growth at various salinity regimes determined by a Dynamic Energy Budget model

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Marine Ecology and Oceanography, Aarhus University, Orbicon
Authors: Saurel, C. (Intern), Maar, M. (Ekstern), Landes, A. (Intern), Dolmer, P. (Ekstern), Petersen, J. K. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Chemical composition and standardized ileal digestibility of protein and amino acids from blue mussel, starfish, and fish silage in pigs

Mussels cultured on lines for nine months and harvested in March were boiled to removeshells and processed into a dry meal or a silage acidified by formic acid. Starfish meal was prepared from starfish caught in May, and a starfish juice fraction was obtained by pressing fresh starfish. Commercial fish silage from farmed salmon was also included in the experiment. The standardized ileal digestibility (SID) of crude protein (CP) and amino acids (AA) was evaluated in a Latin square design with pigs (initial weight 39.3 kg) fitted with a simple T-cannula in the terminal ileum. Diets contained 131–162 g CP/kg and 5 g chromic oxide/kg. Endogenous losses of protein and AA were estimated by feeding an N-free diet. On a dry matter (DM) basis, mussel meal contained 605 g, mussel silage 575 g, starfish meal 700 g, starfish juice 393 g, and fish silage 776 g CP/kg. The ratio of AA to CP ranged from 0.83 to 0.87. The content of crude fat was high in the mussel products (157–161 g/kg DM), and the starfish meal and juice were high in ash (203 and 474 g/kg DM) with one-fourth being calcium. The AID of CP was 0.74, 0.81, 0.70, and 0.61 for mussel meal, mussel silage, starfish meal, and fish silage. The SID of CP was 0.83, 0.87, 0.80, and 0.68 for mussel meal, mussel silage, starfish meal, and fish silage. For both CP and AA digestibility, the lowest (P<0.05) was found in fish silage and the highest (P<0.05) in mussel silage. In conclusion, both mussel and starfish products showed chemical characteristics arguing for their use as feedstuffs in pig diets. Processing into silage rather than meal increased the SID of CP and AA, and both mussel products and starfish meal had greater SID compared to commercial fish silage.
Co-cultivation of sugar kelp (Saccharina latissima) and blue mussels (Mytilus edulis) in Limfjorden, Denmark, using mussel long line technology

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University
Authors: Nielsen, M. M. (Forskerdatabase), Canal-Vergés, P. (Intern), Petersen, J. K. (Intern), Bruhn, A. (Ekstern), Rasmussen, M. B. (Ekstern)
Publication date: 2015
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Amino acids, Fish silage, Mussel, Pig, Protein, Starfish

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Source: FindIt
Source-ID: 275012265
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Costs and benefits of farming fish with selected behavioural and physiological traits

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Aquaculture, Danish Shellfish Centre
Authors: Skov, P. V. (Intern), de Jesus Gregersen, J. (Intern), Jokumsen, A. (Intern)
Publication date: 2015
Event: Abstract from Aquaculture 2015, Montpellier, France.
Main Research Area: Technical/natural sciences

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

Dansk produktion af linemuslinger til konsum

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Copenhagen
Authors: Frost, H. (Ekstern), Nielsen, R. (Ekstern), Petersen, J. K. (Intern), Larsen, V. B. (Forskerdatabase)
Number of pages: 21
Publication date: 2015
Establishment of blue mussel beds to enhance fish habitats

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

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Petersen, J. K. (Intern), Saurel, C. (Intern), Canal-Vergés, P. (Intern)
Number of pages: 1
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Publication date: 2015
Conference: 107 Annual Meeting, National Shellfisheries Association, Monterey, California, United States, 22/03/2015 - 22/03/2015
Main Research Area: Technical/natural sciences

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Faglig understøttelse af nye forvaltningsprincipper for muslingefiskeri: Kortlægning af makroalger og ålegræs i Natura 2000-områder i Limfjorden

General information
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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Canal-Vergès, P. (Intern), Petersen, J. K. (Intern)
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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Nielsen, C. F. (Intern), Canal-Vergés, P. (Intern), Nielsen, P. (Intern), Gommesen, M. (Intern), Petersen, J. K. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
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Growth and respiration in blue mussels (Mytilus spp.) from different salinity regimes

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Danish Shellfish Centre, Orbicon, NIRAS A/S, University of Copenhagen
Authors: Landes, A. (Intern), Dolmer, P. (Ekstern), Poulsen, L. K. (Ekstern), Petersen, J. K. (Intern), Vismann, B. (Ekstern)
Pages: 373-382
Publication date: 2015
Main Research Area: Technical/natural sciences
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Web of Science (2017): Indexed Yes
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Scopus rating (2016): CiteScore 1.01 SJR 0.433 SNIP 0.644
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.5 SNIP 0.75 CiteScore 1.02
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.425 SNIP 0.488 CiteScore 0.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.564 SNIP 0.693 CiteScore 1.03
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.446 SNIP 0.647 CiteScore 1
For blue mussels, *Mytilus edulis*, one major constrain in the Baltic Sea is the low salinities that reduce the efficiency of mussel production. However, the effects of living in low and variable salinity regimes are rarely considered in models describing mussel growth. The aim of the present study was to incorporate the effects of low salinity into an eco-physiological model of blue mussels and to identify areas suitable for mussel production. A Dynamic Energy Budget (DEB) model was modified with respect to i) the morphological parameters (DW/WW-ratio, shape factor), ii) change in ingestion rate and iii) metabolic costs due to osmoregulation in different salinity environments. The modified DEB-model was validated with experimental data from different locations in the Western Baltic Sea (including the Limfjorden) with salinities varying from 8.5 to 29.9 psu. The identified areas suitable for mussel production in the Baltic Sea are located in the Little Belt area, the Great Belt, the southern Kattegat and the Limfjorden according to the prevailing salinity regimes. The new model can be used for supporting site selection of new mussel nutrient extraction cultures in the Baltic Sea that suffers from high eutrophication symptoms or as part of integrated multi-trophic aquaculture production. The model can also be used to predict the effects of salinity changes on mussel populations e.g. in climate change studies.
Konsekvensvurdering af fiskeri efter blåmuslinger i Lillebælt 2015

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data

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Moderate establishment success of Pacific oyster, Crassostrea gigas, on a sheltered intertidal mussel bed

The Pacific oyster (Crassostrea gigas Thunberg 1793) is introduced into marine ecosystems worldwide. In Denmark, C. gigas was introduced into the micro tidal Limfjord, around 1972 for aquaculture. This study describes the population structure of C. gigas at Agger Tange in 2007, 2009, 2010, and 2011. Here, C. gigas use beds of Blue mussels (Mytilus edulis L.) as primary habitat. The mean abundance (±1 SD) of C. gigas was unchanged during our study (45±2indv.m-2), while it increased for M. edulis from 2010 to 2011 (934±610 to 1434±750indv.m-2, respectively). In 2009, a newly settled cohort of C. gigas was present, but in the succeeding years no or negligible recruitment was recorded. However, age cohort analyses, based on individual shell size at different ages, suggest successful recruitment in three out of seven years. A comparison with the course of the bioinvasion in List Tidal Basin, suggests that the population at Agger Tange is not in the expansion phase of the bioinvasion, despite of frequent settlement, high shell growth rates and relatively high abundance. So far, C. gigas has had moderate establishment success. We conclude that C. gigas is still in the establishment phase, but that this is prolonged, presumably due to low food availability.
Muslingeproduktion i danske fjorde – uudnyttet potentiale eller problemfyldt farvand?

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data
Authors: Nielsen, P. (Intern), Geitner, K. (Intern), Funk, E. S. (Intern), Petersen, J. K. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
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Muslingeproduktion i Vejle Fjord - muligheder og begrænsninger

General information
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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data
Authors: Nielsen, P. (Intern), Geitner, K. (Intern), Funk, E. S. (Intern), Petersen, J. K. (Intern)
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Muslinger som marint virkemiddel til fjernelse af næringsstoffer – miljøeffekter på fjordskaia

General information
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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University
Authors: Timmermann, K. (Ekstern), Bolding, K. (Ekstern), Maar, M. (Ekstern), Larsen, J. (Ekstern), Petersen, J. K. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Mussel mitigation cultures: A cost-efficient and area-intensive tool to improve water quality in coastal waters

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Novagrass, modellering af ålegræs i Danske Fjorde

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, DHI Denmark, University of Southern Denmark
Authors: Rasmussen, E. K. (Ekstern), Flindt, M. (Ekstern), Kuusemäe, K. (Ekstern), Canal-Vergés, P. (Intern)
Publication date: 2015
Event: Abstract from 18. Danske Havforskermøde, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Payment for ecosystem services - paying mussel producers for nitrogen mitigation

General information
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Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Copenhagen, Aarhus University
Authors: Hasler, B. (Ekstern), Petersen, J. K. (Intern), Zandersen, M. (Ekstern), Frost, H. (Ekstern), Ørum, J. E. (Ekstern), Timmermann, K. (Ekstern)
Publication date: 2015
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Main Research Area: Technical/natural sciences
Publication: Research › Conference abstract for conference – Annual report year: 2015

Pelagic and benthic nutrient regeneration processes in mussel cultures (Mytilus edulis) in a eutrophic coastal area (Skive Fjord, Denmark)

Long-line mussel farming has been proposed as a mitigation tool in eutrophic coastal areas as nutrients are removed from the ecosystem upon harvest of the crops and transferred back to land. Further mussels filter the water and thereby increase water transparency and promote benthic plant growth. Intensive mussel farming may, however, negatively affect the nutrient cycling in the local environment through nutrient regeneration in the water column and through sedimentation of biodeposits resulting in organic enrichment of the underlying sediments leading to hypoxic conditions. The objective of this study was to explore the environmental interactions of a long-line mussel farm located in a eutrophic coastal area (Skive Fjord, Denmark) by studying the nutrient cycling in the water column and sediments and assessing their contribution to the nutrient dynamics and oxygen conditions in the fjord. The mussel lines contributed with nutrients, primarily ammonium, to the pool of nutrients in the water column and the contribution increased as the biomass of mussels in the farm increased. The sedimentation of biodeposits was only slightly higher at the farm (51–86 %) compared with a reference site, and the impact on the benthic environment was limited. During most of the production cycle the farm was a net sink of N due to uptake of N in the sediments, but after 1 year, the farm became a net source of N to Skive Fjord. Mussel excretion accounted for ~82 % and sediments for ~18 % of the N released from the farm. The study shows that mitigation of nutrients by long-line mussel farming will be most efficient, if mussels are harvested within the first year of the production cycle

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Southern Denmark
Authors: Holmer, M. (Ekstern), Thorsen, S. W. (Ekstern), Carlsson, M. S. (Ekstern), Petersen, J. K. (Intern)
Pages: 1629-1641
Publication date: 2015
Main Research Area: Technical/natural sciences
Publication information
Journal: Estuaries and Coasts
Volume: 38
Issue number: 5
ISSN (Print): 1559-2723
Ratings:
BFI (2018): BFI-level 1
Pleje af østersbestanden i Limfjorden

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Nielsen, C. F. (Intern), Petersen, J. K. (Intern)
Number of pages: 31
Publication date: 2015

Publication information
Place of publication: Charlottenlund
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
Original language: Danish
Reducing the impact of blue mussel (Mytilus edulis) dredging on the ecosystem in shallow water soft bottom areas

Dredging blue mussels (Mytilus edulis) and thus removing structural elements, inducing resuspension of sediment as well as reducing filtration capacity, will inevitably affect the ecosystem. The study demonstrates that the impacts of fishing can be reduced through gear developments. A new light dredge was tested on commercial vessels using two different experimental setups. First, a twin haul experiment tested the standard gear (i.e., a Dutch dredge) against the light dredge by fishing the two gears side by side onboard the same vessel. Second, a single dredge experiment tested the absolute performance of the two gears by fishing in areas with a known blue mussel density. Results from the twin haul experiment demonstrate that the weight of sediment retained in the gear per square metre fished is 49% less in the light dredge compared with the Dutch dredge which will reduce resuspension of sediment at the surface. Also, the drag resistance of the light dredge was significantly less (177.1 vs. 202.7kgm⁻¹). In the twin haul experiment no significant difference was found in the catch per unit effort (CPUE) of the two gears. The single dredge experiment, on the other hand, demonstrated a significant increase in CPUE exceeding 200% when using the light dredge. Seafloor tracks made by the two dredges could not be distinguished by use of side-scan sonar and the tracks were still detectable2months 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
Authors: Frandsen, R. (Intern), Eigaard, O. R. (Intern), Poulsen, L. K. (Ekstern), Tørring, D. B. (Intern), Stage, B. (Intern), Lisbjerg, D. (Intern), Dolmer, P. (Ekstern)
Pages: 162-173
Publication date: 2015
Main Research Area: Technical/natural sciences

Publication information
Journal: Aquatic Conservation : Marine and Freshwater Ecosystems
Volume: 25
Reproduction rates under variable food conditions and starvation in Mnemiopsis leidyi: significance for the invasion success of a ctenophore

The ctenophore Mnemiopsis leidyi is characterized by high growth rates and a large reproductive capacity. However, reproductive dynamics are not yet well understood. Here, we present laboratory data on food-dependent egg production in M. leidyi and egg hatching time and success. Further, we report on the reproduction of laboratory-reared and field-caught animals during starvation. Our results show that the half-saturation zooplankton prey concentration for egg production is reached at food levels of 12–23 µgC L−1, which is below the average summer food concentration encountered in invaded areas of northern Europe. Furthermore, starved animals continue to produce eggs for up to 12 days after cessation of feeding with high overall hatching success of 65–90%. These life history traits allow M. leidyi to thrive and reproduce in environments with varying food conditions and give it a competitive advantage under unfavourable conditions. This may explain why recurrent population blooms are observed and sustained in localized areas in invaded northern Europe, where water exchange is limited and zooplankton food resources are quickly depleted by M. leidyi. We suggest that these reproductive life history traits are key to its invasion success.

General information

State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Danish Shellfish Centre, Centre for Ocean Life, University of Gothenburg
Authors: Jaspers, C. (Intern), Møller, L. F. (Intern), Kiørboe, T. (Intern)
Pages: 1011-1018
Publication date: 2015
Main Research Area: Technical/natural sciences
Review of environmental factors influencing distributions of selected Baltic species: Report: BIO-C3 Deliverable, D1.1 . EU Bonusproject BIO-C3

General information
State: Published
Organisations: National Institute of Aquatic Resources, Centre for Ocean Life, Section for Marine Ecology and Oceanography, Danish Shellfish Centre, University of Hamburg, Leibniz Institute of Marine Sciences, University of Tartu
Number of pages: 75
Publication date: 2015

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
DOIs:
10.3289/BIO-C3_D1.1
Links:
http://oceanrep.geomar.de/31919/
Publication: Research › Report – Annual report year: 2016

The invasive comb-jelly Mnemiopsis leidyi in northern Europe: Transport, origin and local extinction and re-invasion of sub-populations

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Marine Ecology and Oceanography, Danish Shellfish Centre, Leibniz Institute of Marine Sciences
Authors: Jaspers, C. (Intern), Hinrichsen, H. (Ekstern), Møller, L. F. (Intern)
Publication date: 2015
Event: Abstract from ASLO Aquatic Sciences Meeting 2015, Granada, Spain.
Turning pests into protein – starfish by-product management in the Danish mussel industry

**General information**

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

Bivalve aquaculture transfers in Atlantic Europe. Part A: Transfer activities and legal framework

Intentional transfers of numerous bivalve species have had a long tradition and are commonly conducted along the European Atlantic coast. However numerous studies have concluded that intentional transfer of species for aquaculture purposes is one of the most principal vectors for the introduction of exotic species around the world. Threats due to the transfer and introduction of species have been identified and a range of global and regional agreements, guidelines, standards and statutes to minimize effects have been established. Yet whether such regulations can protect and conserve the marine environment and address economic considerations remains unanswered. This study provides the first overview of bivalve transfer activities for aquaculture purposes along the European Atlantic coast. Existing international and EU legislation is described, and potential weaknesses in the existing legislative frameworks are discussed. Recommendations for the development of integrated risk assessment methods are given. These may help to minimize the intrinsic threats of transfer activities in marine environments. The resulting impacts and effects of transfer activities of bivalves for aquaculture purpose are addressed in detail in a companion paper.

**General information**

**State:** Published
**Organisations:** Danish Shellfish Centre, National Institute of Aquatic Resources, Marine Scotland, Institute for Agricultural and Fisheries Research, Institute of Marine Research, IFREMER, Marine Research Institute, Marine Institute, Centre for Marine Research, Rutgers Cooperative Extension, Wageningen IMARES
**Authors:** Muehlbauer, F. (Ekstern), Fraser, D. (Ekstern), Brenner, M. (Ekstern), Van Nieuwenhove, K. (Ekstern), Buck, B. (Ekstern), Strand, O. (Ekstern), Mazurié, J. (Ekstern), Thorarinsdottir, G. (Ekstern), Dolmer, P. (Intern), O’Beirn, F. (Ekstern), Sanchez-Mata, A. (Ekstern), Flimlin, G. (Ekstern), Kamermans, P. (Ekstern)
**Pages:** 127-138
**Publication date:** 2014

**Publication information**

**Journal:** Ocean & Coastal Management
**Volume:** 89
**ISSN (Print):** 0964-5691
**Ratings:**
- BFI (2018): BFI-level 1
- Web of Science (2018): Indexed yes
- BFI (2017): BFI-level 1
- Web of Science (2017): Indexed yes
- BFI (2016): BFI-level 1
- Scopus rating (2016): CiteScore 2.23 SJR 0.887 SNIP 1.123
- BFI (2015): BFI-level 1
- Scopus rating (2015): SJR 0.783 SNIP 1.002 CiteScore 1.92
- Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 1
- Scopus rating (2014): SJR 0.883 SNIP 1.306 CiteScore 2.05
- Web of Science (2014): Indexed yes
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 0.719 SNIP 1.394 CiteScore 1.84
- ISI indexed (2013): ISI indexed yes
- BFI (2012): BFI-level 1
For centuries human populations have moved live shellfish around the world for consumption or aquaculture purposes; being relayed from their area of origin for growout or sale. This is in contrast to the inadvertent anthropogenic spreading of species via e.g. ballast waters. There are inherent risks associated with transfer of shellfish including introducing of alien species, diseases, pests, bacteria and viruses associated with the translocated species in addition to the potential impact on genetic integrity and biodiversity of local stocks. Many examples of severe ecological impacts have been documented worldwide owing to the intentional or unintentional translocation of animals. It is therefore important to develop risk reduction methods which have not yet been documented to be incorporated into current fish health or environmental legislation. This part of the study describes the impacts of transfer activities of cultured bivalve shellfish along the European Atlantic coast; identifies hitch hiker species, fouling organisms or infectious agents which can be translocated with a target species. Further, the study highlights the need for thorough, standard risk reduction measures designed to minimise the impact on ecosystems worldwide. In a companion paper details of actual transfer activities in Atlantic Europe are presented and all levels of legislation dealing with transfer activities on a global, regional and national scale are carefully reviewed.

**Bivalve aquaculture transfers in Atlantic Europe. Part B: Environmental impacts of transfer activities**

For centuries human populations have moved live shellfish around the world for consumption or aquaculture purposes; being relayed from their area of origin for growout or sale. This is in contrast to the inadvertent anthropogenic spreading of species via e.g. ballast waters. There are inherent risks associated with transfer of shellfish including introducing of alien species, diseases, pests, bacteria and viruses associated with the translocated species in addition to the potential impact on genetic integrity and biodiversity of local stocks. Many examples of severe ecological impacts have been documented worldwide owing to the intentional or unintentional translocation of animals. It is therefore important to develop risk reduction methods which have not yet been documented to be incorporated into current fish health or environmental legislation. This part of the study describes the impacts of transfer activities of cultured bivalve shellfish along the European Atlantic coast; identifies hitchhiker species, fouling organisms or infectious agents which can be translocated with a target species. Further, the study highlights the need for thorough, standard risk reduction measures designed to minimise the impact on ecosystems worldwide. In a companion paper details of actual transfer activities in Atlantic Europe are presented and all levels of legislation dealing with transfer activities on a global, regional and national scale are carefully reviewed.

**General information**

State: Published
Organisations: Danish Shellfish Centre, National Institute of Aquatic Resources, Marine Scotland, Institute for Agricultural and Fisheries Research, Marine Institute, IFREMER, Marine Research Institute, Centre for Marine Research, Institute of Marine Research, Rutgers Cooperative Extension, Wageningen IMARES
Authors: Brenner, M. (Ekstern), Fraser, D. (Ekstern), Van Nieuwenhove, K. (Ekstern), O'Beirn, F. (Ekstern), Buck, B. (Ekstern), Mazurié, J. (Ekstern), Thorarinssóttir, G. (Ekstern), Dolmer, P. (Intern), Sanchez-Mata, A. (Ekstern), Strand, O. (Ekstern), Flimlin, G. (Ekstern), Miossec, L. (Ekstern), Kamermans, P. (Ekstern)
Pages: 139-146
Publication date: 2014
Main Research Area: Technical/natural sciences

**Publication information**

Journal: Ocean & Coastal Management
Volume: 89
ISSN (Print): 0964-5691
Clearance rate of Mytilus edulis (L) as a function of current velocity and mussel aggregation

The aim of the current study was to investigate the effect of water current velocities on the clearance rate of Mytilus edulis when different numbers of mussels were used in the experiments. An automatic setup, which controlled and monitored the algal concentration continually, was used to measure the effect of increasing current velocity (0.05-1.4 m/sec) on the M. edulis clearance rate. Clearance rate measurements were performed under constant food concentrations of 3,000 cells/mL of Rhodomonas salina on either 3 mussels or 20 mussels. We found that the clearance rate of 20 mussels was unaffected by current velocities up to 1.4 m/sec, whereas experiments with 3 mussels showed that clearance of the mussels decreased progressively at current velocities greater than 0.2 m/sec, and reached 0 L/h per individual at current velocities greater than 0.6 m/sec. The constant feeding at all current velocities observed in the experiments with 20 mussels was most likely a result of a combination of reduced current velocity within the aggregated mussels, a current velocity-dependent change of siphon orientation, and attachment of the mussels at current velocities less than 1.2 m/sec,
whereas in experiments with 3 mussels, mussels were detached at >= 0.4 m/sec and the mussel valves were closed in
genral. Thus, it is evident that the number of mussels present in the experimental tank affects the results and
emphasizes the importance of discriminating between the individual level and the level of mussel aggregations in the
study of current velocity effects on clearance, especially when the study is made on a bivalve species that form dense
beds in nature, to ensure consistency with field observations.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, University of Copenhagen
Authors: Nielsen, P. (Intern), Vismann, B. (Ekstern)
Pages: 457-463
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Shellfish Research
Volume: 33
Issue number: 2
ISSN (Print): 0730-8000
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 1.01 SJR 0.433 SNIP 0.644
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.5 SNIP 0.75 CiteScore 1.02
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.425 SNIP 0.488 CiteScore 0.8
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.564 SNIP 0.693 CiteScore 1.03
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.446 SNIP 0.647 CiteScore 1
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.548 SNIP 0.632 CiteScore 1.01
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.547 SNIP 0.628
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.477 SNIP 0.549
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.371 SNIP 0.551
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.492 SNIP 0.674
Scopus rating (2006): SJR 0.492 SNIP 0.615
Scopus rating (2005): SJR 0.397 SNIP 0.624
Scopus rating (2004): SJR 0.474 SNIP 0.757
Scopus rating (2003): SJR 0.481 SNIP 0.56
Scopus rating (2002): SJR 0.383 SNIP 0.634
De Lokale Dyder: Udvikling af muslingeerhvervet i Limfjorden

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Number of pages: 32
Publication date: 2014

Publication information
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
Original language: Danish
Main Research Area: Technical/natural sciences
Electronic versions:
Publishers version
Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008

Ecosystem goods and services from Manila clam culture in Puget Sound: a modelling analysis

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, New University of Lisbon, Pacific Shellfish Institute, Chuckanut Shellfish Inc, Baywater Inc., University of Washington
Authors: Saurel, C. (Intern), Ferreira, J. (Ekstern), Cheney, D. (Ekstern), Suhrbier, A. (Ekstern), Dewey, B. (Ekstern), Davis, J. (Ekstern), Cordell, J. (Ekstern)
Pages: 255-270
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Aquaculture Environment Interactions
Volume: 5
ISSN (Print): 1869-215X
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 2.19 SJR 0.945 SNIP 1.051
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.867 SNIP 0.867 CiteScore 2.25
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.861 SNIP 1.047 CiteScore 2.25
From shellfish feeding to carrying capacity modelling

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, New University of Lisbon
Authors: Saurel, C. (Intern), Ferreira, J. (Ekstern), Petersen, J. K. (Intern)
Publication date: 2014
Event: Abstract from Annual Meeting of the National Shellfish Association, Jacksonville, FL., United States.
Main Research Area: Technical/natural sciences
Publication: Research › Journal article – Annual report year: 2014

Konsekvensvurdering af fiskeri på blåmuslinger i Lillebælt 2014

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

Publication information
Publisher: Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet
ISBN (Electronic): 978-87-7481-188-6
Original language: Danish

Series: DTU Aqua-rapport
Number: 282-2014
ISSN: 1395-8216
Main Research Area: Technical/natural sciences
Electronic versions:
Links:
http://www.aqua.dtu.dk/Publikationer/Forskningsrapporter/Forskningsrapporter_siden_2008
Publication: Commissioned › Report – Annual report year: 2014

Konsekvensvurdering af fiskeri på blåmuslinger og søstjerner i Løgstør Bredning 2014/2015

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Monitoring and Data, Danish Shellfish Centre

Publication: Commissioned › Report – Annual report year: 2014
Mussels as a tool for mitigation of nutrients in the marine environment

Long-line mussel farming has been proposed as a mitigation tool for removal of excess nutrients in eutrophic coastal waters. A full-scale mussel farm optimized for cost efficient nutrient removal was established in the eutrophic Skive Fjord, Denmark where biological and economic parameters related to nutrient removal was monitored throughout a full production cycle (1yr). The results showed that it was possible to obtain a high area specific biomass of 60tWWha−1equivalent to a nitrogen and phosphorus removal of 0.6–0.9 and 0.03–0.04tha−1yr, respectively. The analysis of the costs related to establishment, maintenance and harvest revealed that mussel production optimized for mitigation can be carried out at a lower cost compared to mussel production for (human) consumption. The costs for nutrient removal was 14.8€kg−1N making mitigation mussel production a cost-efficient measure compared to the most expensive land-based measures.
Research, tourism and education: A turbulent but successful marriage.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Nielsen, C. F. (Intern), Canal-Vergés, P. (Intern), Tørring, D. B. (Intern), Gommesen, M. (Intern), Petersen, J. K. (Intern)
Publication date: 2014
Main Research Area: Technical/natural sciences
Source: PublicationPreSubmission
Source-ID: 103005142
Publication: Research › Conference abstract for conference – Annual report year: 2014

Starfish by-products management for mussel industry in Denmark

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Nielsen, C. F. (Intern), Saurel, C. (Intern), Fitridge, I. (Intern), Canal-Vergés, P. (Intern), Petersen, J. K. (Intern)
Publication date: 2014
Event: Abstract from Aquaculture Europe 14, Donostia-San Sebastian, Spain.
Main Research Area: Technical/natural sciences
Links: https://www.was.org/easonline/mobile/Paper.aspx?id=3550
Publication: Research › Conference abstract for conference – Annual report year: 2014
The Pacific oyster, Crassostrea gigas, was introduced into the Netherlands in 1964 for aquaculture purposes and has since spread extensively in Northern European waters. Eight locations in the western part of the Limfjord, Denmark, first sampled in 2006 were revisited in 2011, to determine how the population of C. gigas has changed. Densities were lower at all but two locations. No differences in average shell lengths or condition indices were detected. No changes in the number or distribution of shell size classes were observed. These similarities suggest there is a single population that has not expanded in terms of geographic distribution. While reproduction does occur, conditions for population growth appear to be suboptimal. The species has become established in western Limfjord but abundance is low and densities are much lower than those considered harmful to the ecosystem. At present, the C. gigas population is not a cause for concern in the Limfjord ecosystem.
The seaweed challenge

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Canal-Vergés, P. (Intern), Tørring, D. B. (Intern), Bruhn, A. (Ekstern), Petersen, J. K. (Intern)
Publication date: 2014
Event: Abstract from Aquaculture Europe 14, Donostia-San Sebastian, Spain.
Main Research Area: Technical/natural sciences
Publication: Research › Journal article – Annual report year: 2014

Anvendelse af GIS i forbindelse med konsekvensvurderinger af fiskeri på skaldyr i Natura 2000-områder i Danmark

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Monitoring and Data, Danish Shellfish Centre, Section for Ecosystem based Marine Management
Authors: Geitner, K. (Intern), Christensen, H. T. (Intern), Christoffersen, M. O. (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


General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
Authors: Banta, G. T. (Ekstern), Delefosse, M. (Ekstern), Canal-Vergés, P. (Intern), Kristensen, E. (Ekstern)
Publication date: 2013
Event: Abstract from Dansk Havforskermøde, Roskilde, Denmark.
Main Research Area: Technical/natural sciences
Source: PublicationPreSubmission
Source-ID: 103004930
Publication: Research › Conference abstract for conference – Annual report year: 2013

Blue Reef - Reetableret stenrev og deres effekt på fiskefaunen – foreløbige resultater af fiskeundersøgelserne på Læsø Trindel

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

Dannelse af bankestruktur hos blåmuslinger: effekt af substrat, tid og muslingernes oprindelse

General information
State: Published
Dan miljømæssige betydning af tilstedeværelsen af den introducerede stillehavsøsters, Crassostrea gigas, på en litoral blåmuslingbanke ved Agger Tange, Limfjorden

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre
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

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, 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

Genskabelse af biogene rev i Nørrefjord

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Danish Shellfish Centre, Section for Monitoring and Data
Authors: Kristensen, L. (Intern), Poulsen, L. K. (Intern), Christensen, H. T. (Intern), Stenberg, C. (Intern), Thorsen, S. W. (Ekstern), Reibek, M. (Intern), Andersen, S. K. (Intern), Dolmer, P. (Intern), Geitner, K. (Intern), Gram, V. (Ekstern), van Deurs, M. (Ekstern), Holm, N. (Intern), Holmer, M. (Ekstern), Knudsen, J. (Ekstern), Knudsen, M. (Ekstern), Støttrup, J. (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

Konsekvensvurdering af fiskeri på blåmuslinger i Lillebælt 2013

General information
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Section for Ecosystem based Marine Management, Section for Monitoring and Data
Authors: Dolmer, P. (Intern), Christoffersen, M. O. (Intern), Geitner, K. (Intern), Larsen, F. (Intern), Dinesen, G. E. (Intern), Holm, N. (Intern)
Number of pages: 62
Publication date: 2013

Publication information
Place of publication: Charlottenlund
Makroalger og deres betydning for ålegræsset

**General information**
State: Published
Organisations: National Institute of Aquatic Resources, Danish Shellfish Centre, Aarhus University
Authors: Canal-Vergès, P. (Intern), Rasmussen, J. R. (Ekstern), Olesen, B. (Ekstern)
Pages: 12-15
Publication date: 2013
Main Research Area: Technical/natural sciences

**Publication information**
Journal: Vand og jord
Volume: 20
Issue number: 1
ISSN (Print): 0908-7761
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Multiple roles of a mixotrophic dinoflagellate in the marine food web

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Acidification and warming affect both a calcifying predator and prey, but not their interaction: Feature article

Both ocean warming and acidification have been demonstrated to affect the growth, performance and reproductive success of calcifying invertebrates. However, relatively little is known regarding how such environmental change may affect interspecific interactions. We separately treated green crabs Carcinus maenas and periwinkles Littorina littorea under conditions that mimicked either ambient conditions (control) or warming and acidification, both separately and in combination, for 5 mo. After 5 mo, the predators, prey and predator-prey interactions were screened for changes in response to environmental change. Acidification negatively affected the closer-muscle length of the crusher chela and correspondingly the claw-strength increment in C. maenas. The effects of warming and/or acidification on L. littorea were less consistent but indicated weaker shells in response to acidification. On the community level, however, we found no evidence that predator-prey interactions will change in the future. Further experiments exploring the impacts of warming and acidification on key ecological interactions are needed instead of basing predictions of ecosystem change solely on species-specific responses to environmental change.
Benthic grazing impact: coupling and uncoupling in relation to physical forcing

In the shallow micro-tidal cove Kertinge Nor, Denmark, a series of field campaigns were conducted from April 1995 to September 1996. During these campaigns, the effect of benthic grazing on phytoplankton concentrations was studied using a dual approach. In the first approach, the density, size distribution and in situ growth of 3 dominant benthic grazers were determined to assess grazing potential and its realisation. In the second approach, the realised grazing potential was estimated from the decline in area-specific chlorophyll a (chl a) concentrations after breakdown of stratification. Forcing functions were monitored continuously during the field campaigns using meteorological data, current meters, temperature loggers and CTD point measurements. In addition, measurements from a local monitoring program in Kertinge Nor were included in the data analysis. Stratification of the water column in the cove was mainly governed by wind speed and solar radiation and occurred 50 to 75% of the time. The potential grazing pressure of the benthic suspension feeders varied but was always greater than that required to graze the entire volume of the cove per day. Using both approaches, it was estimated that realised grazing was ~50% of the potential. The lack of realisation of the grazing potential could be attributed to a lack of mixing of the water column, which resulted in strong vertical gradients in concentrations of chl a. The primary mode of decoupling between benthic suspension feeders and phytoplankton was the stratification of the water column, which created refuges for the phytoplankton.
Effects of mussel farms on the benthic nitrogen cycle on the Swedish west coast

The biogeochemical impact of 3 long-line mussel farms (M1, M2 and M3) in Lysekil, Sweden, was investigated from before farm establishment until 1.5 yr after operation had begun. Sedimentation, benthic N flux, total oxygen uptake (TOU) and sulfate reduction rate (SRR) were all significantly increased below the mussel lines at all 3 farms. Effects of increased sedimentation rates were revealed by sediment profile imaging and were highest at Stn M2. These effects increased significantly with time of farm operation, indicating the accumulation of organic matter within sediments over time. Furthermore, more total particulate organic N deposited at farm stations was recycled into the water column compared to at reference stations (~45 versus ~13%), indicating an increased release of dissolved inorganic N from sediment below the mussel farms. At one station (M2) with the highest increase in sedimentation rate, denitrification seemed inhibited, while at another station (M3), with a less pronounced increase in sedimentation rate, denitrification was in fact stimulated, accounting for 13% of total sediment N removal. Calculations based on estimated values of N removal through mussel harvest and direct measurements of N input through changes in sedimentation, N regeneration from sediment to the water column through benthic fluxes and changes in denitrification showed, in all cases, a net removal of N from the system, as
only 26 to 40% of the total amount of harvested N had been added to the sediments during the growth period.
Impact of an icy winter on the Pacific oyster (Crassostrea gigas Thunberg, 1793) populations in Scandinavia

The Pacific oyster (Crassostrea gigas) is an invasive species that has dispersed into Scandinavia during the last few decades. The objective of this study was to evaluate the effects of extreme winter conditions on the mortality of the Pacific oyster in Scandinavia. The study was done by compiling mortality data from independent surveys in Denmark, Sweden and Norway. Winter mortality of the oysters increased with latitude, which can be explained by the colder climate experienced at higher latitudes. Mortality was also found to be affected by site specific conditions such as water depth at the sampling sites of oyster populations. Despite the severe winter conditions of 2009/2010 causing high mortality, the Pacific oyster still exists in large numbers in Scandinavia. The present investigation indicates that extreme winter conditions may result in a temporary reduction of the density of the Pacific oyster, but that the species can be expected to continue its invasion of Scandinavian coastal areas.
Towards sustainable coexistence of aquaculture and fisheries in the coastal zone

Globally, coastal areas are subject to an increase in competing activities. Coastal fisheries and aquaculture are highly dependent on availability and accessibility of appropriate sites. Aquaculture production is increasing, whereas fisheries are at best stagnant. Coastal activities also include activities such as recreation, tourism, facilities for renewable energy production, all of which are expected to increase in importance. There is also increasing focus on Marine Protected Areas (MPAs). Thus, competition for available sites will probably increase, emphasizing the need for Marine Spatial Planning (MSP) and improved management tools supporting policies for space allocation along the entire European coastline.

Successful MSP is not likely to be achieved without a certain level of conflict, and without iterative adaptations in management actions. MSP is viewed an essential part of advancing ecosystem-based management as demanded by the Marine Strategy Directive. The biological interconnectedness of fisheries and aquaculture is strong, with factors such as competition for space, disease transmission, genetic impact from escapees, availability of food for cultured finfish, and organic and inorganic waste management. Furthermore, the public perception of aquaculture in Europe and North America may be characterized by the view of aquaculture being a “new” and “unnatural” activity, whereas fisheries are viewed as “traditional” and “natural”. However, in an ecosystem-based management context, both industries represent human activities strongly influencing, and influenced by, the environment. Management of aquaculture and fisheries, as well as other uses of the coastal zone, should be considered integral parts with local variations in their respective importance.
Coprophagy in copepods and in a natural zooplankton community

Sediment trap studies have revealed that often only a minor fraction of the zooplankton fecal pellet production leave the upper ocean, and it has been suggested that copepod grazing on pellets (coprophagy) is the reason for this. A simple model is here used to estimate rate of coprophagy from lab and field observations. In the lab Acartia tonsa and Temora longicornis have coprophagous behavior and clear fecal pellets at a rate of 10-15 ml/female/d. Observations of fecal pellet production, sedimentation, and abundance collected during a 10-d late summer study in the North Sea revealed that less than 5 % of the fecal pellet production in the upper 50 m was lost as flux below 50 m depth. Estimates of coprophagy rates showed, however, that the zooplankton community > 200 μm could account for only a few percent of the fecal pellet loss. Thus, plankton organisms < 200 μm must be responsible for the degradation of the fecal pellets.