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DFPO Limfjord Mussel and Cockle Fishery

MSC No. 2 Surveillance Report

Prepared for Danish Fishermen Producer Organisation (DFPO)

Certificate No: MRAG-F-50

MRAG Americas, Inc.

July 2017

Authors: Julian Addison and Chris Grieve

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1 Introduction

The DFPO Limfjord Mussel and Cockle Fishery was certified in January 2016, and this report contains the findings of the second annual surveillance cycle under this certification. As part of this certification, a single condition was placed to develop a research plan for the Limfjord cockle fishery. No recommendations were made.

The client's responses to the conditions of certification were set out in the Client Action Plan (CAP). Progress associated with the actions set forth in the CAP was examined as a part of this surveillance audit (see section 4). This progress has been evaluated by MRAG Americas Audit Team (set out below as "Progress on Condition") against the annual milestones set by the assessment team as part of the conditions and the commitments made in the CAP.

The purpose of the annual surveillance report is to:

- a) **Establish and report** on whether or not there have been any material changes to the circumstances and practices affecting the original complying assessment of the fishery;
- b) **Monitor** the progress made to improve those practices that have been scored as below "good practice" (a score of 80 or above) but above "minimum acceptable practice" (a score of 60 or above) – as captured in any "conditions" raised and described in the Public Certification Report and in the corresponding Action Plan drawn up by the client;
- c) **Monitor** any actions taken in response to any (non-binding) "recommendations" made in the Public Certification Report; and
- d) **Re-score** any Performance Indicators (PIs) where practice or circumstances have materially changed during the intervening year, focusing on those PIs that form the basis of any conditions raised.

2 General Information

2.1 Certificate holder details

Fishery name	DFPO Limfjord Mussel and Cockle Fishery		
Unit(s) of assessment	Limfjord Mussels and Cockles		
Date certified	5 th January 2016	Date of expiry	4 th January 2021
Surveillance level and type	Surveillance level 4, off-site surveillance audit.		
Date of surveillance audit	16 th May 2018		
Surveillance stage (tick one)	1st Surveillance		
	2nd Surveillance	✓	
	3rd Surveillance		
	4th Surveillance		
	Other (expedited etc)		
Surveillance team	Lead assessor: Julian Addison Assessor(s): Chris Grieve		
CAB name	MRAG Americas		
CAB contact details	Address	8950 Martin Luther King Jr St. N, Suite 202 St. Petersburg, FL 33702 USA	
	Phone/Fax	Tel: (727) 563-9070 Fax: (727) 563-0207	
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	Contact name(s)	Amanda Stern-Pirlot	
Client contact details	Address	Danish Fishermen Producer Organisation (DFPO) Nordensvej 3, Taulov DK-7000 Fredericia, Denmark	
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	Email	ssm@dkfisk.dk	
	Contact name(s)	Sofie Smedegaard Mathiesen	

3 Background

3.1 Description of the fishery

The blue mussel (*Mytilus edulis*) is an important resource in the Danish fisheries and the most important fishing area for mussels in Denmark is the Limfjord (Figure 1). All vessels within the Unit of Certification (UoC) are mussel dredgers, all of a similar size and power, and all of which are required to use the same type of fishing gear. The fishery issues 50 licenses per year, of which there are currently 24 active vessels during 2018 (Table 1). A new lightweight type of fishing gear was introduced in the fishery in 2010 and is now used throughout the fishery. Vessels continue to fish in the same areas as in previous years. For shellfish production areas to be opened to fishing, fishers must first request the Ministry to open an area, and then the Danish Veterinary and Food Administration assesses the water quality. The two authorities then liaise, and a license is issued to fish the area. All shellfish production areas currently open can be found on the following website:

https://www.foedevarestyrelsen.dk/Kontrol/Muslingeovervaagning/Muslingeovervaagning_Danmark/Sider/11maj2018udmelding1901fiskeri.aspx

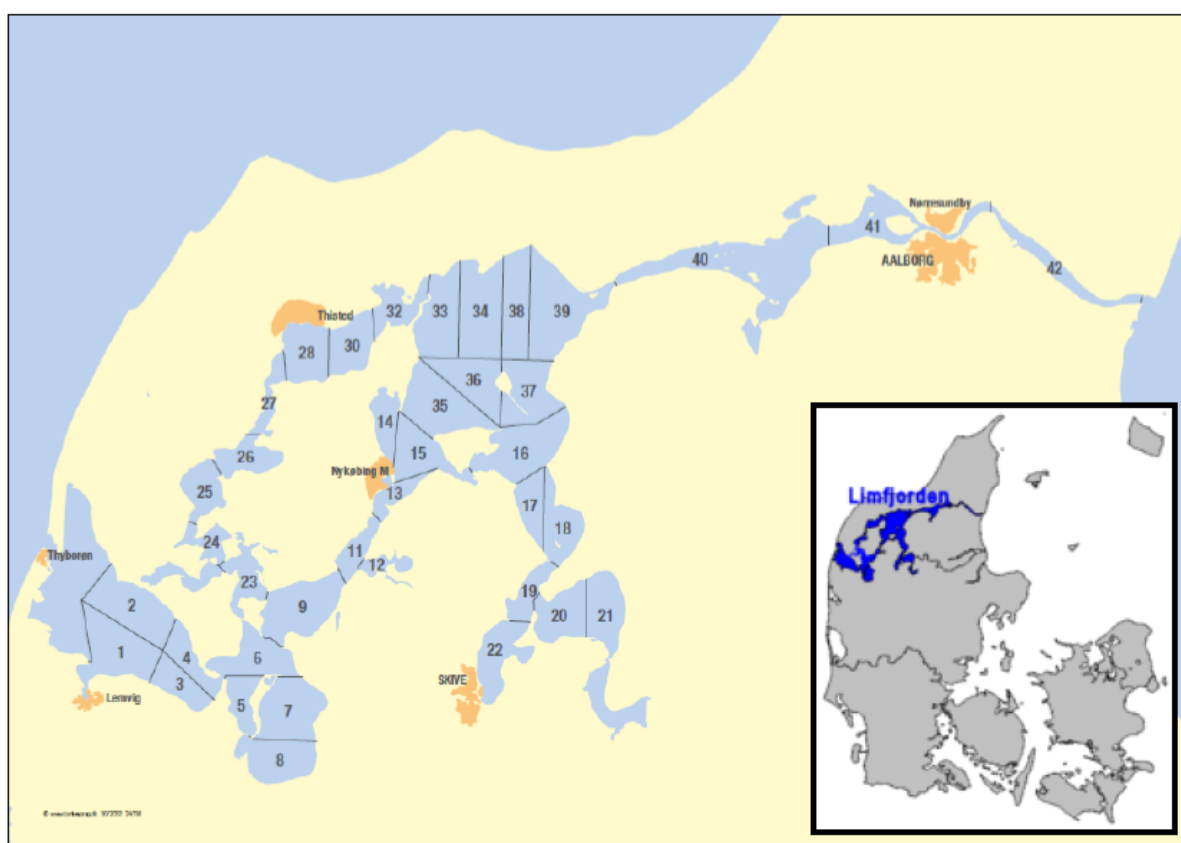


Figure 1: Map of designated shellfish production areas in the Limfjord, northern Denmark. The UoC includes all of the production areas 1-42. Inset map shows the location of the Limfjord in Denmark.

Table 1: List of active vessels in the UoC during 2018

Registration	Vessels
A60	Frida
E63	Sine
HM911	Elias

L154	Tambosund
L158	Heidi Bach
L253	Laura
L491	Berit
L500	Jens Sund
L54	Mads Vester
L933	Blackie
L935	Sandra Pedersen
L941	Musse II
SK21	Ida Marie
SK18	Broberg
SK100	Morton Thomas
SK919	Margrethe P
SK920	Nitsen
SK925	Joan Kiss
T121	Balder
T194	Rikke
T229	Liden Kirsten
T300	Betina Kærgaard
T301	Edith Kærgaard
L150	Smilla

At certain times, mussel dredging vessels will incorporate a smaller mesh net in their dredges to target cockles (*Cerastoderma edule*) in the Limfjord mussel fishery. Catches are highest during the spring and autumn months when the cockles (which are normally buried in the seabed) may emerge on to the surface of the seabed and become amenable to capture in mussel dredges.

Whilst the mussel dredging vessels are clearly targeting cockles at certain times of the year, the Danish Fisheries Agency (Fiskeristyrelsen) does not permit a directed fishery solely for cockles, and mussel dredging vessels are only permitted to retain cockles providing that they weigh no more than 49% of the total landings from a vessel per day.

3.2 Changes in the management system

During 2017, there were significant changes in the overarching management system. At ministerial level, the Danish government restructured the departments and ministries responsible for fisheries management and policy, bringing them under the overall jurisdiction of the Ministry of Foreign Affairs for Denmark. Fisheries policy-making is now the responsibility of the Minister for Fisheries, Equal Opportunities and Nordic Cooperation. While the newly named Danish Fisheries Agency (Fiskeristyrelsen) is responsible for Monitoring, Control and Surveillance, as well as the administration of the European Maritime and Fisheries Fund (EMFF). The Danish Veterinary and Food Administration, under the Ministry of Environment and Food of Denmark, continues to have jurisdiction for determining water quality issues in relation to the opening of mussel fishing grounds. While the functional units of the former AgriFish Agency have been divided across departmental entities, in combination their tasks remain the same as before the restructure, as do the official mechanisms for dialogue within the fisheries management and policy-making process (i.e., the Mussel Advisory Committee). It was suggested that there appears to be more political interaction on a day-to-day basis; however, it is as yet unclear whether this might influence either the day-to-day management of the fishery or policy-making within the overarching management system. The surveillance team noted that checking this in future surveillance audits would provide information relevant to the functioning of the management system.

New Executive Orders describe the powers and authority of the different organisations that make and implement fisheries management decisions in relation to the Limfjord mussel fishery. BEK nr 1388 of 03/12/2017 describes the regulations for the mussel and oyster fisheries in Limfjord, BEK nr 1393 of 04/12/2017 describes the powers of the Danish Fisheries Agency, and LBK nr 46 of 11/01/2017 (the Food Act) describes the powers of the Danish Veterinary and Food Administration.

During 2017, the Mussel Policy was evaluated with a view to updating it in 2018. The Mussel Advisory Committee consulted with a broad range of stakeholders, who were also invited to make written submissions. The process, reported as very good, has resulted in recommendations to continue with the policy to balance exploitation of mussel and environmental protection in Natura 2000 areas by retaining the fishing area limit of 15%, as well as entry criteria. There was also a recommendation to revise Track 3 of the policy to develop new areas and new fisheries, particularly for the invasive species Pacific oyster. The Ministry expects to release a new Mussel Policy in summer 2018 (A. Gadegaard Boye, Danish Fisheries Agency, pers. comm.).

The Mussel Advisory Committee has a new member organisation representing a cooperative for small-scale fishers whose members primarily use lines to catch their fish. Despite this member organisation not representing fishers involved in the mussel fishery, as a member of the Mussel Advisory Committee, they have a voice at the table in relation to decisions and advice emerging from the Committee.

There is a new Fisheries Development Policy that will enable new mussel and oyster fisheries to be developed. As reported in last year's surveillance audit, cockles as a potential target species (i.e., regulating a directed cockle fishery) has risen in importance. Indeed, the political interest in cockles is reported to have further intensified in the last year. The aim of the new development policy is to ensure adequate protections are in place for sustainable exploitation of 'new' species. Despite cockles being fished for years, in the context of management, the management approach has been to treat them as a non-target species. The rising importance of cockles means that the fishery is receiving attention as if it were 'new' (i.e., policy-makers wish to ensure cockles are sustainably exploited).

The development policy also includes a focus on developing fisheries that target invasive species. Under the policy, some licences were granted to mussel fishers in Limfjord waters to fish for the invasive species Pacific oyster. Monitoring of activity in the shallower waters for interactions with eelgrass and birds is a concern. The surveillance team noted that a directed fishery for starfish in the area is also now authorised.

3.3 Changes in relevant regulations

Since the full assessment certification in January 2016, there have been a number of changes to the regulation of the Limfjord mussel and cockle fishery, which includes changes to vessel licensing, gear, and the maximum size of vessels and changes to eelgrass areas within Natura 2000 sites. These were briefly summarized in the 2017 surveillance report and are not repeated here. As noted above, a revised regulation governing mussel and oyster fishing was enacted in December 2017. Below is a brief summary of changes since the Year 1 surveillance report:

(i) **Vessel licensing** – To date, the total number of licenses issued (named individual) and therefore number of vessels remain at 50 although the number of active vessels in the fishery has been steadily reducing (down to 24 by early 2018). Since 2014, vessel owners have been permitted to rent other licenses to enable them to increase their annual catch of mussels and cockles. A new ruling in 2017 allowed individuals to obtain more than one license, or rent a license, to increase quota. This was amended again in early 2018 to allow further pooling of multiple quota shares on a single vessel. Meanwhile all shares that are owned by a fisher, regardless of which vessel they are attached to, count towards that fisher's share total. These new rules are intended to facilitate the removal of older, less

efficient (or idle) vessels from the fishery and to boost the overall economic efficiency of the fishery. The overall level of fishing effort has remained unchanged as the TAC is allocated per license holder.

(ii) **Vessel size** – Due to the reduction in the number of active vessels in the fishery and the subsequent aggregation of licenses, the current vessel size limits (12 m long x 5 m beam) are now considered too small. Since July 2016, the maximum size of vessels licensed to operate within the Limfjord region has been harmonized with the Danish fleet operating on the East coast (16 m long x 6 m beam). The engine size remains unchanged. The Ministry representative reports that, in 2018, the combination of changes to the rules for vessel size and quota pooling continues to contribute to the gradual decrease seen over the past years in the number of active vessels in the fishery.

(iii) **Closed areas** – The Ministry representative reported that there is a plan to close an area of Limfjord around the island of Livø on 1 July 2018 for three years to enable researchers to study the role that stone reefs play in relation to the consequences of agricultural runoff. A statutory order prohibiting fishing around Livø for 18 months from 1 July 2018 to 1 January 2020 was provided to the client by the Ministry and subsequently sighted by the surveillance team.

(iv) **Voluntary ‘real-time’ management by fishers** – Although not strictly about new regulations, both the Ministry and DTU Aqua representatives reported that the Limfjord fishers, through their Association, recommended the closure of one of the Natura 2000 sites as their analysis of the cumulative ‘black box’ data suggested fishers were approaching the 8,000 tonnes limit for the year. The fishers are said to be learning all the time about how to use the technology and can now download and analyze their own black box data to monitor their own impact in real time. This is seen by both the Ministry and DTU Aqua representatives as a positive development in the sustainable management of the fishery.

The surveillance team considers that these changes will not affect the ongoing certification of the fishery.

There have been 28 infringements of regulations in the fishery since 2016. One of these was for landing of undersized fish, but the remainder were for minor reporting infringements, such as more than 10% deviation between log book records and landings declarations.

3.4 Changes to personnel involved in science, management, or industry

It was noted that since the last surveillance audit in March 2017, the DFPO Client contact Jonathan B. Jacobsen had left DFPO. He was succeeded briefly by Ole Lundberg Larsen, but the Client contact in DFPO is now Sofie Smedegaard Mathiesen. Structural changes to departments and ministries responsible for the mussel fisheries are reported above in section 3.2. There have been no other changes in personnel in the Danish Fisheries Agency, DTU Aqua or other stakeholder organisations that would have any significant impact on management of the mussel fisheries.

3.5 Changes to scientific base of information including stock assessment

3.5.1 Mussel stock status

An assessment of the mussel stock status is conducted on an annual basis by DTU Aqua. Until 2016, the assessments did not include areas with water less than 3 meters in depth and are therefore likely to be precautionary estimates for the entire population.

A new geostatistic assessment model has been developed in conjunction with a European Fisheries Fund funded project to develop new methods and models to assess blue mussels using GPS data. This uses the same input data as previous models but now estimates the population’s spatial structure with associated uncertainties (Petersen *et al.*, 2015). Based on this, the total biomass can be calculated within a finite area to determine stock status.

Previous surveys indicate the mussel stock biomass in Limfjord during 2009 and 2013 to be between 400,000 and 500,000 tonnes, whereas the 2014 survey had shown a decline to 265,400 tonnes, which was attributed to poor environmental conditions. In 2015, the stock had begun to recover and was estimated at 347,300 tonnes. The stock continued to increase in 2016 but then declined in 2017 as noted in the detailed surveys carried out for the Løgstør Bredning and Lovns Bredning Natura 2000 sites within the UoC area.

Lovns Bredning

The mussel stock in Lovns Bredning was surveyed in April 2017 and estimates a stock biomass of $82,994 \pm 24,385$ tonnes (Figure 2). This shows the biomass has declined slightly since 2016 but seems to have fully recovered from the very low level observed in 2015 when significant oxygen depletion was observed.

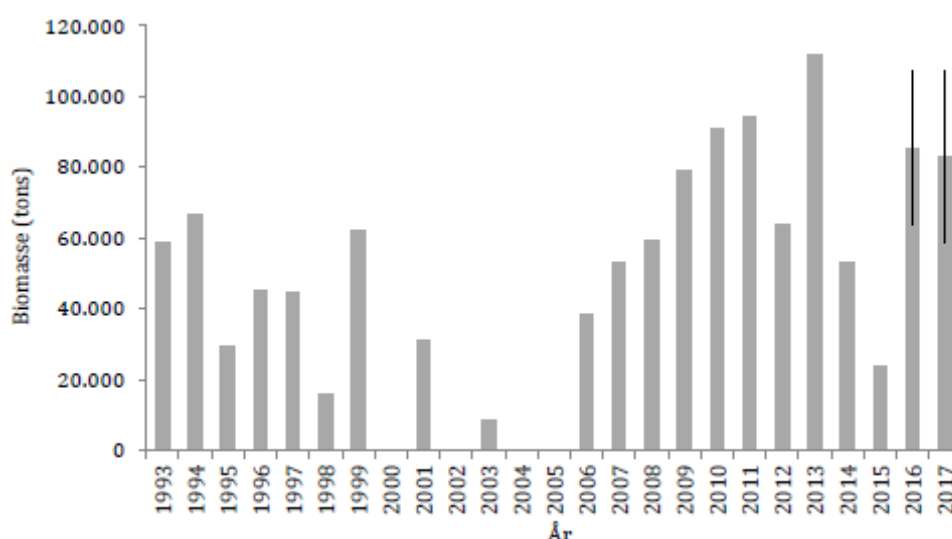


Figure 2: Biomass of mussels in surveys of the Lovns Bredning Natura 2000 site, 1993-2017. Data for the period 1993-2015 are calculated from ArcGIS interpolations and comprise the stock at depths > 3 m whereas estimates (\pm 95% confidence intervals) for 2016 and 2017 are estimated through the geostatistic model and include the whole of Lovns Bredning. Surveys were not undertaken in 2000, 2002, 2004, and 2005 (Source: Nielsen *et al.*, 2018a).

The spatial distribution of the stock in April 2017 is shown in Figure 3. The average biomass throughout Lovns Bredning during 2017 is estimated at 3.51 kg.m^{-2} (where biomass stations are included greater than 1 kg.m^{-2}).

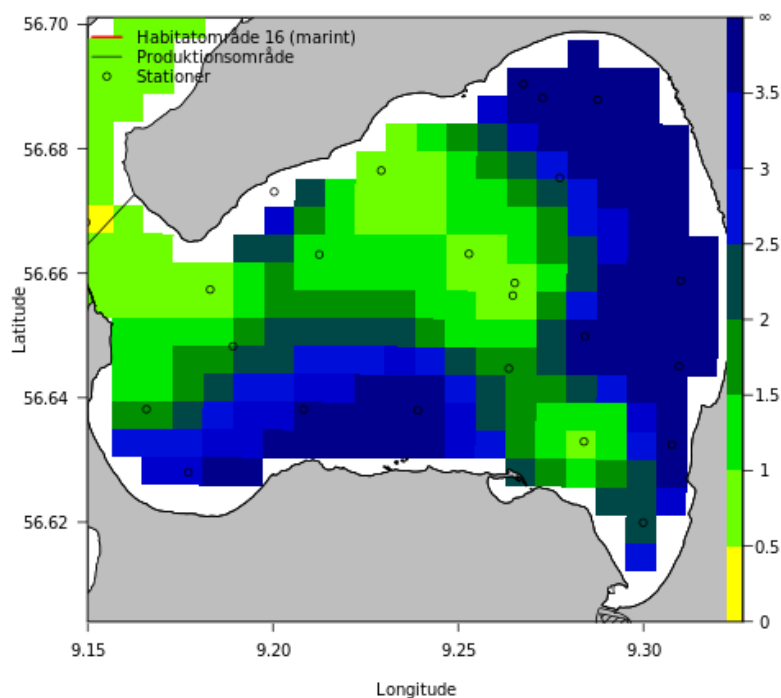


Figure 3: The distribution and abundance of mussel at depths greater than 3 m in Lovns Bredning in April 2017 (Source: Nielsen *et al.*, 2018a).

In addition to the latest estimate of stock biomass, the assessment now includes aggregated “black box” data from fishing vessels that shows the exact locations of all fishing activity between September 2016 and May 2017 (Figure 4). This illustrates the finite spatial distribution of fishing activities that occur mainly in the eastern boundary and in two areas in the south of Lovns Bredning.

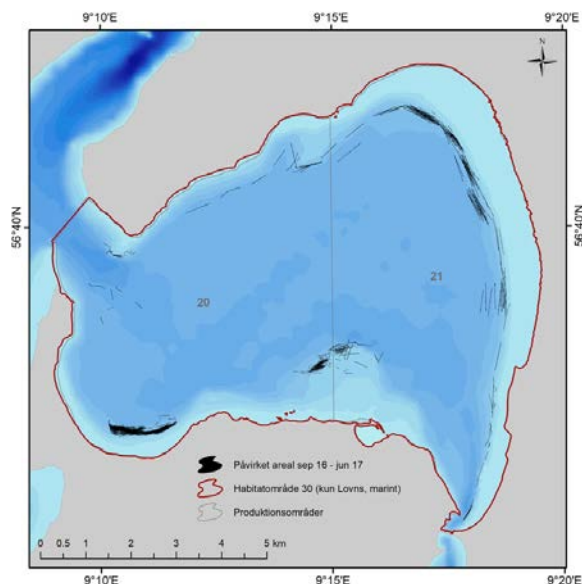


Figure 4: Distribution of mussel fishing activity in the Lovns Bredning Natura 2000 site between September 2016 and June 2017 (Source: Nielsen *et al.*, 2018a).

Løgstør Bredning

The mussel stock in Løgstør Bredning was surveyed in April 2017 and estimates a stock biomass of 113, 259 ± 22,496 tonnes including areas below 3 meters in depth (Figure 5). The mussel stock has declined by 60% since 2016, while the average mussel density is 1.79 kg.m⁻² (where biomass stations are included greater than 1 kg.m⁻²) (Figure 6).

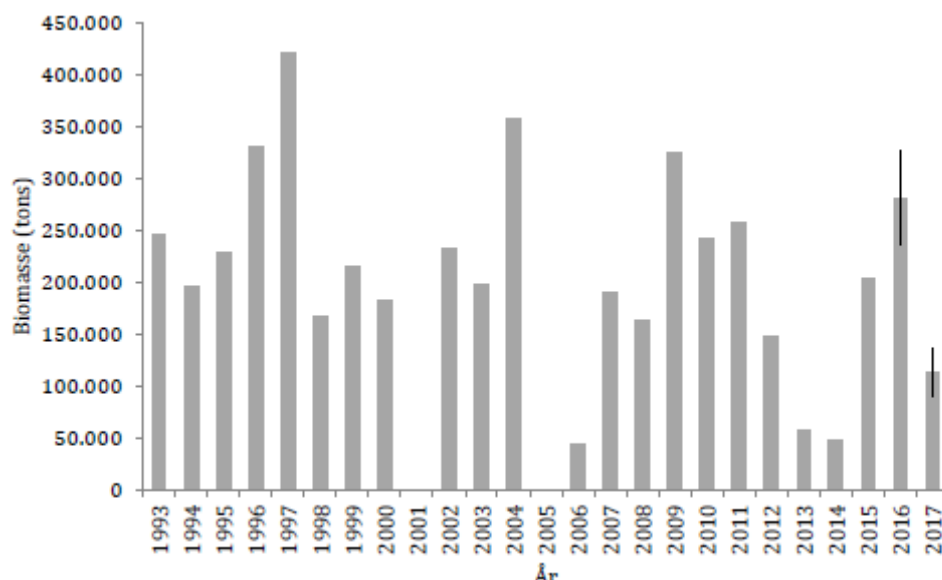


Figure 5: Biomass of mussels in surveys of the Løgstør Bredning Natura 2000 site, 1993-2017. Data for the period 1993-2015 are calculated from ArcGIS interpolations and comprise the stock at depths > 3 m whereas estimates (± 95% confidence intervals) for 2016 and 2017 are estimated through the geostatistic model and include the whole of Lovns Bredning. Surveys were not undertaken in 2001 and 2005 (Source: Nielsen *et al.*, 2018b).

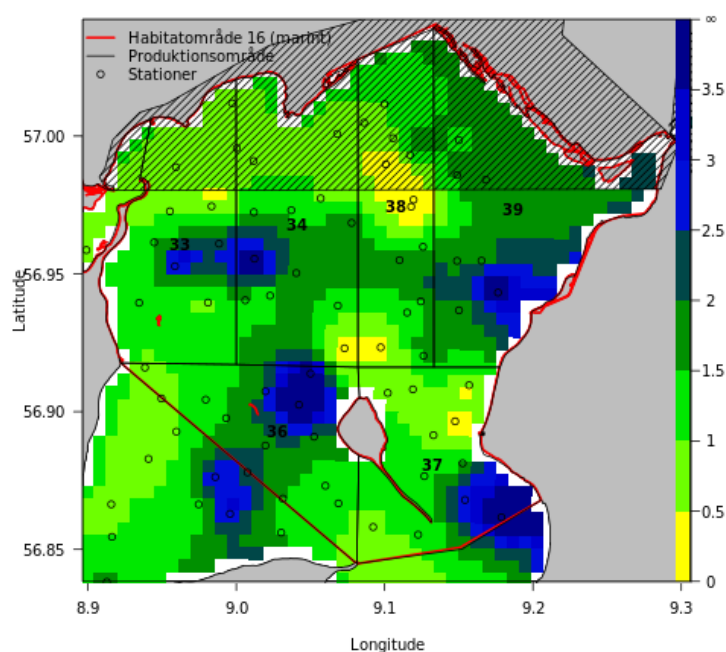


Figure 6: The distribution and abundance of mussel in Løgstør Bredning in April 2017 (Source: Nielsen *et al.*, 2018b).

Similar to Lovns Bredning, the assessment shows the cumulative spatial distribution of fishing within Løgstør Bredning using “black box” data. This is illustrated for all fishing activities between September 2016 and June 2017 (Figure 7). The total affected area was estimated at approximately 3.0 km², which accounts for 1.0% of the Natura 2000 area in Løgstør Bredning. The total area of mussel fishing activity remains below the 15% cap set by the Mussel Policy.

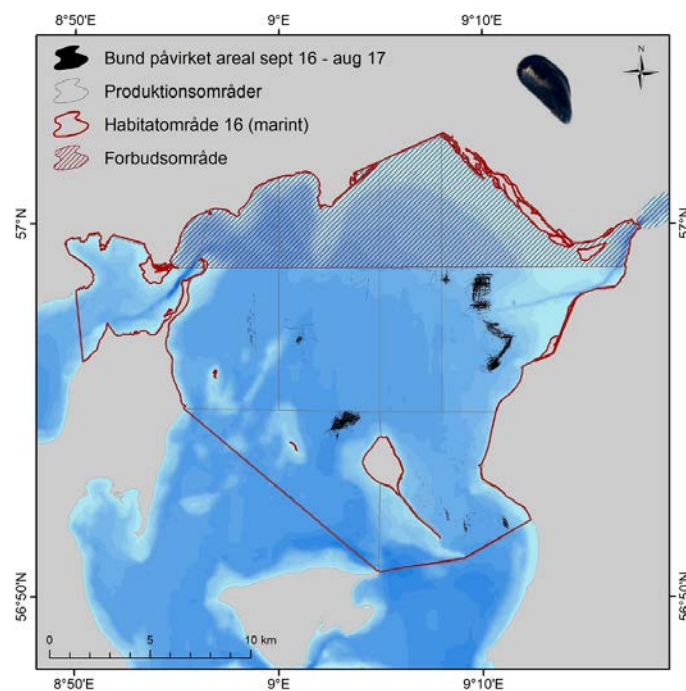


Figure 7: Distribution of mussel fishing activity in the Løgstør Bredning Natura 2000 site between September 2016 and June 2017 (Source: Nielsen *et al.*, 2018b).

3.5.2 Cockle stock status

No formal stock assessment for the cockle stock was presented at this audit. Information about cockle distribution and abundance in the Limfjord can be inferred from the landings data for the different production areas, which indicate that cockles can be present in densities that are economically viable for fishing over a large part of the Limfjord, but abundant populations are patchily distributed, both spatially and temporally.

3.5.3 Changes in ecosystem issues

Native oysters (*Ostrea edulis*) continue to be caught as bycatch in the mussel fishery as they have become more widely distributed in recent years. In particular, there are large numbers of native oysters in Løgstør Bredning. There has also been a significant increase in Pacific oysters (*Crassostrea gigas*) recorded in surveys, although they are not recorded in log books unless they are landed. The mussel fishery also has a bycatch of starfish. The starfish are landed to ensure their removal from mussel beds as starfish are major predators of mussels, although the impact of starfish predation on mussel population dynamics has not been quantified. There is also a separate fishery for starfish using a specially designed purse seine, and there is ongoing research within DTU Aqua on starfish population modelling to establish sustainable harvest rates.

Eelgrass beds continued to be closed to fishing and the distribution of biogenic reefs continues to be mapped. Identification of any such reefs will result in closure to fishing.

All mussel fishermen have signed the DFPO Code of Conduct, and a DFPO wheelhouse guide to all MSC ETP species and sensitive habitats including birds, mammals, corals, and sponges has been placed on all vessels. Reports on any interactions must be returned every three months, and failure to make such returns may result in removal of the vessel by DFPO from the MSC certificate.

3.6 Updates on enhanced fishery's position in relation to scope criteria

The fishery is not an enhanced fishery.

3.7 Developments or changes within the fishery which impact traceability

There have been no changes in the fishery since the last surveillance audit that could impact traceability.

3.8 TAC calculation

The most recently available TAC and catch data for the mussel and cockle fisheries are set out in the tables below. It is noted that the fishing season runs from September to June. As such, the last available total catch data is for the 2016/2017 fishing season. A summary of the impact assessment for fishing opportunities during the 2017/2018 is also given.

3.8.1 Mussel fishery

At present, the AgriFish Agency continues to set a weekly TAC of 45 tonnes per fishing licence (voluntarily reduced to 30 tonnes by the fishing industry body), which is well within the implicit reference point of 50% of the stock biomass. In addition, the TAC within Natura 2000 sites must take into account the food requirements for birds, and the total cumulative impact (proportion of total area) for blue mussels, benthic fauna, macroalgae, and eelgrass must not exceed 15% as set by the Mussel Policy. Generally, the Ministry is conservative in the setting of TACs to ensure that the 15% threshold is not exceeded.

Lovns Bredning

The cumulative area impact for blue mussel, macroalgae, bottom fauna, and eelgrass in proportion of the total area of the marine part of the habitat area between 2013/2014 and 2017/2018 in Lovns Bredning is shown in Table 2. The total cumulative impact for a fishery of 8,000 tonnes of blue mussels during the fishing season 2017/2018 is estimated at 7.4% for blue mussels, 3.6% for macroalgae, 6.1% for bottom fauna, and 0% for eelgrass. For the fishing season 2017/2018, the total cumulative area impact will not exceed the Mussel Policy maximum set limit of 15% for each of the ecosystem components. The quota (8,000 t) for 2017/2018 is estimated to be sustainable at an ecosystem level within Lovns Bredning.

Table 2: Cumulative area of impact for blue mussel (blåmusling), macroalgae (makroalger), bottom fauna (bundfauna) and eelgrass (Ålegræs) as a percentage of the total area of the marine part of habitat area in Lovns Bredning (source Nielsen *et al.*, 2018a).

	Gendan- nelsestid (år)	2013/14 (%)	2014/15 (%)	2015/16 (%)	2016/17 (%)	Estimat for 2017/18 (%)	Kumuleret (%)	Søstjer- ner (%)
Blåmusling	3			1,3	1,0	5,1	7,4	0
Makroalger	>5	1,0	0,1	0,6	0,3	1,6	3,6	Max 1
Bundfauna	2				1,0	5,1	6,1	0
Ålegræs*	>20	0	0	0	0	0	0	0

Løgstør Bredning

The total cumulative impact of a fishery of 10,000 tonnes of blue mussels during the fishing season 2017/2018 is estimated at 11.8% for blue mussels, 14.9% for macroalgae, and 15.01% for bottom fauna (Table 3), which means that the total cumulative area impact for both bottom fauna and macroalgae will be approximately the maximum allowed 15% set by the Mussel Policy. DTU Aqua therefore recommends a quota of 8,000 tonnes of blue mussels for the fishing season 2017/18, where the cumulative area impact including a 4,000 tonnes seine fishery for starfish will be 11.3%, 14.4%, and 14.5% for mussels, macroalgae, and bottom fauna, respectively.

Table 3: Cumulative area of impact for blue mussel (blåmusling), macroalgae (makroalger), bottom fauna (bundfauna) and eelgrass (Ålegræs) as a percentage of the total area of the marine part of habitat area in Løgstør Bredning based upon a TAC of 10,000 tonnes of mussels and 4,000 tonnes of starfish (søstjerner). (source Nielsen et al., 2018b).

	Gendan- nelsestid (år)	2013/14	2014/15	2015/16	2016/17	2017/18 Anmodet 10.000 t	2017/18 Søstjerner 4.000 t	Kumuleret inkl. sø- stjerner
		(%)	(%)	(%)	(%)	(%)	(%)	(%)
Blåmusling	3			8,1	1,0	2,7	0	11,8
Makroalger	>5	1,0	2,4	6,0	0,9*	2,1	Max 2,5	14,9
Bundfauna	2-4		3,2	8,1	1,0	2,7	0	15,01
Ålegræs	>20	0	0	0	0	0	0	0

A summary of the TAC and associated landings for the Limfjord mussel fishery is shown in Table 4.

Table 4: TAC and catch data for the Limfjord mussel fishery (Source: Fiskeristyrelsens database).

TAC	Year	2017/2018	Amount	45 tonnes per licence per week (30 tonnes voluntarily) Lovns Bredning: 8,000 tonnes Løgstør Bredning: 8,000 tonnes
UoA share of TAC	Year	2017/2018	Amount	100% of TAC
UoC share of TAC	Year	2017/2018	Amount	100% of TAC
Total green weight catch by UoC	Year (most recent)	2016/2017	Amount	16,083 tonnes
	Year (second most recent)	2015/2016	Amount	17,751 tonnes

3.8.2 Cockle fishery

The total annual catch of cockles is limited to 49% of the catch aboard a licensed mussel fishing boat on any fishing trip (i.e., a formal limit of 22.05 tonnes per week and a voluntary

limit of 14.7 tonnes per week) (Table 5). Within the Lovns Bredning and Løgstør Bredning Natura 2000 sites, the cockle bycatch is limited to 10% of the total catch. This will be 800 tonnes in both Lovns Bredning and Løgstør Bredning for the 2017/2018 fishing season.

Table 5: TAC and catch data for the Limfjord cockle fishery (Source: Fiskeristyreisens database).

TAC	Year	2017/2018	Amount	49% of mussel catch (10% in Natura 2000 sites)
UoA share of TAC	Year	2017/2018	Amount	100% of TAC
UoC share of TAC	Year	2017/2018	Amount	100% of TAC
Total green weight catch by UoC	Year (most recent)	2016/2017	Amount	8,119 tonnes
	Year (second most recent)	2015/2016	Amount	6,173 tonnes

3.9 Summary of assessment conditions

There was only one condition raised during the original assessment and is summarised below.

Table 6: Summary of assessment conditions.

Condition number	Performance indicator (PI)	Status	PI original score	PI revised score
1	3.2.4	Open	70	70

3.10 Recommendations

There were no recommendations from the full assessment.

4 Assessment Process

4.1 Scope and history of the assessment

4.1.1 Surveillance team details

The MSC require that surveillance audits shall be carried out by a team of two or more individuals with expertise comparable to the members of the original team (that conducted the assessment of the fishery). If different from the original assessment team, the MSC also requires that the selection of individuals to conduct audits shall be justified in writing and their relevant skills and/or expertise documented. This information is documented below.

The original assessment team for the fishery comprised Robert Wakeford (Team Leader, Principle 2), Julian Addison (Principle 1), and Chris Grieve (Principle 3). This surveillance

audit was carried out by two of the original three assessment team: Julian Addison and Chris Grieve who both participated off-site. Below are brief resumes of the team's experience.

Dr Julian Addison (Team Leader)

Julian Addison is an independent fisheries consultant with over 30 years' experience of stock assessment and provision of management advice on shellfish fisheries, and a background of scientific research on shellfish biology and population dynamics and inshore fisheries. Until December 2010 he worked at the Centre for Environment, Fisheries and Aquaculture Science (Cefas) in Lowestoft, England where he was Senior Shellfish Advisor to Government policy makers, which involved working closely with marine managers, legislators and stakeholders, Government Statutory Nature Conservation Organisations and environmental NGOs. He has also worked as a visiting scientist at DFO in Halifax, Nova Scotia and at NMFS in Woods Hole, Massachusetts where he experienced shellfish management approaches in North America. For four years he was a member of the Scientific Committee and the UK delegation to the International Whaling Commission providing scientific advice to the UK Commissioner. He has worked extensively with ICES and most recently was Chair of the Working Group on the Biology and Life History of Crabs, a member of the Working Group on Crangon Fisheries and Life History and a member of the Steering Group on Ecosystems Function. He has extensive experience of the MSC certification process primarily as a P1 team member but also as a P2 team member and team leader, undertaking MSC full assessments of the fisheries for Newfoundland and Labrador snow crab, Ireland and Northern Ireland bottom grown mussels, Estonia and Faroe Islands Barents Sea cold water prawns, Nephrops in the Skagerrak and Kattegat, separate assessments for Swedish, Danish and Norwegian Skagerrak and Norwegian Deep cold water prawns, Eastern Canada offshore lobsters, Limfjord mussels and cockles, Chilean crustaceans, North Sea brown shrimp, Inner Danish Waters mussels, Shetland inshore shellfish, Canadian Arctic surf clams, Dutch cockles and razorfish, Norway Barents Sea shrimps and Poole Harbour clams and cockles. He has also undertaken MSC pre-assessments in Europe, North America and Australia, over 50 annual surveillance audits and technical reviews and has carried out peer reviews of MSC assessments worldwide of lobster, cold water prawn/shrimp, razorfish, cockle, scallop, mussel, oyster, pikeperch, slipper limpet, king crab and clam fisheries. Other recent work includes a review of the stock assessment model for blue crabs in Chesapeake Bay, USA, and an assessment of three Alaskan crab fisheries under the FAO-based Responsible Fisheries Management scheme. Julian has completed MSC training in the use of the RBF methodology and MSC assessment team leader.

Ms Chris Grieve

Chris has 25+ years' experience in fisheries management and policy-making from local to global levels. She was first a research assistant to Australian stock assessment scientists, then as manager of complex Australian demersal fisheries. She moved to the UK in 2000 to lead the Sustainable Fisheries Policy Research Programme for IEEP, a London-based think tank where the vision was to influence change in the EU's Common Fisheries Policy. In 2002, Chris became the International Policy Director for the MSC, leading the organisation's work on standards, certification and accreditation, governing bodies and developing world fisheries. From 2005-2010, Chris's role evolved to Associate Director after she established Meridian Prime as a consulting company with a diverse portfolio of work. Chris led and participated in work on the development, evolution and implementation of the MSC standard and certification requirements. She also led and participated in sustainable fisheries projects for client organisations in Europe and the USA. As a consultant, Chris is Executive Director of EDGE Certified Foundation: a Swiss-based, global certification scheme dedicated to gender equality in Fortune 500 companies. Chris was a founding Trustee and Vice Chair of the ISEAL Alliance, the global sustainability standards organization; and a statutory-appointed member of two Australian fisheries management public boards.

4.1.2 Date and location of surveillance audit

The surveillance audit was held remotely with the Client (DFPO), the Danish Fisheries Agency, and DTU Aqua on 16 May 2018 (Appendix 6).

4.1.3 Stakeholder consultation and meetings

Thirty days prior to the surveillance audit, all stakeholders from the full assessment and previous surveillance audit were informed of the meeting and the opportunity to provide information to the auditors in advance of, or during, the meeting. No requests from outside stakeholders were received to take part in the meeting or provide information remotely.

The following participants were in attendance:

Name	Affiliation
Julian Addison	Independent Fisheries Consultant, surveillance team
Chris Grieve	Meridian Prime, surveillance team
Sofie Smedegaard Mathiesen	DFPO, client
Anja Gadegaard Boye	Danish Fisheries Agency, Policy
Jens K. Petersen	DTU Aqua

Table 7: Agenda for the Skype meetings held on 16 May 2018.

Time	Item	Participants	Supporting documents
09:00	Meeting with Fisheries Agency	Julian Addison Chris Grieve Anja Gadegaard Boye	Previous full assessment report (MRAG, 2016) Data on TACs and landings for Limfjord mussels and cockle fisheries. Information on infringements in the Limfjord fisheries.
10:00	Meeting with Client	Julian Addison Chris Grieve Sofie Smedegaard Mathiesen	Previous full assessment report (MRAG, 2016) List of vessels participating in the fishery.
13:30	Meeting with DTU Aqua	Julian Addison Chris Grieve Jens K. Petersen Sofie Smedegaard Mathiesen	Impact assessments of fishing for blue mussels and starfish in Lovns Bredning and Løgstør Bredning in 2017/2018. Previous full assessment report (MRAG, 2016) EMFF research proposal on cockles
15.30	Closing meeting with Client	Julian Addison Chris Grieve Sofie Smedegaard Mathiesen	Previous full assessment report (MRAG, 2016)

4.1.4 Standards and guidelines used

MSC Certification Requirements version 2.0 (for process requirements)

MSC Certification Requirements version 1.3 (for performance requirements, including assessment tree)

Guidance to the MSC Certification Requirements version 2.0 (for process requirements)

Guidance to the MSC Certification Requirements version 1.3 (for performance requirements, including assessment tree)

MSC Surveillance Reporting Template version 1.0

4.1.5 Harmonisation

An identical Unit of Assessment (UoA) and UoC was re-certified in 2015 for Vilsund Blue A/S by Acoura Marine. During the 2016 full assessment by MRAG Americas for DFPO, new information became available that resulted in two of the original three conditions identified under the Vilsund Blue assessment being no longer valid. It is noted that the 2015 annual surveillance audit report for Vilsund Blue repealed these two conditions so that both fisheries were fully harmonized. However, the Vilsund Blue dredge fishery has now withdrawn from the MSC assessment on 28 February 2017 and officially joined the DFPO client group since their activity was covered under this UoA.

The Inner Danish Waters mussel fishery has also been recently certified. The Inner Danish Waters fishery is in the Isefjord and eastern areas of Denmark and therefore does not cover the same stock as the Limfjord fishery and is in a different geographical area so there is no requirement to harmonise scores for P1 and P2 between the two fisheries. However, the management framework for the two fisheries is very similar so the audit team reviewed the Principle 3 scores for the two fisheries. There were no significant differences between the two fisheries for Principle 3 scores (Table 8) so the audit team considered that the scoring of the two fisheries had been harmonised.

Table 8: Principle 3 scores for the Limfjord and Inner Danish waters mussel fisheries.

	PI	Component	Limfjord	Inner Danish Waters
Principle Three	3.1.1	Legal & customary framework	100	100
	3.1.2	Consultation, roles & responsibilities	100	100
	3.1.3	Long term objectives	90	90
	3.1.4	Incentives for sustainable fishing	90	90
	3.2.1	Fishery specific objectives	90	90
	3.2.2	Decision making processes	90	95
	3.2.3	Compliance & enforcement	100	100
	3.2.4	Research plan	80	80
	3.2.5	Management performance evaluation	90	90

5 Results

5.1 Condition 1

The following table contains information on the agreed client action plan, milestones set, and progress against the fishery's condition. There was only one condition of certification, summarized in the table below. There were no recommendations made.

Table9: Outline of condition 1

Document: DFPO Limfjord mussel and cockle surveillance report	page 18
Date of issue: July 2018	

	Insert relevant PI number(s)	Insert relevant scoring issue/ scoring guidepost text	Score
Performance Indicator(s) & Score(s)	3.2.4	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	70
Condition	A research plan should be prepared for the Limfjord cockle fishery that is designed to provide the management system with reliable and timely information about the effects of the fishery on the cockle stock and the components of the marine environment.		
Milestones	<p>Year 1 – a draft research plan should be prepared in collaboration with relevant organisations and institutions.</p> <p>Resulting score: 70</p> <p>Year 2 – the research plan should be agreed and implemented.</p> <p>Resulting score: 70</p> <p>Years 3-4 – evidence of implementation of the research plan and initial research results should be provided.</p> <p>Resulting score: 80</p>		
Client action plan	<p>The DFPO will ensure that a research plan for the cockle fishery is developed and implemented. Work plan:</p> <p>Year 1: A draft research plan will be produced in collaboration with DTU Aqua.</p> <p>Year 1 or Year 2: The research plan will be agreed and implemented.</p> <p>Year 2 to Year 4: Evidence of implementation will be provided, as well as results of research carried out as according to the plan.</p>		
Progress on Condition [Year 1]	<p>At the time of the site visit there had been progress with this condition. The client worked with DTU Aqua to develop and draft a plan for research in the cockle fishery and submitted this to the surveillance team.</p> <p>The document begins with contextual background that explains some of the marine environment, biological and behavioural factors that confound understanding of the impact of the cockle fishery on cockle biomass. As burrowing animals, cockles are only available to dredge (i.e., vulnerable to fishing pressure) when they are exposed on the sea bed. Thus, the plan is to first study the proportion of the cockle population that is exposed to fishing pressure. The outcome of such a study will give the client, scientists and management stakeholders an idea of the magnitude of the issues in relation to fishery/cockle dynamics, and this will help them determine together which research options to pursue next. If, for example, a large proportion of the stock is vulnerable to fishing pressure, then understanding the biological mechanisms and their influence on cockle behaviour would become a priority for study under the plan. If, on the other hand, only a very small proportion is ever vulnerable to fishing pressure, conclusions may be drawn about the effect of fishing on cockle biomass, which in turn may influence decisions about the value of pursuing further research.</p> <p>The draft plan states the intention for DFPO and the Danish Shellfish Centre (DSC) to apply together to the government for research funds for the initial scoping study.</p> <p>With increasing interest in the cockle fishery and its management by a range of stakeholders, AgriFish staff interviewed for this audit confirmed that there is also increasing interest from a management perspective in understanding</p>		
Document: DFPO Limfjord mussel and cockle surveillance report			
Date of issue: July 2018			

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	<p>cockle/fishery dynamics and therefore in principle support for funding research into cockles that is relevant to the combined interests of fishers, managers, scientists and other stakeholders.</p> <p>Conclusion</p> <p>Progress with this condition is on target.</p>
Progress on Condition [Year 2]	<p>At the time of the surveillance audit, the client had made more progress on this condition. The research plan included DFPO and DTU Aqua collaborating on a grant proposal for funding for a comprehensive cockle research project. The Ministry representative confirmed, as did both client and DTU Aqua representatives, that the proposal had been submitted for funding from EMFF. The client provided written confirmation from the Danish Fisheries Agency that the proposal was received in December 2017.</p> <p>There has been a delay in formal decisions about funding from the EMFF. A funding decision is expected by September 2018. Despite this, DTU Aqua and fishers started the study in 2018 at their own financial risk. The surveillance team noted that this demonstrates commendable commitment by the client and DTU Aqua. The surveillance team considers the commencement of the study consistent with implementation of the previously agreed research plan, and therefore the year 2 milestone has been met. However, the DTU Aqua representative reported to the team that it is unlikely DTU Aqua would continue the project unfinanced. The surveillance team concluded that this is a key reason to rule that the condition should remain open and subject to continued surveillance.</p> <p>The two-year project (2018-2019) aims to establish the scientific basis for sustainable exploitation of cockle resources in the Limfjord. Specifically, the purpose is to estimate the size of cockle stocks, estimate the proportion of cockles on the surface of sediment, and describe the reasons for their presence on the surface rather than being naturally submerged. Work packages over the two years will examine: 1) Mapping of fishing and hence areas cockles have come emerged from the seabed. 2) Cockle stock status in the Limfjord. 3) The proportion of cockles on the surface of the seabed. 4) Attempt to describe surfacing/resurfacing [emergence] behaviour of cockles. 5) Screening for diseases and parasites. 6) Summary and design of recommendations for management and project management. Work Package 1 (WP1) will inform the activities in WP2, which will in turn inform WP3. The outcomes of WP6 will depend on the results of WP1-5.</p> <p>Conclusion</p> <p>Progress with this condition is on target.</p>
Status of Condition	This condition remains open.

6 Conclusion

The client is on target with the single condition of certification on PI 3.2.4 for the cockle fishery. The condition remains open, and the score remains the same (70), in accordance with the agreed client action plan accepted by the initial assessment team and the milestones established under the Public Certification Report.

The Limfjord Blue Mussel and Cockle fisheries shall continue to be certified.

7 References

- MRAG Americas, 2016. DFPO Limfjord Mussel and Cockle Fishery. Public Certification Report. 262pp. Available from: https://www.msc.org/track-a-fishery/fisheries-in-the-program/certified/northeast-atlantic/dfpo-limfjord-mussel-and-cockle/assessment-downloads-1/20151230_PCR_MUS507.pdf
- Nielsen, P., Nielsen, M.M., Geitner, K., & Nielsen, C.F., Petersen, J.K., 2018a. Konsekvensvurdering af fiskeri af blåmuslinger og søstjerner i Lovns Bredning 2017/2018. DTU Aqua-rapport nr. 329-2019. Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet. 59 pp.
- Nielsen, P., Nielsen, M.M., Geitner, K., & Nielsen, C.F., Petersen, J.K., 2018b. Konsekvensvurdering af fiskeri af blåmuslinger og søstjerner i Løgstør Bredning 2017/2018. DTU Aqua-rapport nr. 330-2019. Institut for Akvatiske Ressourcer, Danmarks Tekniske Universitet. 58 pp.
- Petersen, J.K., Høgsbro, U., Saurel, C., Stage, B., Nielsen, P., Canal-Verges, P., Kristensen, K., Brida, J., Pedersen, E.V., Geitner, K. & Nielsen, C.F., 2015. Estimering af bestande af blåmuslinger. Test af nye metoder og modeller. Danmarks Tekniske Universitet Institut for Akvatiske Ressourcer – Dansk Skaldyrcenter. 64pp

Danish Legislation

- BEK nr 1388 af 03/12/2017 Bekendtgørelse om regulering af fiskeri efter muslinger og østers (Executive Order on the regulation of fishing for mussels and oysters) <https://www.retsinformation.dk/Forms/R0710.aspx?id=195197#ided41e148-3212-4e65-afdb-5b9190fa87ec> Accessed on 10 June 2018
- BEK nr 1393 af 04/12/2017 Bekendtgørelse om Fiskeristyrelsens varetagelse af visse opgaver i henhold til fødevareloven (Executive Order on the Fisheries Agency's performance of certain tasks under the Food Law) <https://www.retsinformation.dk/Forms/R0710.aspx?id=195153> Accessed on 10 June 2018
- LBK nr 46 af 11/01/2017 Bekendtgørelse af lov om fødevarer (Executive Order on the Food Act) <https://www.retsinformation.dk/Forms/R0710.aspx?id=186202> Accessed on 10 June 2018
- Bekendtgørelse om forbud mod fiskeri omkring Livø 2018 (Statutory Order on the Prohibition of Fishing around Livø). <https://prodstoragehoeringspo.blob.core.windows.net/f3c7cb7e-7eaa-4de8-a55f-91d64a945e20/Udkast%20til%20bekendtgørelse%20om%20forbud%20mod%20fiskeri%20omkring%20Livø.pdf> Accessed 10 June 2018

8 Appendices

Appendix 1. Rescoring evaluation tables

Not applicable. Progress by the client on the condition for PI 3.2.4 is on track. This means that the score remains the same, in accordance with the milestones set for the agreed client action plan.

There were no other PIs that have been re-scored.

Appendix 2. Stakeholder submissions

Separate stakeholder meetings were held by Skype with representatives from the Client, DFPO, Danish Fisheries Agency and DTU Aqua.

DFPO

The audit team spoke with Sofie Smedegaard Mathiesen on two occasions – at an initial meeting with the Client, and at a closing meeting after other stakeholders had been met.

The main purpose of the meetings was to discuss progress on the Client Action Plan in relation to Condition 1 and to re-affirm information provided by DTU Aqua and the Fisheries Agency during the surveillance audit. In addition to a verbal submission, the client also submitted updated information relating to the 2017 fishing year, an updated list of vessels in the fishery and a link to the website describing all currently open shellfish production areas.

Fiskeristyrelsens (Fisheries Agency)

The audit team spoke with Anya Gadegaard Boye.

In summary, discussion focused on changes to the structure of Government Departments and Ministries, changes in licensing arrangements, the proposed review of the Mussel Policy, any changes in management arrangements in the mussel fishery in the last year, the more proactive approach on research and management of cockle fishing, the new area closed to fishing in the Livø area, and voluntary real-time management by fishers of their fishing activity through the black box data.

Danish Shellfish Centre, DTU Aqua

The audit team spoke with Jens K. Petersen of DTU Aqua by Skype. The Client, Sofie Smedegaard Mathiesen, also participated in the meeting by agreement with the stakeholder.

In summary, discussion focussed on the stock assessment methods and current status of the mussel and cockle populations within Limfjord. In particular, this included the results of the impact assessments for each fishing plan submitted for operations within Lovns Bredning and Løgstør Bredning Natura 2000 sites (Nielsen *et al.*, 2018a; Nielsen *et al.*, 2018b). Use of the “black box” vessel monitoring system over the past five years has now enabled new geostatistical models to be developed for the assessment of the mussel population, which includes estimates of uncertainty. A new research proposal on cockle dynamics has been submitted for EMMF funding. Discussions also covered bycatches of native and Pacific oyster and starfish in mussel dredges, and the recently-commenced fishery for starfish using an adapted purse seine.

Appendix 3. Surveillance audit information

Not applicable. All relevant information provided in appropriate sections of this report.

Appendix 4. Additional detail on conditions/actions/results

Not applicable. All relevant information provided in appropriate sections of this report.

Appendix 5. Revised surveillance program

Not applicable. The surveillance program remains unchanged from the Public Certification Report.

Appendix 6. Notification of surveillance audit



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MRAG-MS-108-v1

Marine Stewardship Council Surveillance Announcement

Name of Fishery	DFPO Limfjord mussel and cockle	
Surveillance level and type	<p>Level 4, 2 on-site and 2 off-site</p> <p>As per FCR 7.23.4, the team has determined that the surveillance level can be lowered from Level 6 to Level 4 since all necessary information on the fishery and on the one open condition can be obtained remotely.</p>	
Surveillance number (tick one)	1st Surveillance	
	2nd Surveillance	X
	3rd Surveillance	
	4th Surveillance	
	Other (expedited etc.)	
Proposed team leader	<p>Julian Addison is an independent fisheries consultant specializing in shellfish and inshore fisheries. Until 2010 he served for 28 years at the Centre for Environment, Fisheries and Aquaculture Science (Cefas), which is the UK Government's marine science agency for environment, fisheries and aquatic science, most recently as Senior Shellfish Advisor. Relevant skills and experience include 30 years' experience of stock assessment and provision of management advice on shellfish and inshore fisheries, extensive shellfish research primarily in the field of crustacean population dynamics and assessment, extensive knowledge of the UK shellfish and inshore fisheries industry and liaison with fishers and other stakeholder groups, knowledge of shellfisheries management regimes worldwide, effective oral and written communication skills and winning of contracts under competitive tender. He has conducted MSC full assessments for the Newfoundland and Labrador snow crab fishery, the Ireland and Northern Ireland bottom grown mussel fisheries, both the Estonia and Faroe Islands Barents Sea cold water prawn fisheries, the nephrops fishery in the Skagerrak and Kattegat, separate assessments for the Swedish, Danish and Norwegian Skagerrak and Norwegian Deep cold water prawn fishery, the Eastern Canada offshore lobster fishery, Limfjord mussel and cockle fisheries and Chile squat lobster fisheries. Peer reviews of MSC assessments in both Europe and North America of lobster, cold water prawn, razorfish, cockle and scallop fisheries.</p> <ul style="list-style-type: none"> • He has an appropriate university degree and more than five years' experience in management and research in fisheries; • He has passed the MSC team leader training; • He has the required competencies described in Table PC1, Section 2; • He has undertaken at least two fishery assessments as a team member in the last five years; and • He has experience in applying different types of interviewing and facilitation techniques and is able to effectively communicate with clients 	

	<p>and other stakeholders.</p> <p>In addition, he has the appropriate skills and experience required to serve as a Principle 1 assessor as described in FCR Annex PC Table PC3.</p> <ul style="list-style-type: none"> MRAG Americas confirms that Julian Addison has no conflicts of interest in relation to the fishery under assessment.
Proposed team member	<p>Chris Grieve has 25+ years' experience in fisheries management and policy-making from local to global levels. First as research assistant to Australian stock assessment scientists, then the manager of complex Australian demersal trawl and dredge fisheries. She moved to the UK in 2000 to lead the Sustainable Fisheries Policy Research Programme for a London-based think tank where the mission was influencing change in the EU's Common Fisheries Policy. In 2002, Chris became International Policy Director for the Marine Stewardship Council (MSC) to lead MSC's work on standards, certification and accreditation, governing bodies and developing world fisheries. Chris's role evolved to become Associate Director between 2005 and 2010 after she established Meridian Prime as a consulting company with a diverse portfolio of work. Chris led and participated in work on the development, evolution and implementation of the MSC standard and certification requirements. She has also led and participated in sustainable fisheries-related projects for client organisations in the UK, across Europe and the USA. Chris has been team member on fishery assessments under the MSC certification scheme; and is an approved independent peer reviewer for MSC's Peer Reviewer College. On a consultancy basis, Chris is Executive Director Standards & Impacts of the EDGE Certified Foundation: a Swiss-based, global certification scheme pursuing gender equality in Fortune 500 companies. Chris served until recently as a Board Director for WOCAN (an international non-profit focusing on gender equality in natural resource management in the global south) and was on the founding Advisory Board of Ocean Outcomes (a US-based non-profit focusing on sustainable fisheries). Chris was a founding Trustee and Vice Chair of the ISEAL Alliance, the global sustainability standards organization; and a statutory-appointed member of two Australian fisheries management public boards.</p> <p>MRAG Americas confirms that Chris Grieve meets the competency criteria in Annex PC for team members as follows:</p> <ul style="list-style-type: none"> She has an appropriate university degree and more than five years' experience in management and research in fisheries; She has undertaken at least two MSC fishery assessments or surveillance site visits in the last five years; and She is able to score a fishery using the default assessment tree and describe how conditions are set and monitored. <p>In addition, she has the appropriate skills and experience required to serve as a Principle 3 assessor as described in FCR Annex PC Table PC3, and MRAG Americas confirms she has no conflicts of interest in relation to the fishery under assessment.</p> <p>The whole assessment team collectively meets the requirements as described in FCR Annex PC Table PC3.</p>
Audit/review time and location	The surveillance will take place remotely via Skype calls May 15-16.
Assessment/review activities	The surveillance will review any changes in science and management and will monitor progress in closing out conditions.

MRAG Americas invites stakeholders to provide any information considered relevant to the surveillance and expedited assessments of the fisheries. The MSC has developed a guide for stakeholder input, available at <http://www.msc.org/documents/get-certified/stakeholders> and a template for stakeholder response available at <https://www.msc.org/documents/scheme-documents/forms-and-templates/template-for-stakeholder-input-into-fishery-assessments-v2.0/view>.

You may use the template or provide your response in any other format. All comments and inquiries should be directed to MRAG Americas. MRAG will schedule meetings with stakeholders if requested. To schedule a meeting please provide:

- your name and contact details
- your association with the fishery
- the issues you would like to discuss
- where and when you would like to meet

We request that stakeholders provide written information or request a meeting by 5:00 pm PDT on May 7, 2018.

More information on the fishery is available at <https://fisheries.msc.org/en/fisheries/dfpo-limfjord-mussel-and-cockle-fishery/@assessments>.

Please send any documentation, requests for meetings, or inquiries to:

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