Marine Stewardship Council fisheries assessments

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Muslingeriet Rope Grown Mussel Fishery

Announcement Comment Draft Report

Conformity Assessment Body (CAB)	**Lloyd's Register**
Assessment team	Jim Andrews and Marie Maar
Fishery client	**Muslingeriet**
Assessment type	Initial Assessment
Date	August 2021

Assessment Data Sheet

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Assessment Team	Team Leader	Jim Andrews
	P1 Assessor	N/A
	P2 Assessor	Marie Maar
	P3 Assessor	Jim Andrews

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1 Glossary

CAMF	Central Association of Mussel Fishermen
CFP	Common Fisheries Policy
DHI	Danish Hydraulic Institute
DMU NERI	Danmarks Miljoundersogelser National Environmental Research Institute
DSNC	Danish Society for Nature Conservation
DTU Aqua	Danish Technical University
EEZ	Exclusive Economic Zone
EFF	European Fisheries Fund
EIA	Environmental Impact Assessment
ETP	Endangered, Threatened and Protected Species
EU	European Union
IA	Impact Assessment
ICZM	Integrated Coastal Zone Management
MFPA	Mussel Fishermen and Producers Association
MFLF	Ministry of Food, Land and Fisheries
MLS	Minimum landing size
MoE	Ministry of Environment
MSC	Marine Stewardship Council
PI	Performance Indicator
SG	Scoring Guideline
SI	Scoring Issue
SPICOSA	Science and Policy Integration for Coastal System Analysis
SUSTAINEX	National Danish project focusing on the Impact of mussel dredging
TAC	Total Allowable Catch
UOC	Unit of Certification
VMS	Vessel Monitoring System
WFD	Water Framework Directive

2 Executive summary

» This report is the Announcement Comment Draft Report (ACDR) which provides details of the Marine Stewardship Council (MSC) assessment process for the **Muslingeriet Rope Grown Mussel fishery** for the Danish aquaculture company **Muslingeriet**. The assessment process begins with publication of this ACDR on **23rd August 2021**. The completion date for the assessment process has not been determined.

» A review of information presented by the client and sourced from published documents has been carried out, assessed and scored by the assessment team in this report. Please note this **does not** represent a final scoring outcome or a certification decision.

» The scoring presented in this report has not been reviewed by stakeholders, peer reviewers or the client – these steps will all take place later in the assessment process.

» Stakeholders are encouraged to review the scoring presented in this report and use the Stakeholder Input Form to provide evidence to the team of where changes to scoring are necessary.

» **All** stakeholder comments will be published ahead of the site visit.

» Stakeholders can discuss this MSC assessment with the assessment team at the "site visit" which owing to Covid-19 restrictions is likely to be carried out using telephone and video conferencing methods during the, week commencing the **1st November 2021.**

» The **Target Eligibility Date** for this assessment is the **5th April 2022**, which is the earliest date by which the assessment process can be completed.

The assessment team for this fishery assessment comprised of Jim Andrews who acted as team leader and was primarily responsible for the evaluation of Principle 3 (management and governance); Marie Maar was primarily responsible for evaluation of Principle 2 (marine environment). Information about the assessment team's background is set out in section 3.1 of this report. Please note that as an enhanced "Catch and Grow" fishery, MSC Principle 1 is not assessed (see section 4.2 of this report).

Fishery strengths

» This is a small scale "Catch and Grow" bivalve fishery with no impact on the wild stock of mussels in Limfjorden.
» There is good information available about the impact of the UoA on marine habitats and ecosystems in Limfjorden which shows that any adverse impacts are likely to be localised and reversible; and indeed, the cultivation of mussels serves to improve the quality of the environment by mitigating eutrophication impacts.
» There is a well-established system of management and governance of mussel fishing and cultivation activity in Denmark.

Fishery weaknesses

» No weaknesses have been identified at this stage in the assessment process; this is consistent with the findings of other MSC assessments for the wild and cultivated mussel fisheries in Limfjorden.

Assessment Determination

» At this point in the assessment process neither the assessment team nor Lloyd's Register have yet made a determination of whether this fishery should be awarded MSC certification. This determination will be made as the assessment progresses in accordance with the following instruction from the MSC:-

Draft determination to be completed at Public Comment Draft Report stage

Summary of Key Issues for Further Investigation:-

Principle 1:

» As an enhanced “Catch and Grow” fishery, MSC Principle 1 is not assessed (see section 4.2 of this report).

Principle 2:

» For ETP species it will be useful to investigate:

› Whether there is any evidence at all of interactions with any ETP species; and

› If has been any review of the practicality of alternative measures to minimise UoA-related mortality of ETP species.

» More information will be sought about the seabed character and habitats in the vicinity of mussel farms.

Principle 3:

» Although all Performance Indicators for this and overlapping fisheries score over 80, it will be important to determine that management and governance has not been adversely affected during the disruption caused by the Covid-19 pandemic.

For interested readers, the report also provides background to the target species and fishery covered by the assessment, the wider impacts of the fishery and the management regime, supported by full details of the assessment team, a full list of references used and details of the stakeholder consultation process.

Lloyd’s Register confirm that this fishery is “within scope” for assessment against the MSC Standard.

Readers are advised that parts of this report are currently incomplete. This is deliberate, and these parts of the report will be completed as the assessment progresses.

3 Report details

3.1 Authorship and peer review details

All team members listed below have completed all requisite training and signed all relevant forms for assessment team membership on this fishery.

3.2 Assessment team leader: Dr Jim Andrews

3.2.1 Primarily responsible for assessment under Principle 3

Jim Andrews is a marine biologist with over 25 years' experience working in marine fisheries and environmental management. His previous experience includes running the North Western and North Wales Sea Fisheries Committee as its Chief Executive from 2001 to 2005, previously working as the SFC's Marine Environment Liaison Officer (from 1996-2001), and prior to that working for the English Government's nature conservation advisor, English Nature on wildlife and coastal zone management in northwest England (from 1992-1996). During his time with the SFC he was responsible for the regulation, management and assessment of inshore finfish and shellfish stocks along a 1,500km coastline, as well as assessment and management of fisheries interactions with aquatic ecosystems in this area. He has an extensive practical knowledge of fisheries and environmental management as well as the enforcement and regulation of fisheries under UK and EC legislation. As well as scientific training (BSc & PhD) Jim has formal legal training & qualifications, with a special interest in the policy, governance and management of fisheries impacts on marine ecosystems in the UK, EU and globally (this particular subject being the focus of his LLM research over the period 1997-99). He has worked as an assessor and lead assessor on more than 30 MSC assessments within the UK, in Europe, Australia, Asia, South America and in India since 2007.

Jim has passed MSC training as a Lead Assessor and in the use of the Risk Based Framework. He has no Conflict of Interest in relation to this fishery. Full CV available upon request

3.3 Expert team member: Dr Marie Maar

3.3.1 Primarily responsible for assessment under Principle 2

Marie Maar is a professor at the Aarhus University (AU), Denmark, and holds a PhD degree from AU. She has participated in several large EU- and national funded research projects on the ecology of bivalves, ecosystem dynamics and environmental effects of aquacultures and offshore platforms with special emphasis on blue mussels. In addition, she has conducted environmental assessment consultancy for government departments. Marie has 20 years of experience within marine ecology and has published 58 peer-reviewed papers. She has previously carried out MSC pre-assessment work for a mussel- and oyster fishery and production of rope grown mussels in Denmark. Marie Maar has passed MSC training and has no Conflict of Interest in relation to this fishery. Full CV available upon request.

3.4 Peer Reviewers

This section of the report has been intentionally left blank in accordance with the following directions from the MSC:-

Peer reviewer information to be completed at Public Comment Draft Report stage

(Note: the MSC Peer Review College will propose the peer reviewers for this assessment at a later stage in the process.)

3.5 RBF Training

Jim Andrews has been fully trained in the use of the MSC's Risk Based Framework (RBF). Information on how RBF was applied in this assessment can be reviewed in section 8.10.

The RBF was not used in this assessment.

3.6 Version details

The versions of the MSC fishery program documents used in this assessment are stated in the table below.

Table 1. Fisheries program documents versions

Document	Version number
MSC Fisheries Certification Process	Version 2.2
MSC Fisheries Standard	Version 2.01*
MSC General Certification Requirements	Version 2.4.1
MSC Reporting Template	Version 1.2

*Default assessment tree modified for Enhanced Bivalve fishery (MSC Standard v2.01 Annex SB)

4 Units of Assessment, Units of Certification and results overview

4.1 Units of Assessment and Units of Certification

The terms “Unit of Assessment” (UoA) and “Unit of Certification” (UoC) are used by the MSC to determine the extent of a fishery both during the assessment process (the “Unit of Assessment”). If the UoA meets the MSC Standard it will then become the “Unit of Certification” of the certified fishery. The MSC define the UoA and UoC as:-

> *The target stock(s) combined with the fishing method/gear type(s) and if relevant vessel type(s) pursuing that stock, and any fishing fleets, or groups of vessels, or individual fishing operators pursuing that stock, including any other eligible fishers that are outside the proposed Unit of Certification (UoC)*

This section of the report identifies the UoA and UoC based on the fishery description presented in the previous section.

4.1.1 Units of Assessment

Lloyd’s Register have evaluated the fishery with respect to the MSC Scope Requirements and have concluded that it is eligible for assessments (see section 4.2 of this report).

This report considers two Units of Assessment (UoA). At this point in the assessment process the UoAs have been defined provisionally. They will be confirmed later in the assessment process in conformity with MSC FCP v2.2 §7.5.5 & 7.17.3.

The UoAs are described in Table 2 & Table 3. A map showing the location of UoA operations is provided in Figure 1.

Table 2: Unit of Assessment (UoA) 1: Blue mussel spat collection.

UoA 1	Description
Species	Blue Mussels (*Mytilus edulis*)
Stock	Limfjorden
Fishing gear type(s) and, if relevant, vessel type(s)	Spat collectors
Client group	Muslingeriet
Other eligible fishers	None
Geographical area	Limfjorden

Table 3: Unit of Assessment (UoA) 2: Blue mussel cultivation.

UoA 2	Description
Species	Blue Mussels (*Mytilus edulis*)
Stock	Limfjorden
Fishing gear type(s) and, if relevant, vessel type(s)	Cultivation on ropes
Client group	Muslingeriet
Other eligible fishers	None
Geographical area	Limfjorden

Figure 1: Map showing the location and area of the UoA spat collection and cultivation areas near Hvalpsund in Limfjorden. Inset map shows location of the UoA in northern Denmark.

4.1.2 Unit(s) of Certification

The proposed UoCs for this fishery are identical to the UoAs described in section 4.1.1 above.

4.2 Scope of assessment with respect to the MSC Standard

Lloyds Register has reviewed whether the fishery is within the scope set out in the MSC Fisheries Certification Process v2.2. Specifically: -

a) **Target species §7.4.2.1** – the target species under Principle 1 is not an amphibian, reptile, bird or mammal.

b) **Destructive fishing practices §7.4.2.2** – no poisons or explosives are used in the fishery

c) **Controversial unilateral exemptions to international agreements §7.4.2.3** - there are currently no controversial unilateral exemptions to international agreements affecting the fishery.

d) Forced or child labour:

i. **Convictions §7.4.2.4** – neither the client nor any operators in the fishery have been prosecuted for a forced or child labour violation in the last 2 years; and

ii. **Submission of forced and child labour polices statement §7.4.2.5 *et seq.* –** the client has submitted a statement which has been reviewed by the CAB ready for publication later in the assessment process.

e) **Conviction for shark finning §7.4.2.10** – the CAB has received a statement from the client confirming that the client and client group have not been convicted for a shark finning violation in the past 2 years.

f) **Controversial disputes §7.4.2.11** – there are understood to be mechanisms in place for resolving disputes between the fishery and the management system.

g) **Enhanced fishery §7.4.2.12** – This is an enhanced fishery. The assessment team has considered whether it meets the scope criteria set out in FCP v2.2 and has concluded that the fishery meets the relevant MSC scope criteria as an "Enhanced Catch and Grow" ("CAG") fishery (see Table 4).

The MSC Fisheries Standard v2.01 requires that Annex SB is applied in all enhanced bivalve fishery assessments. This has the following effects on the assessment approach adopted here:-

i. **Assessment of Principle 1:** because this is an "enhanced catch and grow" (CAG) fishery, and does not involve any translocations of stock, CABs may choose not to score Principle 1 (SB2.1.4).

The assessment team has concluded that there is no plausible mechanism for the UoAs to negatively impact the parent stock, so it is not necessary to score Principle 1.

ii. **Assessment of Principle 2:** as an enhanced "CAG" fishery based solely on spat collection the team has followed the following directions:

i. Neither the primary nor the secondary species PIs are to be scored (SB3.1.1);

ii. ETP species shall be scored as normal (SB3.1.2);

iii. PIs for habitats and ecosystems shall be scored as normal, and for suspended culture systems (such as the fishery under assessment), scoring shall consider:

1. habitat impacts of bio-deposition and benthic organic enrichment; and

2. ecosystem impacts such as those on carrying capacity through localized phytoplankton depletion (SB3.1.3).

iv. This fishery does not involve any translocations of stock, so the translocation PIs are not appropriate (SB3.1.4).

iii. **Assessment of Principle 3:** no change to the default assessment tree, however, because P1 has not been scored the assessment team has focused P3 scoring on whether or not the appropriate and effective legal and/or customary framework is capable of delivering sustainable fisheries in accordance with P2 PISGs (SB4.1.2).

h) **Introduced Species Based Fishery §7.4.2.13** – the target species in native to Limfjorden and is not introduced.

i) **Inseparable or practically inseparable catches §7.5.9** – there are no inseparable or practically inseparable (IPI) species in the catch.

Lloyds Register have concluded from this review that the fishery is in scope and can be assessed against the MSC Standard using the assessment tree modified for Enhanced Bivalve Fisheries. This view is consistent with the other MSC-certified mussel fishery in Limfjorden.

Table 4: Evaluation of compliance of the fishery under assessment with MSC Scope Criteria for enhanced fisheries.

A	**Linkages to and maintenance of a wild stock**		
	Criterion	**Met (Y/N)**	**Rationale**
i	At some point in the production process, the system relies upon the capture of fish from the **wild environment**. Such fish may be taken at any stage of the life cycle including eggs, larvae, juveniles or adults. The 'wild environment' in this context includes marine, freshwater and any other aquatic ecosystems.	Y	The fishery relies on the capture of juvenile mussels ("spat") from the wild environment.
ii	The **species are native** to the geographic region of the fishery and the natural production areas from which the fishery's catch originates unless MSC has accepted a variation request to include introduced species for the pilot phase.	Y	Mussels are native to Limfjorden.
iii	There are **natural reproductive components** of the stock from which the fishery's catch originates that maintain themselves without having to be restocked every year.	Y	There is a large stock of wild mussels in Limfjorden (estimated at around 800,000t) which maintains itself without having to be restocked.
iv	Where fish stocking is used in hatch-and-catch (HAC) systems, such **stocking** does not form a major part of a current rebuilding plan for depleted stocks. Note: This requirement shall apply to the "current" status of the fishery. Wild stocks shall be managed by other conventional means. If rebuilding has been done by stocking in the past, it shall not result in an out-of-scope determination as long as other measures are now in place.	NA	This is not a "hatch and catch" fishery.
B	**Linkages to and maintenance of a wild stock**		
	Criterion	**Met (Y/N)**	**Rationale**
i	The production system operates without **substantial augmentation of food supply**. In HAC systems, any feeding is used only to grow the animals to a small size prior to release (not more than 10% of the average adult maximum weight), such that most of the total growth (not less than 90%) is achieved during the wild phase. In catch-and-	Y	There is no augmentation of the food supply. Mussels filter feed on plankton that naturally occur in the water column.

	grow (CAG) systems, feeding during the captive phase is only by natural means (e.g. filter feeding in mussels), or at a level and duration that provide only for the maintenance of condition (e.g. crustacean in holding tanks) rather than to achieve growth.		
ii	In CAG systems, production during the captive phase does not routinely require disease prevention involving chemicals or compounds with medicinal prophylactic properties.	Y	No disease prevention involving chemicals or compounds with medicinal prophylactic properties are used in this fishery.
C	**Habitat and ecosystem impacts**		
	Criterion	**Met (Y/N)**	**Rationale**
i	Any modifications to the habitat of the stock are reversible and do not cause serious or irreversible harm to the natural ecosystem's structure and function. Note: Habitat modifications that are not reversible, are already in place and are not created specifically for the fishery shall be in scope. This includes: - Large-scale artificial reefs. - Structures associated with enhancement activities that do not cause irreversible harm to the natural ecosystem inhabited by the stock, such as salmon fry farms next to river systems.	Y	No irreversible modifications are made to the habitat of the stock. The installation of spat collectors and rope systems for mussel cultivation is not irreversible and does not have a serious effect on ecosystem structure and function.

5 Assessment results overview

5.1 Determination, formal conclusion and agreement

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Public Comment Draft Report stage

5.2 Principle level scores

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report

5.3 Summary of conditions

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report

5.4 Recommendations

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report stage

6 Traceability and eligibility

6.1 Eligibility date

The target eligibility date for the UoAs considered in this assessment is **5th April 2022**, which is the earliest date by which the assessment process can be completed.

6.2 Traceability within the fishery

A preliminary review of traceability within the fishery is presented below. This will be updated following the site visit for the fishery.

Table 5: Traceability within the fishery

Factor	Description
Will the fishery use gears that are not part of the Unit of Certification (UoC)? If Yes, please describe: - If this may occur on the same trip, on the same vessels, or during the same season; - How any risks are mitigated.	No. Vessels working on mussel farms are generally specialised craft that are not designed for fishing wild shellfish. In cases where fishing vessels are used in operations on mussel farms, they are prohibited from carrying shellfish dredges aboard.
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, please describe: - If this may occur on the same trip; - How any risks are mitigated.	No. There is a potential risk of vessels working on one of the UoC mussel farms harvesting mussels from another farm that is outside the UoC. This risk is considered to be negligible because all of the vessels and farms within the UoC are owned by companies that do not own farms that are outside the UoC. They are therefore not permitted to harvest mussels from non-UoC farms (indeed they would be liable to prosecution if they did). All mussel landings from shellfish farms also have to include a declaration of where the mussels were harvested, which would identify whether any mussels had been gathered from outside the UoC.
Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate? This refers to both at-sea activities and on-land activities. - Transport - Storage - Processing - Landing - Auction If Yes, please describe how any risks are mitigated.	No.

Does transhipment occur within the fishery? If Yes, please describe: - If transhipment takes place at-sea, in port, or both; - If the transhipment vessel may handle product from outside the UoC; - How any risks are mitigated.	There is no trans-shipment of shellfish at sea.
Are there any other risks of mixing or substitution between certified and non-certified fish? If Yes, please describe how any risks are mitigated.	The risk of substitution of certified shellfish with non-certified shellfish has been evaluated and is considered to be very low because of the strict controls imposed throughout the chain of custody by Fiskeristyrelsen. These controls combine monitoring of landings and cross-referencing to processor's records to guarantee the provenance of all shellfish caught in Limfjorden.

6.3 Eligibility to enter further chains of custody

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report

6.4 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to enter further chains of custody

There are no inseparable or practicably inseparable (IPI) species in the catch.

7 Scoring

7.1 Summary of Performance Indicator level scores

The provisional scoring ranges indicated at this stage in the assessment process are shown in the table below. Please note that this scoring does not indicate an assessment outcome, and that scoring is likely to change as the assessment progresses. Scoring rationales are presented in the following sections of the report.

Table 6: Provisional Performance Indicator (PI) scores indicated for the Muslingeriet Rope Grown Mussel fishery. "N/A" shows PIs that are not scored for enhanced bivalve fisheries. A score of "≥80" indicates that the MSC pass level appears to be met; "60-79" indicates that a condition of certification may be required; and "<60" indicates that the information currently available does not meet the MSC Standard.

Principle	Component	Performance Indicator (PI)		Provisional Score Range	
				UoA1: Spat Collection	UoA2: Mussel cultivation
One	Outcome	1.1.1	Stock Status	N/A	N/A
		1.1.2	Stock rebuilding	N/A	N/A
	Management	1.2.1	Harvest Strategy	N/A	N/A
		1.2.2	Harvest Control rules & tools	N/A	N/A
		1.2.3	Information & monitoring	N/A	N/A
		1.2.4	Assessment of stock status	N/A	N/A
Two	Primary Species	2.1.1	Outcome	N/A	N/A
		2.1.2	Management strategy	N/A	N/A
		2.1.3	Information / Monitoring	N/A	N/A
	Secondary Species	2.2.1	Outcome	N/A	N/A
		2.2.2	Management strategy	N/A	N/A
		2.2.3	Information / Monitoring	N/A	N/A
	ETP Species	2.3.1	Outcome	≥80	≥80
		2.3.2	Management strategy	≥80	≥80
		2.3.3	Information / Monitoring	≥80	≥80
	Habitats	2.4.1	Outcome	≥80	≥80
		2.4.2	Management strategy	≥80	≥80
		2.4.3	Information / Monitoring	≥80	≥80
	Ecosystems	2.5.1	Outcome	≥80	≥80
		2.5.2	Management strategy	≥80	≥80
		2.5.3	Information / Monitoring	≥80	≥80
Three	Governance and policy	3.1.1	Legal &/or customary framework	≥80	
		3.1.2	Consultation, roles & responsibilities	≥80	
		3.1.3	Long term objectives	≥80	
	Fishery specific management system	3.2.1	Fishery specific objectives	≥80	
		3.2.2	Decision making processes	>80	
		3.2.3	Compliance & enforcement	≥80	
		3.2.4	Monitoring & management performance	≥80	

7.2 Principle 1

Principle 1 of the Marine Stewardship Council standard states that:

> *"A fishery must be conducted in a manner that does not lead to over fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery."*

Principle 1 covers all fishing activities on the entire stock - not just the fishery undergoing assessment.

In this section of the report, a referenced summary is provided covering:

a) an outline of the fishery resource, including life history information;
b) an outline of the status of the stock as indicated by stock assessment, including a description of the assessment methods, and stock indicators.
c) a history of the fishery for the stock and its management.

The narrative text and scoring below is based on the information available to the assessment team prior to the site visit. Following the site visit this text will be revised to take account of new information gathered by the assessment team and submitted by stakeholders at the site visit.

7.2.1 Principle 1 background

There are two aspects to the consideration of stock status for an enhanced fishery. One aspect concerns the state of the stock within the cultivated system; and the other is the state of the wild stock outside that system. Each is considered in turn in this section from the perspective of the potential effect of mussel farming on wild mussel stocks.

7.2.1.1 Mussel cultivation

A brief description of the mussel cultivation process is provided here and is illustrated in Figure 2. Videos of the client's mussel farming operations are also available on YouTube:

- Showing all stages of the cultivation process is here: **https://youtu.be/wi48WuZpSPg**
- Showing more detail and also interviews with the client: **https://youtu.be/k_7DyNu4SIA**

All of the mussel farming operations involve the use of a grid of ropes that are suspended close to the surface of the water by buoys and anchored to the seabed around the edges of the mussel farm. The farms are anchored using "screw anchors which have a diameter of 30cm and are screwed into the seabed. There are two distinct phases to the cultivation process, described here.

Mussel spat collection and seed production takes place from April to August of each year. Spat are collected by deploying a suitable surface for the planktonic mussel larvae attach to (typically nylon webbing or old trawl netting), illustrated in Figure 2 (a) & (b). By August the tiny mussel spat have grown into "seed" mussels (Figure 2 (c)), which are harvested in August-September, sorted and then secured to longlines using biodegradable cotton "socks", which encase the seed mussels whilst they become attached to the longline (see Figure 2 (d)). The socks and yarn used to secure the seed mussels rot away in 3-6 weeks (depending on water temperature).

Mussel harvesting takes place between March and August, when the mussels have grown to a marketable size (Figure 2 (e)). The mussels are harvested using the purpose build vessel *Lykke* Figure 2 (f). Harvesting of the mussels is mechanised, using a conveyor to recover the mussel lines, which are stripped from the longlines, washed on board, and stored in large bags on deck before unloading in the home port of Hvalpsund.

Each of the mussel farming areas measures approximately 250 x 750m. Within this area the client typically deploys 70-80 lines of 1200-1500m length for spat collection, which provide enough sees mussels for 200 longlines of 200m length.

The client currently operates 4 boats: 1 larger vessel (*Lykke*, 15m LOA x 6m beam); and three smaller "service" vessels (*Elnoka*, 8m x 2.6m; *Elvira*, 11.8m x 4.6m; and *Nor*, 6.9m x 3.25m). The *Lykke* is used as a platform for socking and harvesting operations (see Figure 2(f)). The smaller vessels are used for routine farm operations, particularly adjusting the cultivation lines and maintaining buoys to ensure that the lines do not contact the seabed (this can result in starfish getting on to the longlines which can cause considerable loss of stock).

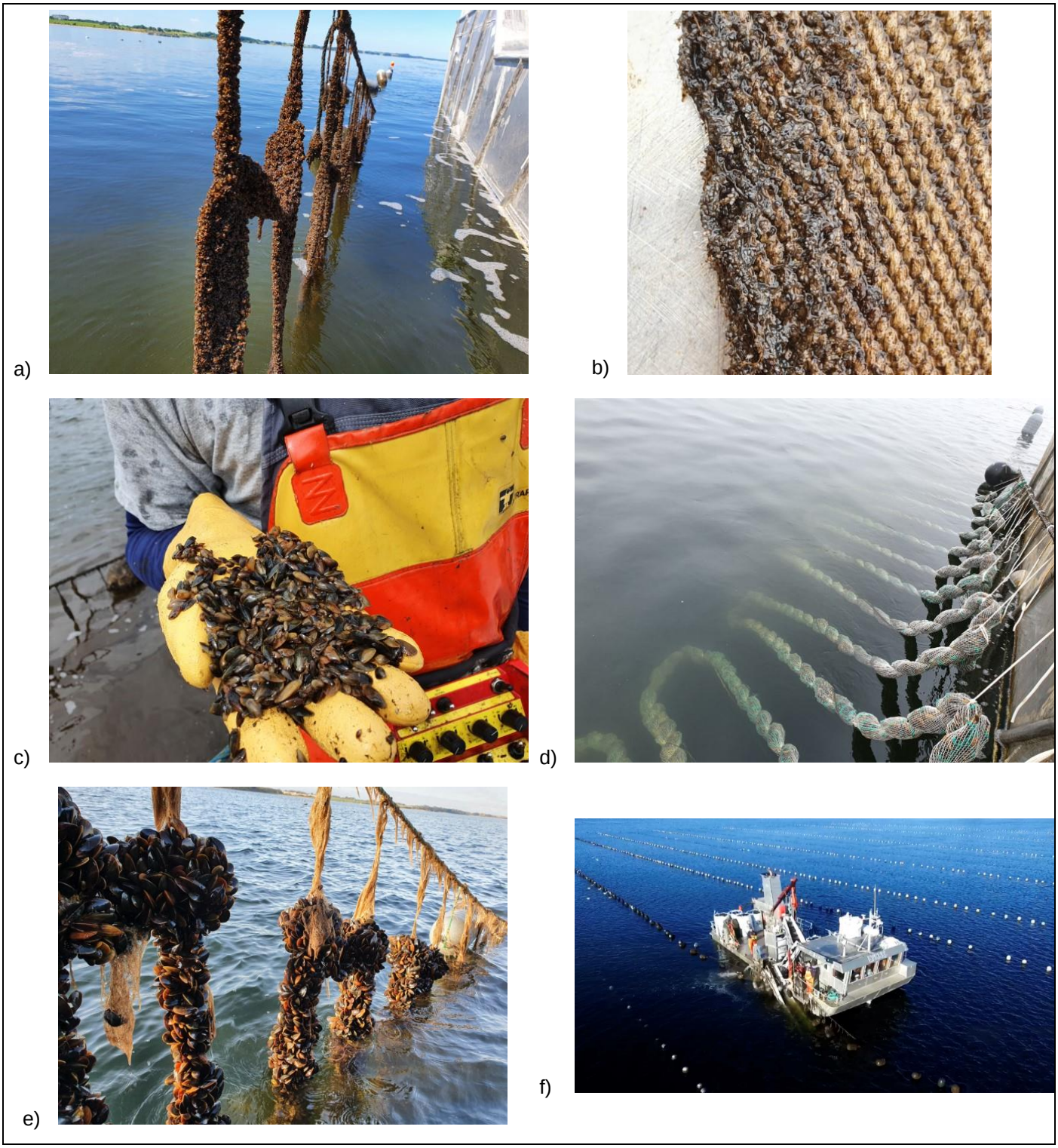

Figure 2: **Images of the mussel cultivation cycle: (a) and (b) show spat collectors, which are deployed in April; (c) shows the seed mussels which are harvested in August and September and are returned to the sea in cotton "socks" around longlines (d); mussels grow on these lines until they each market size (e); the vessel Lykke is used to harvest the mussels between March and August (Pictures by Muslingeriet).**

7.2.1.2 Cultivated stock

The cultivation of mussels has the potential to effect wild mussel stocks through the removal of mussel larvae from the wild stock, and through the production of mussel larvae by the cultivated stock before it is harvested.

The quantity of mussel larvae taken out of the plankton by the mussel farms in Limfjorden is likely to be proportional to their surface area. Less than 10km² of Limfjorden is used for mussel cultivation, and the UoA area covers 1.88km² (see Figure 1). The area used for spat collecting ropes and cultivation is less than this total area (see Figure 2 (f)). Limfjorden has a total area of 1,575km². Using these surface areas as a proxy, the total capture of mussel larvae by all mussel farms is likely to be very approximately, around 0.6% of the total stock in Limfjorden (and the unit of certification area is likely to capture no more than 0.1% of the spat stock).

The status of the cultivated stock is monitored by each mussel farmer within their farm area. Effective mussel farm management requires careful recording of stocking densities and harvest output from the farm to ensure that it is managed optimally. The husbandry of mussels within mussel farms results in the production of around 1,500 tonnes of cultivated mussels per year. Each one of the cultivated mussels has the potential to produce around 3 million gametes per year, so the reproductive output of the mussel stock in cultivation is enormous.

The client submits a quarterly report on the standing stock of mussels and harvest from each cultivation area. The highted standing stock of mussels in the farmed area is seen in the 1st and 4th quarters of the year, at around 1,300t. This standing stock is slightly less than the annual harvest because the mussels are constantly growing. The biomass of wild mussels in the nearby Lovns Bredning Natura 2000 site is estimated to be in excess of 40,000t (see Figure 4).

7.2.1.3 Wild stock status

The MSC Scheme is principally concerned with the effect of the enhanced fishery on the wild stock. The ongoing success of the mussel farming industry in Limfjorden is dependent on the existence of the wild stock, which, initially at least, provides the mussel larvae that settle on spat collectors and are subsequently cultivated. However, once a farm is established it could become a net exporter of larvae. This section briefly considers the status of the wild mussel stock in Limfjorden.

7.2.1.3.1 Management Units

Limfjorden is divided into 42 shellfish production areas for food safety purposes (Figure 3). The status of shellfish in relation to algal toxins and microbiology has to be analysed and documented before fishing is allowed by the authorities in any of these areas (this is discussed further in section 7.4.1 below). Landings of shellfish (in tonnes) from the wild mussel fishery are reported in relation to each production area, and closures are applied at this scale as well, so these areas therefore serve as the *de facto* management units for the fishery.

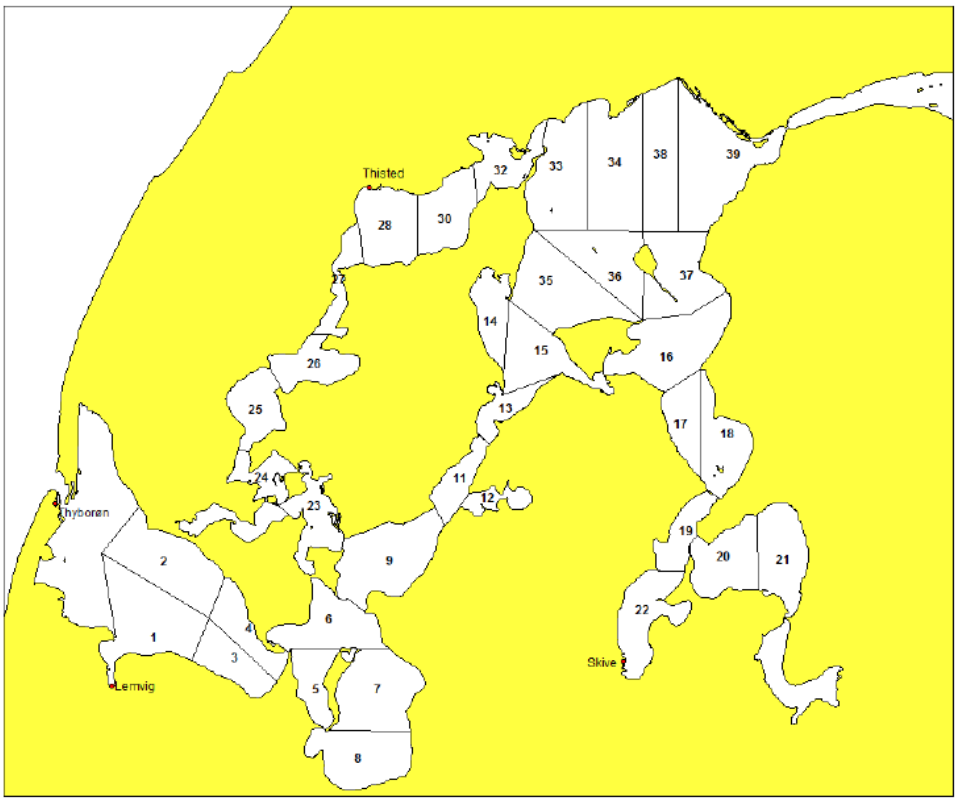

Figure 3: Shellfish production areas in the western Limfjord (numbered 1-39) [Source: Miljø-og Fødevareministeriet website, 2016]

For management purposes, Limfjorden mussel stock is regarded as a single stock unit. There is a flow of water from the west to the eastern end of Limfjorden through the narrow entrances connecting it to the North Sea and the Kattegat, and thus a possible connection to the wider distribution of mussels outside Limfjorden. Nevertheless, all management decisions for the mussel fisheries in Limfjorden are based on the assumption that the stock is isolated, which leads to a more precautionary approach to management.

7.2.1.3.2 Assessments and stock status

Limfjorden is the most important waters for mussel fishing in Denmark. Over the period 1993-2014, DTU Aqua estimated the stock of mussels in the fjord every year except in 2002 and 2005 in wates more than 3m deep and found that the stock was typically in the range of 200-400,000t. The counties around Limfjorden have estimated that the mussel stocks lying in water depths less than 3 metres represent 325,000 tonnes in total (average 1998-2002) (Data from County of Viborg).

The most recent data available on the status of wild mussel stocks in the area near to the UoA are presented in the impact assessment report for harvesting wild mussels from the Lovns Bredning Natura 2000 site which lies to the west of the UoA in production areas 20 & 21 (see Figure 3).

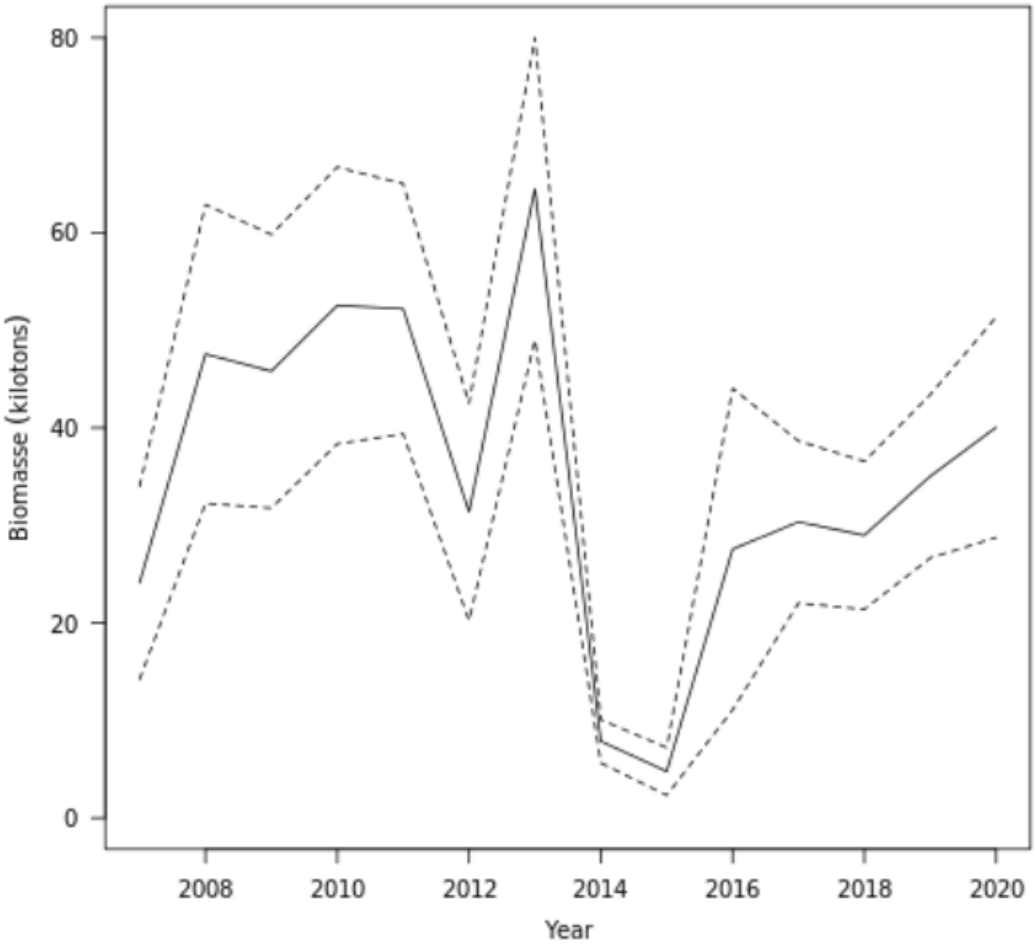

Figure 4: Wild mussel stock biomass in the Lovns Bredning Natura 2000 site (production areas 20 & 21) in areas deeper than 3 metres for the period 2007-2020 (Nielsen, Olsen and Nielsen, 2020)

The surveys in this area indicate that the mussel stock biomass in this area has been in the range of 20-40,000t for the past 5 years, with a general trend of increasing biomass over that time after a sudden decline in biomass in 2014 (this was seen throughout Limfjorden and was attributed to the warm, still summer weather in 2014 which resulted in low oxygen levels that killed off large areas of mussels.

7.2.1.4 Management advice

Management advice on fishing activity for the wild mussel stocks in Limjorden is provided to the Danish Government by DTU-Aqua. The main focus of this advice at present is to ensure that mussel dredging operations do not adversely affect the features of Natura 2000 sites. Historically, management advice to the Government has resulted in a restrictive licensing scheme for mussel dredging vessels in Limfjorden, limiting the number of vessels that can operate in the area (Nielsen, Olsen and Nielsen, 2020). There is also a weekly quota restriction in force, as well as restrictions on the depth of water that dredgers can fish in. Taken together, this advice and the regulations that stem from it results in a management regime that secures large reserves of mussels as a broodstock to safeguard ongoing recruitment to the fishery.

7.2.2 Relationship between wild and cultivated stocks

The effect of mussel cultivation on the wild stock in Limfjorden appears more likely to be beneficial than detrimental. A relatively small proportion of the mussel larvae in the area are likely to be harvested by the fishery as spat settlement; and the stock of mussels within the farm areas are likely to more than compensate for the initial removal of mussel larvae by spawning before they are harvested. Moreover, due to the high densities and three-dimensional disposition of mussels on ropes it is likely that fertilization success is very high within the farmed areas, which will also contribute to the export of spat from the farms to the wild stocks.

It is therefore highly unlikely that spat collection will have any detrimental effect on recruitment to wild mussel stocks.

7.2.3 Research

A considerable amount of research is carried out into the mussel fisheries and stocks in Limfjorden. The scale of the mussel stock is known from annual DTU-Aqua surveys, and the scale of fishery removals from the wild stock is constantly monitored by Fiskeristyrelsen. Mussel cultivation is also carefully monitored, with farm operators required to submit quarterly returns that detail the standing stock of mussels in cultivation and the quantity of mussels that have been harvested.

In response to concerns about the potential impact of mussel farming on the ecosystem in Limfjorden, a considerable amount of research has been carried out over the past decade. This research has examined the effect of mussel farming on nutrient and phytoplankton abundance in the water column, and also the impact that mussel faeces and pseudofaeces may have on the seabed. Much of this research has been carried out by the Danish Shellfish Centre (DTU Aqua) and has involved other Baltic Sea partners in several EU-funded projects. These projects have resulted in publications in peer reviewed journals and the development of new policy guidelines for mussel farming.

The key conclusions from this work are:-

a) **Eutrophication:** mussel cultivation has the effect of removing nitrogen and phosphorus from the water column (at rates of 0.6-0.9 and 0.03-0.04 t/ha/yr), and has the potential to mitigate the impacts of eutrophication of coastal waters resulting from other anthropogenic activities (Petersen *et al.*, 2015; Nielsen *et al.*, 2016; EUCC, 2019; Taylor *et al.*, 2019; Timmermann *et al.*, 2019; Bergström *et al.*, 2020; Holbach *et al.*, 2020).

b) **Biodeposition** increases beneath mussel farms. These impacts were very localised and of very limited magnitude; at the basin scale the effect of mussel farming is to reduce overall levels of biodeposition which is considered likely to benefit benthic habitats and communities overall (Maar *et al.*, 2021; Taylor *et al.*, 2021).

Research into the interactions between mussel farming and the habitats and ecosystems in Limfjord is ongoing, and interviews with scientists carrying out this work will be sought at the site visit.

7.2.4 Translocations

Licence conditions for each mussel farm operator restrict the operator to the use of seed from Limfjorden area; they cannot import any seed from outside the area. The mussel farms in the UoA are self-sufficient in seed. There are therefore no translocations of mussels from outside the unit of certification area.

7.2.5 Catch profiles

The client has provided mussel harvest data for the period since 2019, which is summarised in Table 7.

7.2.5.1 Total Allowable Catch (TAC) and catch data

The fishery is not subject to management by TAC.

Table 7: Total Allowable Catch (TAC) and catch data

TAC	Year	NA	Amount	NA
UoA share of TAC	Year	NA	Amount	NA
UoA share of total TAC	Year	NA	Amount	NA
Total green weight catch by UoC	Year (most recent)	2020	Amount	1,880t
Total green weight catch by UoC	Year (second most recent)	2019	Amount	1,654t

7.2.6 Principle 1 Performance Indicator Scores

Because this is an “enhanced catch and grow” (CAG) fishery, and does not involve any translocations of stock, CABs may choose not to score Principle 1 (SB2.1.4).

The assessment team has concluded that there is no plausible mechanism for the UoAs to negatively impact the parent stock and it is not necessary to score Principle 1.

7.3 Principle 2

Principle 2 of the Marine Stewardship Council standard states that:

> *"Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent ecologically related species) on which the fishery depends."*

This section of the report presents a description of the key characteristics of the ecosystem in the Unit of Assessment and then presents the scoring of the fishery against the MSC Principle 2 Performance Indicators.

As an enhanced "Catch and Grow" ("CAG") fishery based solely on spat collection the team has followed the MSC's directions for modifying the assessment tree as set out in Annex SB of Fisheries Standard v2.01. These are detailed in section 4.2 of this report, and specify that

- neither the primary nor the secondary species PIs are to be scored (SB3.1.1);
- ETP species shall be scored as normal (SB3.1.2); and that
- PIs for habitats and ecosystems shall be scored as normal, with an emphasis on the impacts associated with suspended culture systems (SB3.1.3).

The information presented in this section of the report reflects these modifications to the assessment tree.

7.3.1 Principle 2 background

The background below sets out the information available about the interaction between the two UoAs being considered here and the components in the modified assessment tree. This information sets the context for scoring and assessing the fishery.

7.3.1.1 Context

Limfjorden is the largest fjord in Denmark. It has a surface area of approximately 1,575 km^2 and has connections to the North Sea in the west and the Kattegat in the east (Figure 3). The connection to the North Sea has been open since 1825, following a flood that penetrated the Agger Tange isthmus. Prior to that flood the western end of the fjord consisted of a series of freshwater lakes draining eastward into the Kattegat. Limfjorden receives salt water from both the west (32-34‰) and from the Kattegat (19-25‰), although the net flow within the fjord is strongly from west to east. The average depth of Limfjorden is only around 7m and there are extensive areas of less than around 5m. The fjord is essentially composed of a series of shallow broads (5-8 m) linked by deeper sounds (18-22 m).

The catchment consists primarily of flat agricultural land and provides on average 2.7 km^3 of freshwater runoff annually, equal to approximately one third of the volume of the fjord. As a consequence, there is a high nutrient input to the fjord system which results in frequent oxygen depletion. Deoxygenation events occur to at least some degree every year and large scale deoxygenation events are frequent particularly in certain basins. Dolmer and Frandsen (2002) point out that as much as 20% of the fjord may be affected on average. On occasion hundreds of thousands of tonnes of mussels are reported to have been killed during these events. There is a complex relationship between mussels, phytoplankton and eutrophication/oxygen levels which is discussed in further detail in section 7.3 below.

Important habitats in Limfjorden include beds of eelgrass *Zostera* sp in the shallow areas (Figure 7). In much of the rest of the fjord the seabed consists of sands and gravels with various amounts of stones. It is known that boulder reefs have been deliberately exploited in the past, for building materials for example, but there is no quantitative information on this. The importance of structural complexity (which is increased by the presence of shell, stones and boulders) for mussel settlement and survival, as well as for other benthos, is recognised (see summary in Dolmer and Frandsen, 2002, for example).

Six areas of the fjord have been designated as Natura 2000 areas based on features "Large shallow inlets and bays" (Annex IV code 1160) and 1170 "Reefs", and including as interest features birds, rocky reefs, and eelgrass (*Zostera*) beds. In the future it is anticipated that biogenic reefs will also be included within the designation. The two larger areas (Løgstør Bredning and Lovns Bredning) are also Special Protection Areas (SPAs) for birds, and Limfjord Ramsar site is encompassed within these areas. These designated areas are shown in Figure 9.

Bird species which are the main mussel feeders in Limfjord are goldeneye *Bucephala clangula*, principally in Lovns Bredning. There are no large populations of other mussel feeding birds such as eiders in the fjord, although there are other important populations of birds that feed on small fish species, principally two Merganser species; red-breasted Merganser *Mergus serrator*, found in both Løgstør Bredning and Lovns Bredning, and Common Merganser *Mergus*

merganser, concentrated in Lovns Bredning. All three of the above species are of importance as interest features in the designation of the Løgstør Bredning and Lovns Bredning areas as SPAs.

7.3.1.2 Non-target species

Although the MSC Fisheries Standard v2.01 states that impacts on non-target species of a "catch and grow" fishery based on the use of spat collectors should not be assessed, it is considered appropriate to provide some background information here to confirm that there are no impacts of any significance that might be overlooked.

There have been no reports of any species other than mussels being retained as a commercial catch from either the spat collectors or as a result of the cultivation of adult mussels.

Mussel farmers indicated that the abundance of species other than mussels on both spat collectors and adult mussels was generally low, although heavy fouling by sea squirts (Ascidiacea) has been a problem in some instances (see Figure 5).

Larger non-target species and those that are not attached to the mussels or mussel ropes are likely to be discarded at sea as the ropes are recovered. Smaller species and those that are firmly attached are likely to be retained and separated from the catch when it is processed on shore.

The species composition of the mussels in hanging cultivation in Limfjorden has been examined on behalf of the Netherlands Government (Gittenberger & Rensing, 2010). This report found that 30 non-target species were found on rope-cultivated mussels. The abundance of these species is not recorded, only their presence or absence. The species list and the number of samples in which each species was observed are shown in Table 8. This survey was repeated in 2013, when a total of 27 species other than mussels were found in samples from shellfish farms in Limfjorden (Gittenberger et al, 2013). The species list and relative abundance of non-target species is very similar in this latter survey to the 2010 results.

The species that were most frequently observed on cultivated mussels from Limfjorden in 2010 were the starfish *Asterias rubens*, and the bryozoan *Alcyonidium mytili*. In 2013, the most frequently observed species were starfish again, the sea anemone *Metridium senile* and the amphipod *Caprella mutica*.

These species, and all of the others that are associated with the rope grown mussels are all widely distributed and abundant in Limfjorden and regionally (Appeltans et al, 2011).

Species records for spat collectors are not available but are reported to be similar to those on the mussel ropes.

Table 8: List of non-target species and their presence in 46 samples from mussel cultivation lines in Limfjorden [Source Gittenberger & Rensing, 2010].

Species	Classification	Presence in samples	
		Number	Proportion
Callithamnion corymbosum	Algae	1	2%
Ceramium virgatum	Algae	2	4%
Clavelina lepadiformis	Algae	2	4%
Colaconema cf. nemalii	Algae	1	2%
Erythrotrichia carnea	Algae	1	2%
*Polysiphonia harveyi**	Algae	1	2%
*Sargassum muticum**	Algae	12	26%
Stylonema alsidii	Annelida	1	2%
Harmothoe cf imbricata	Annelida	18	39%
Hediste diversicolor	Annelida	4	9%
Lepidonatus cf squamatus	Annelida	2	4%
Pomatoceros triqueter	Ascidiacea	3	7%
Acidiella aspersa	Ascidiacea	1	2%
Ciona intestinalis	Ascidiacea	33	72%
*Styela clava**	Ascidiacea	2	4%
*Mya arinaria**	Bivalvia	1	2%
Alcyonidium mytili	Bryozoa	40	87%
Conopeum reticulum	Bryozoa	7	15%
Obelia longissima	Cnidaria	33	72%
Balanus crenatus	Crustacea	36	78%
*Caprella mutica**	Crustacea	9	20%
Carcinus maenas	Crustacea	4	9%
Corophium cf volutator	Crustacea	8	17%
Elminius modestus	Crustacea	3	7%
*Jassa marmorata**	Crustacea	3	7%
*Macropodia rostrata**	Crustacea	1	2%
Sacculina carcini	Crustacea	1	2%
Asterias rubens	Echinodermata	39	85%
Psammechinus miliaris	Echinodermata	1	2%
Tergipes tergipes	Nudibranchia	1	2%

* Non-native species (considered further in section 7.3.1.5)

Figure 5: Non-target species on mussel ropes. From left to right, the pictures show the ascidian *Styela clava*, heavy fouling of mussels by ascidians, and also fouling of mussel shells by barnacle species. [Source: Christensen et al, 2008.]

7.3.1.3 Endangered, Threatened and Protected species

For the purposes of MSC assessments, Endangered, Threatened & Protected ("ETP") species are those that are:

- Recognised by national ETP legislation,
- Listed on Appendix I of Convention on International Trade in Endangered Species (CITES) (unless it can be shown that the particular stock of the CITES listed species impacted by the UoA under assessment is not endangered),
- Listed in any binding agreements concluded under the Convention on Migratory Species (CMS), or
- Classified as 'out of scope' (amphibians, reptiles, birds and mammals) that are listed in the International Union for the Conservation of Nature (IUCN) Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

The list of species associated with the rope grown mussel fishery (Table 8) has been checked against CITES Appendix 1 (accessed at the CITES website (CITES, 2016)). None of the species are listed here, nor are they listed in either Annex II or IV of the EC Habitats Directive (92/43/EC).

Mussel farms have the potential to impact ETP species on the seabed, either through the direct physical effect of the farm anchorage on the seabed, or the indirect effect of mussel faeces and pseudofaeces, which can smother seabed habitats. The risk of such impacts arising in Limfjorden is addressed by strict mussel farm location criteria, which prevent farms from being located in the vicinity of seabed habitat areas that are likely to contain ETP species (such as parts of Natura 2000 sites, and also all eelgrass beds).

It is reported that mussel farms in parts of Denmark outside Limfjorden have suffered high levels of predation from Eider duck (*Somateria mollissima*) which can make mussel farming inviable (Petersen *et al.*, 2021). Similar problems have been seen elsewhere in Europe. The mussel farmers operating in Limfjorden have not experienced any problems with predation from Eider duck (see Figure 6), because Eider are not found in this area.

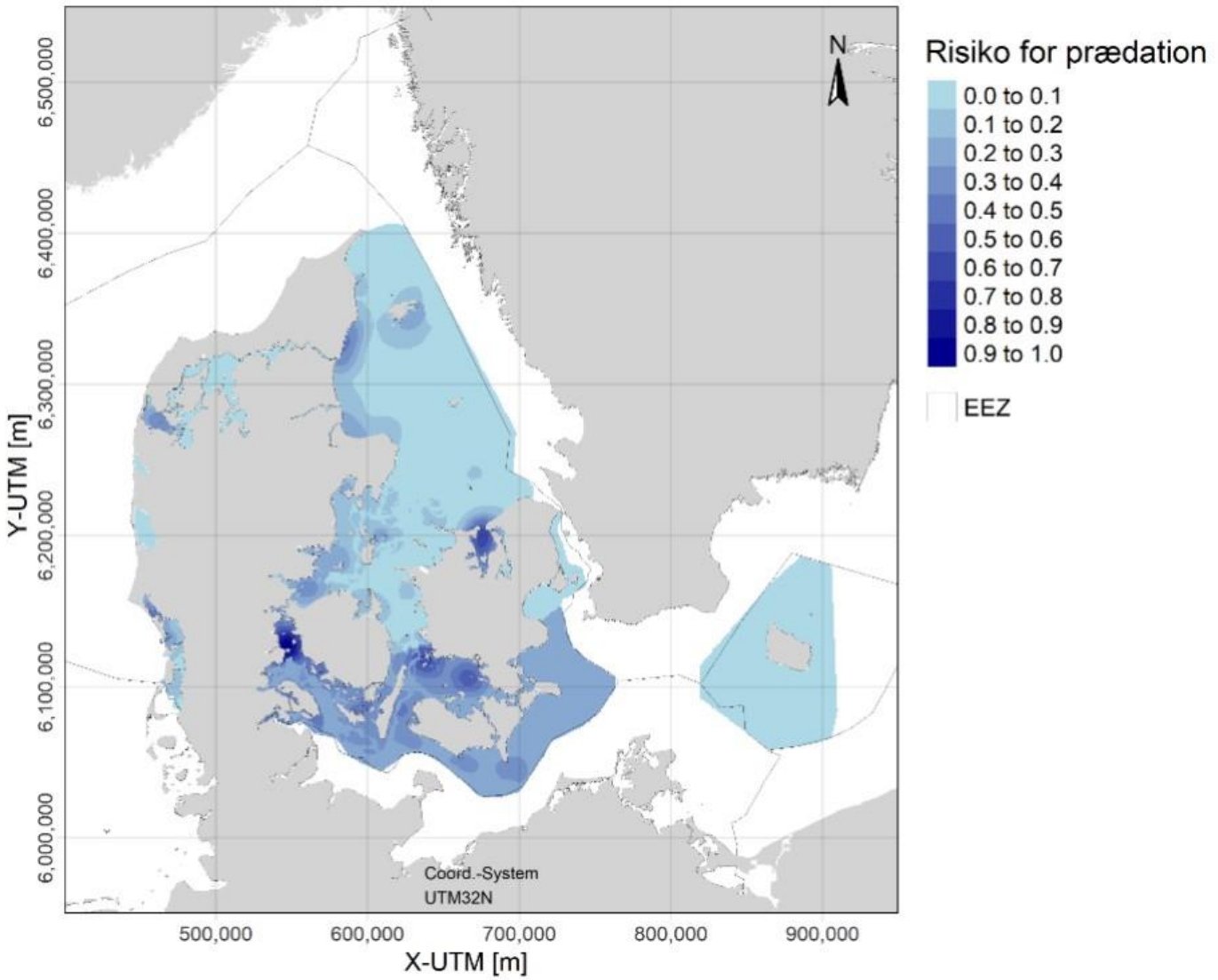

Figure 6: Risk of predation of cultivated mussels by Eider duck (*Somateria mollissima*) in Denmark (Petersen *et al.*, 2021).

There is evidence that the important ETP populations of birds in Limfjorden are monitored as part of the Danish Government's commitment to establish and protect Natura 2000 sites (see, for example, Dolmer et al, 2011, 2013; Canal-Vorgés et al, 2013, 2014; Nielsen et al, 2015a,b). All of the mussel farm sites in the UoC are located outside Natura 2000 sites, and there is no evidence from recent reports of the status of these sites that mussel farming is having any off-site indirect impacts on them.

Neither commercial operators of mussel farms, nor DTU-Aqua (Petersen *et al.*, 2021) have reported any interactions with ETP bird species that are listed in the Annexes of EC Birds Directive (2009/147/EC) or species such as cetaceans and pinnipeds that are listed in the Annexes of the EC Habitats Directive (92/43/EC). All of the UoA farm sites are located outside Natura 2000 sites, which are the most important areas for ETP species such as birds. The management policy presumption against the location of mussel farms in these areas serves as a precautionary management measure that minimises the risk of interactions with ETP species.

No reports of interactions with any ETP species have been identified from surveillance audit reports for the currently MSC-certified rope grown mussel operations in Limjorden.

7.3.1.3.1 Unobserved mortality

Unobserved mortality can include impacts arising from illegal or unregulated fishing in the UoA, animals that are injured and may die following an interaction with the fishing gear (whether from direct impact or as a result of trying to avoid the fishing gear) or from “ghost fishing” by lost fishing gear.

There is no evidence of any unobserved mortality arising from the UoA, nor any plausible mechanism for it arising.

7.3.1.4 Habitat

The UoA and all associated activities take place entirely within Denmark. Marine habitats in Denmark are subject to protection within “Natura 2000” sites. There are two types of Natura 2000 site that can be created under this legislation: Special Protection Areas (established under the EC Birds Directive to protect wild birds and their habitats); and Special Areas of Conservation (established under the EC Habitats and Species Directive). In addition, wetland areas of international important may be designated “Ramsar” sites and protected under Danish Legislation.

7.3.1.4.1 Special Protection Areas

Denmark has designated 113 Special Protection Areas (SPAs). The basis of these areas is the Birds Directive of 1979, which aims to protect and improve conditions for wild birds in Europe. The Directive also contains provisions on which bird species to be hunted and the hunting methods must be used. The Birds Directive was transposed into Danish legislation by the Environment Ministry Order No. 408 of 25 May 1994, as amended.

Many of the SPAs in Denmark are at sea, often close to shore, where they also include marshes or other natural areas. Each area is designated to protect certain species.

Danish SPAs have a total area of around 14,700 km ², of which approx. 12,100 km ² are in marine areas and approx. 2,600 km ² of land. The area of land within SPAs is equivalent to approx. 6% of Denmark’s land area and the SPA area at sea is approx. 11% of Danish marine space. About 9,200 km ² of SPA areas are also designated as SAC.

7.3.1.4.2 Special Areas of Conservation

In Denmark there are 254 Special Areas of Conservation (SACs), which were designated in the period 1998 - 2004. These areas have been established under the EC Habitats and Species Directive of 1992, which was transposed into Danish law by Statutory Order No. 782 of 1st November 1998, as amended.

The SACs cover a total area of approximately 11,100 km ², which is divided into approx. 7,950 km ² in marine areas and approx. 3,150 km ² of land.

7.3.1.4.3 Ramsar Sites

Denmark has designated 27 Ramsar sites, under the 1972 Ramsar Convention, which has been transposed into Danish Law by Environment Ministry Order No. 26 dated 4 April 1978 Convention on Wetlands.

Danish Ramsar sites cover a total area of approx. 7,400 km ². The total area is divided into approximately 6,000 km ² as marine areas and approx. 1,400 km ² of land, as the Danish Ramsar sites often include salt marshes or other areas adjacent to wetlands.

7.3.1.4.4 Location of protected sites

The location of Natura 2000 and Ramsar sites in the unit of certification is shown in Figure 9. The main Natura 2000 sites and those that are mentioned elsewhere in this report are labelled.

7.3.1.4.5 Monitoring

Bird numbers and the extent of key habitats and species within these Natura 2000 sites are carefully monitored. The results of monitoring are taken into account during the annual assessment of proposed fishing activities in these sites (see for instance the recent assessments for Lovns Bredning (Nielsen et al, 2015a) and Løgstør Bredning (Nielsen et al, 2015b)).

The extent of certain habitat features, notably eelgrass is also monitored throughout Limfjorden, beyond Natura 2000 site boundaries. The extent of eelgrass beds in the central Limfjord and their location relative to mussel farms is shown in Figure 7. The distribution and extent of marine habitats in Limfjorden, is regularly monitored and reported (see, for instance, Canal-Vorgés et al 2014 and Figure 8).

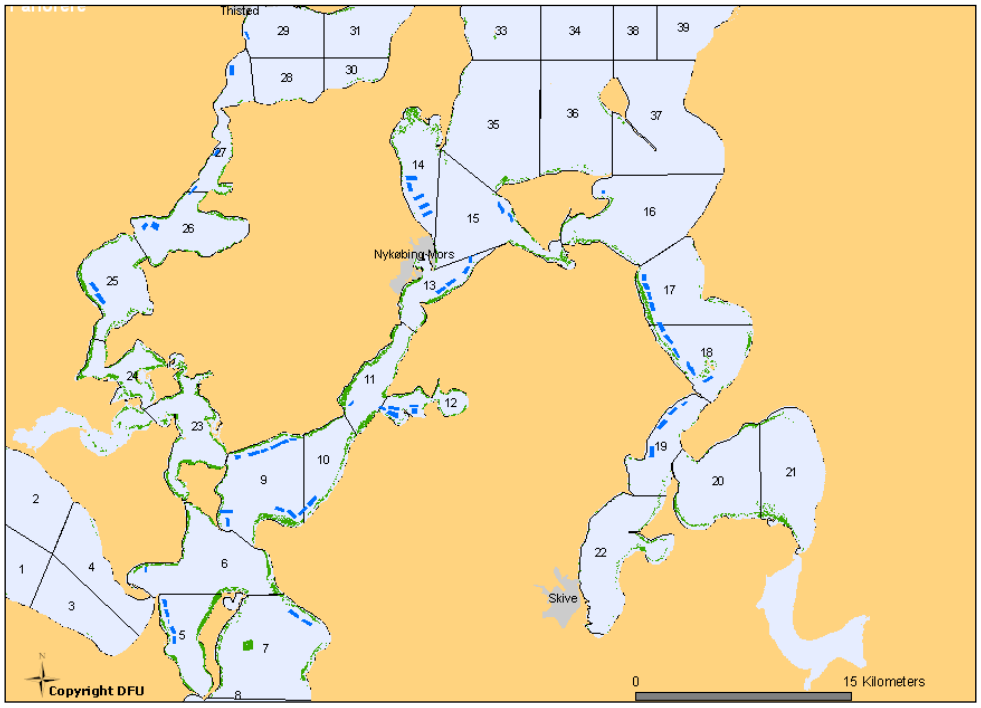

Figure 7: Map showing the location of eelgrass beds in Limfjorden (green) relative to mussel farming areas (blue) [Source: manually updated from original map downloaded from DFU website GIS viewer[1]].

[1] http://gis.dfu.min.dk/website/imfjord/viewetm

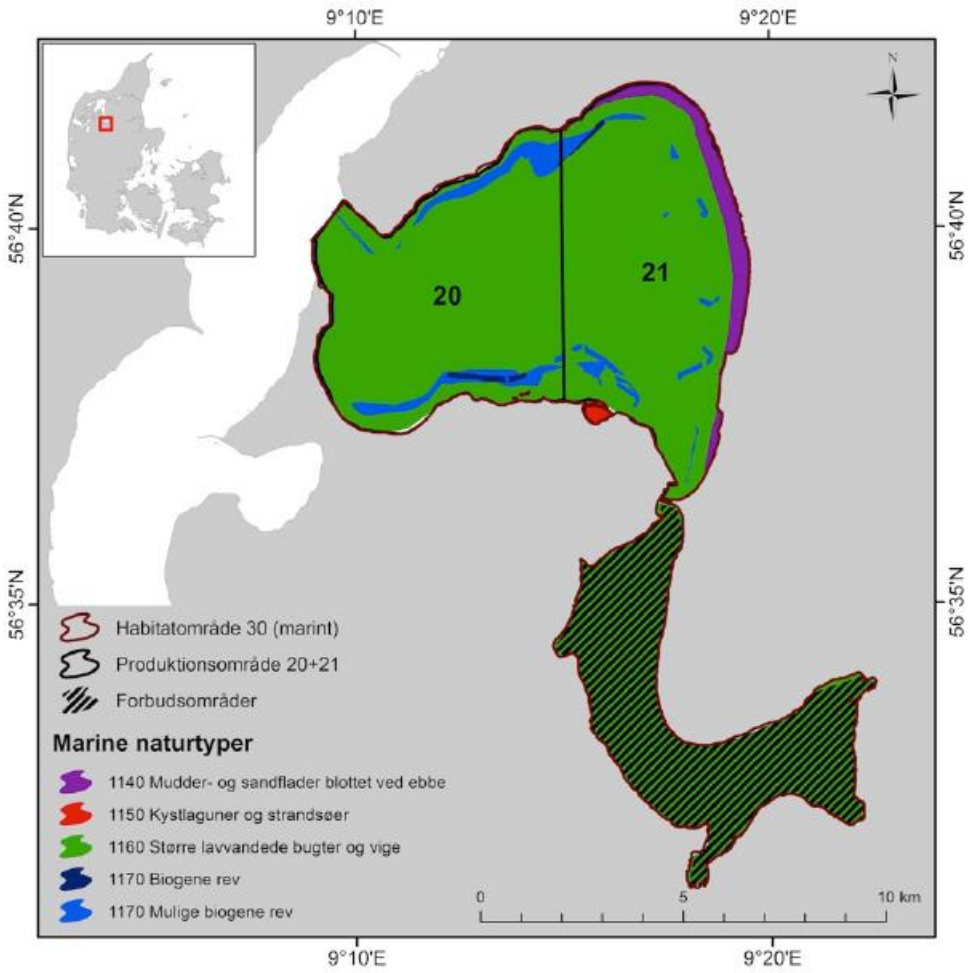

Figure 8: Map showing detailed mapping of vulnerable habitat types in Limfjorden, in this case from the Lovns Bredning Natura 2000 site (Nielsen, Olsen and Nielsen, 2020).

7.3.1.4.6 Mussel cultivation and marine habitats

The site selection process that has been established for mussel farms is designed to ensure that they are appropriately located. The location factors that are taken into account, include Natura 2000 sites, the presence of eelgrass bed and also the location of mussel farms relative to bathing beaches. This “site screening” procedure ensures that sensitive marine habitats are highly unlikely to be impacted by mussel farms. All of the UoA cultivation areas lie outside Natura 2000 sites (see Figure 9).

The relative scale of the UoA and Limfjorden is relevant to considering habitat impacts. The total area of the four UoA sites is 87.6ha (0.876km²). The total area of Limfjorden is over 1,500km²; thus, the UoA covers just under 0.06% of the seabed area of Limfjorden.

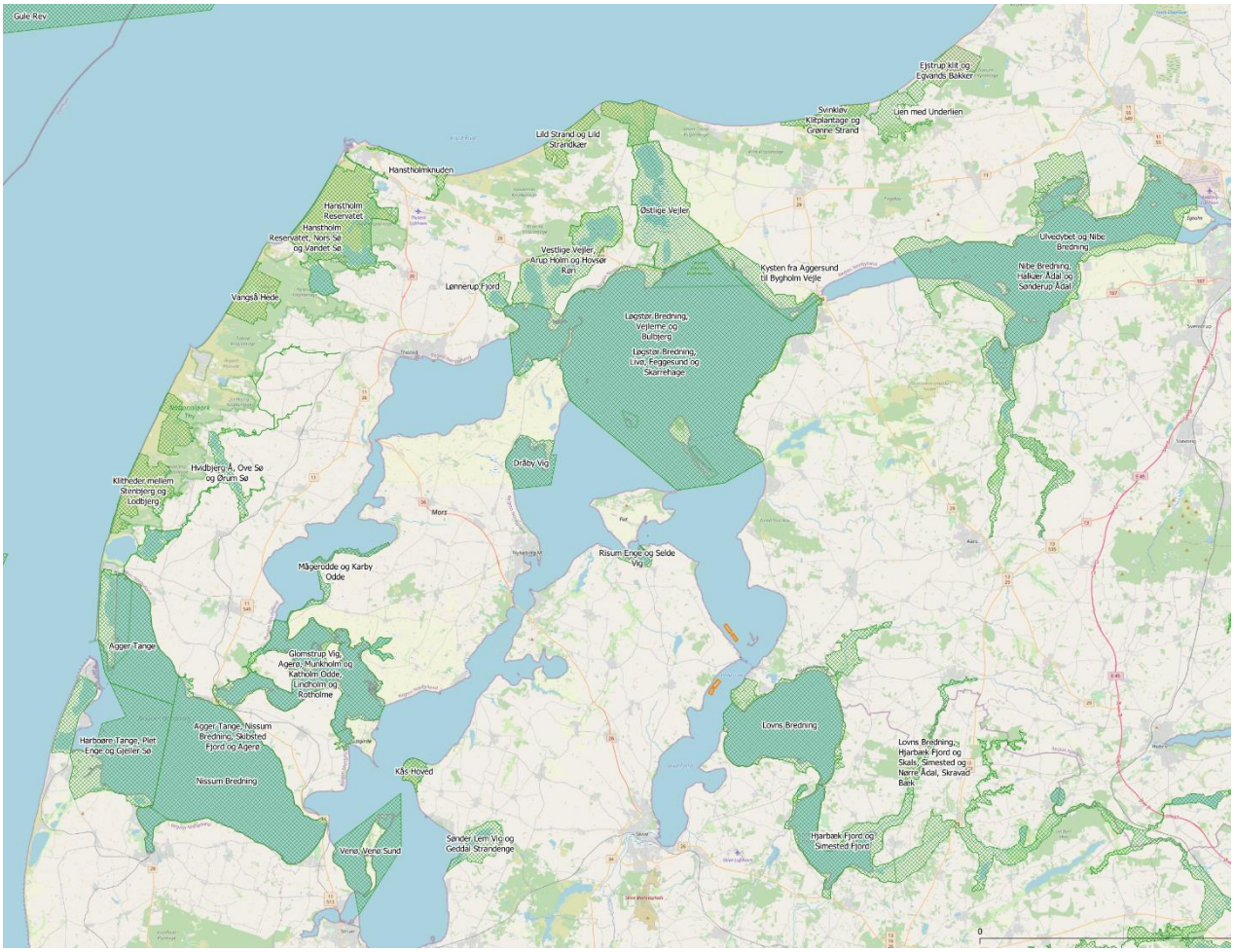

Figure 9: Location of Natura 2000 sites (green) (EMODnet, 2020) relative to UoA cultivation sites (orange) Basemap © OpenStreetMap contributors[2]].

The potential effect of fishing and aquaculture activities on Natura 2000 site features is reviewed in Sewell & Hiscock (2005) and in Sewell et al (2007). Neither publication notes any records of impacts of rope-grown mussel cultivation on the marine habitats found in Natura 2000 sites, although both note the potential smothering effects of faecal and pseudofaecal material from mussel farms.

In the absence of clear evidence of any impacts of rope-grown mussel cultivation on Natura 2000 seabed habitats, the assessment team has briefly considered the effects that might arise. These are considered in turn here.

[2] http://www.openstreetmap.org/copyright

- **Anchorage** – the mussel farms are anchored to the seabed using screw anchors, which occupy a very small area of seabed. The tidal range in Limfjorden is small, and currents are weak, so relatively short mooring chains can be used, minimising the area of seabed that might be abraded by the farm anchorage. Adverse effects of anchoring mussel farms are therefore likely to be small-scale and localised
- **Smothering** – there is some evidence emerging from studies in Limfjorden that the faecal and pseudofeacal material from mussel farms can have localised effects on the seabed within 1-200m of the farm.
- **Shading** – it is possible that mussel farms could reduce the amount of light reaching the seabed beneath, which could adversely affect marine plants. There is no evidence that this has occurred in Limfjorden, and the policy of locating shellfish farms away from the known extent of areas occupied by eelgrass and macroalgae would prevent this impact from arising.
- **Water currents** – mussel farms could alter the speed and direction of water currents in their vicinity. Again, there is no evidence of this happening in Limfjorden.
- **Competition for food with wild stocks** – the mussel stock in cultivation could compete for planktonic food with wild mussel stocks. There is evidence that the mussel farms can indeed cause localised reductions in phytoplankton concentrations. Limfjorden is regarded as a eutrophied water body, with a very high phytoplankton productivity that can lead to oxygen depletion in deeper areas. The stock of mussels in cultivation is a tiny proportion of the adult stock (less than 1%). It therefore seems very unlikely that either phytoplankton abundance is a limiting factor for mussel stocks in Limfjorden, or that the cultivated stock of mussels will exceed the carrying capacity of the ecosystems.
- **Consumption of larvae** – adult mussels are known to ingest and consume planktonic mussel larvae. There is a risk that the cultivated stock could interfere with stock recruitment to natural stocks by consuming larvae before they settle. Again, this seems to be a remote possibility given the small biomass of cultivated mussels relative to the wild stock; the location of mussel farms away from wild beds; and the very small biomass of mussels in cultivation compared to the wild stock.

In summary, it appears highly unlikely that mussel farming by the UoA in Limfjorden at its current scale is likely to have adverse effects on seabed habitats. However, this conclusion might change if the scale of cultivation activity increased substantially.

There is the possibility that each Unit of Assessment might have a slightly different effect on seabed habitats, and this is considered below.

7.3.1.4.6.1 Spat collection

The physical installation of spat collectors is likely to have only limited impacts on habitats. The gears employed are static and, once deployed, the anchors and main supporting rope systems are likely to be left in place unless repairs or other remedial action is required.

Spat collectors are harvested whilst the mussels are small, soon after they have settled. These small mussels and their relatively low biomass are unlikely to create substantial quantities of faecal or pseudofaecal material, so the risk of spat collection causing smothering of benthic habitats is low.

7.3.1.4.6.2 Cultivation

Cultivation takes place on the same rope systems used for spat collection, so the physical impact on habitats (caused by anchors or other physical disturbance of the seabed) is again likely to be limited. Impacts have been considered in a study of mussel cultivation in Limfjorden by DTU-Aqua in 2005 (Tørring & Petersen, 2005). Key findings of this and related work are summarised here.

The faeces and pseudofaeces produced by rope-grown mussels tend to sink rapidly to the seabed. The accumulation of faeces and pseudofaeces in cultivation areas has the potential to smother seabed habitats and alter seabed chemistry in the vicinity of mussel farming areas.

This effect has been observed in association with mussel cultivation. In areas with strong water currents, no sedimentation effects can be seen; whilst in areas where water motion is limited, faecal and pseudofeacal material may accumulate to create a seabed habitat rich in organic material and in some areas a benthic community with resistance against low oxygen levels.

Studies of the effect of mussel farms on benthic chemistry have recently been carried out in Limfjorden (Carlsson et al, 2009; 2010). These demonstrate that mussel farms alter sediment chemistry, and that the magnitude of the effect is proportional to the biomass of mussels in the farm area. These effects seem to be localised (to within an area of 100m around the farm) but are considered likely to increase benthic degradation rates in an area that is already eutrophied (Carlsson et al, 2009). These studies also show that the organic material produced by mussel farms decomposes rapidly, so the effect on the seabed in an area is likely to be reversible.

7.3.1.5 Ecosystem

The ecosystem of Limfjorden is well monitored and carefully studied. A review of ecosystem and trends has been published (Markager et al, 2006), focussing on the effects of human activities on water quality and hence on the biota of Limfjorden.

There are two potential ecosystem effects of mussel cultivation that have not already been considered here. The first of these is the risk of introducing or spreading non-native species in the area; and the second is the overall effect of mussel farming on nutrient levels and their management in Limfjorden.

7.3.1.5.1 Non-native species

It is noted that 6 of the species recorded on mussel ropes are non-native species (see Table 8). These non-native species are highly unlikely to have been introduced by the mussel farming industry and are known to be distributed widely in the area following introductions (largely by international shipping) over the past 150 years (Leppäkoski et al, 2002). It is unlikely that the unit of certification will result in any further spread of these species within Limfjorden, as there is little or no movement of stock between farms within the area.

7.3.1.5.2 Nutrients

The potential effect of mussel farms on nutrient cycles in the water column and in seabed sediments is currently the subject of much debate and investigation.

With respect to water quality, some studies suggest that mussel farms might reduce the concentration of nitrogen and phosphorus within an area by removing mussel biomass through harvesting (Støttrup et al, 2010). In addition, filtration of phytoplankton in the water column by cultivated mussels might improve water quality in the area by increasing the Secchi depth, decreasing sedimentation rates and reducing the occurrence of hypoxia in the nearby area (report by Petersen et al. 2010). By contrast, an earlier study by Carlsson et al. (2009) found that mussel farms may cause enhanced fluxes of nutrients. This could potentially lead to increased primary production, encourage harmful algal blooms and promote hypoxia.

On the seabed, it has been found that mussel farming altered sediment chemistry and increased sedimentation, nutrient fluxes and denitrification rates just below a farm in Limfjorden (Carlsson et al. 2009). A recent study (Stadmark & Conley, 2011) suggests that mussel farming can cause local hypoxia below the farm and thereby reduce denitrification rates. This would alter the overall nutrient budget because more nutrients could be released from the sediment. They therefore concluded that mussel farming is unlikely to be effective tools for nutrient reduction. New estimates of denitrification rates in Limfjorden show that approximately 200 kg/N/year is removed by this process in an area corresponding to a 18 ha mussel farm, which is less than 2% of the 10 T N/year that is removed from harvest of mussels from a typical farm in Limfjorden (Petersen et al. 2012). Hence, in this case mussel farming and harvest result in a significant net removal of nitrogen from the marine environment even if denitrification is inhibited.

The Mumihus project in Limfjorden showed that the mussel farms had a positive effect on the ecosystem through the filtering of phytoplankton and suspended matter, which were reduced on average by 13-30% and >50% within the farm area (Nielsen et al. 2016). According to 3D model results, the improvement of Secchi depth due to mussel filtration was also evident on basin scale (Petersen et al. 2014). Mussel filtration and the subsequent production of faecal material resulted in an increased biodeposition below the culture unit, but due to the removal of organic particles from the surrounding waters, the effects on basin scale were a net reduction in total sedimentation (Petersen et al. 2014). The extension of enhanced nutrient regeneration, enhanced sediment oxygen uptake and accumulation of organic matter at the farm is restricted to the sediments in immediate vicinity of the mussel lines and is of limited magnitude compared with unfarmed reference sites (Holmer et al. 2015). This is probably due to the eutrophic conditions with frequent oxygen depletion events, high nutrient concentrations, high sedimentation rates, organic-rich sediments with a sparse benthic infauna, and rapid nutrient regeneration in the water column and the sediments (Carstensen et al. 2013, Holmer et al. 2015). The regeneration of nutrients on the mussel lines and in the sediments contributes at the maximum with 114 kg N/d and during most of the production season the farm is a net sink of N (8–41 kg N/day) (Holmer et al. 2015). However, after 1 year the farm became a nutrient source and it was recommended to harvest the mussels within the first year of

the production cycle (Holmer et al.2015). The harvest of mussel biomass from cultivation sites in Limfjorden removes nutrients from the fjord corresponding to 16 t N and 0.7 t P per year.

7.3.1.6 Principle 2 Scoring elements

The MSC require that the team identify and list the scoring elements for fisheries under assessment. The provisional list of scoring elements is presented overleaf.

Table 9: Provisional list of Scoring elements

Component	Designation	Scoring elements	Data-deficient
Principle 1	Target Species	NA – Annex SB for enhanced bivalve fisheries applied.	NA
Primary species *Species not covered under Principle 1, and that are within scope and where management tools and measures are in place intended to achieve management objectives reflected in either limit or target reference points.*	Main (>5% of total catch)	NA – Annex SB for enhanced bivalve fisheries applied.	NA
	Minor (<5% of total catch)	NA – Annex SB for enhanced bivalve fisheries applied.	NA
Secondary species *Species not covered by Principle 1 and that are not primary species, or species that are out of scope but are not "ETP" species.*	Main (>5% of total catch)	NA – Annex SB for enhanced bivalve fisheries applied.	NA
	Minor (<5% of total catch)	NA – Annex SB for enhanced bivalve fisheries applied.	NA
Endangered, Threatened and Protected (ETP) species *Species that are recognised by national ETP legislation or in specified binding international agreements (see FCR SA3.1.5.2); or out of scope species that are listed in the IUCN as VU, EN, or CE.*	ETP species with national / international limits	NA - Evidence of no interactions.	No
	ETP species with no national / international limits	NA - Evidence of no interactions.	No
Habitats	Commonly encountered	**Substratum** • Fine muddy / sandy sediments **Geomorphology**	No

Component	Designation	Scoring elements	Data-deficient
		• Flat **Biota** • Mixed small / low encrusting invertebrates • Infaunal bioturbators	
	Vulnerable marine ecosystems	Evidence of no interactions	No
	Minor habitats	None – the UoA is static, so only impacts on “commonly encountered” habitats.	No
Ecosystems	NA	Trophic relationships	No

7.3.2 Principle 2 Performance Indicator scores and rationales

7.3.2.1 PI 2.3.1– ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the **effects of the UoA** on the population/ stock are known and **likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, the **combined effects of the MSC UoAs** on the population /stock are known and **highly likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a **high degree of certainty** that the **combined effects of the MSC UoAs** are within these limits.
	Met?	Yes	Yes	Yes
Rationale				

The MSC define Endangered Threatened & Protected (ETP) species as those that are:

- Recognised by national ETP legislation,
- Listed on Appendix I of Convention on International Trade in Endangered Species (CITES) (unless it can be shown that the particular stock of the CITES listed species impacted by the UoA under assessment is not endangered),
- Listed in any binding agreements concluded under the Convention on Migratory Species (CMS), or
- Classified as 'out of scope' (amphibians, reptiles, birds and mammals) that are listed in the International Union for the Conservation of Nature (IUCN) Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

The list of species associated with the rope grown mussel fishery (Table 8) has been checked against CITES Appendix 1 (accessed at the CITES website (CITES, 2016)). None of the species are listed here, nor are they listed in either Annex II or IV of the EC Habitats Directive (92/43/EC).

None of the species that have been found to colonise mussel farms in Limfjorden are listed as ETP in national legislation or listed in CITES Appendix 1. There are no records of any ETP species that are found in the area (such as wild birds, pinnipeds or cetaceans) being caught in this fishery. All of the cultivation areas in the UoC are located outside Natura 2000 sites that have been designated for birds, minimising the risk of disturbance to protected bird species.

Mussel farmers operating in Limfjorden report that in contrast to other parts of Denmark they have no problems with predation of mussels in cultivation by diving ducks (notably Eider duck, *Somateria mollisima*). This anecdotal view is supported by recent research (Petersen *et al.*, 2021).

Neither commercial operators of mussel farms, nor DTU-Aqua (Petersen *et al.*, 2021) have reported any interactions with ETP bird species that are listed in the Annexes of EC Birds Directive (2009/147/EC) or species such as cetaceans and pinnipeds that are listed in the Annexes of the EC Habitats Directive (92/43/EC). No reports of interactions with ETP species have been made in the certification or surveillance reports for overlapping MSC-certified mussel farms. The policy requirement for all of the farms in the UoC to be located outside Natura 2000 sites, which are the most important areas for ETP species such as birds, serves as a precautionary management measure that minimises the risk of interactions with ETP species.

There is evidence that the important ETP populations of birds in Limfjorden are monitored as part of the Danish Government's commitment to establish and protect Natura 2000 sites. All of the mussel farm sites in the UoC are located outside Natura 2000 sites, and there is no evidence from recent reports on the condition of these sites (Nielsen *et al.*,

2018b, 2018a, 2021; Nielsen, Olsen and Nielsen, 2020; Petersen *et al.*, 2021) that mussel farming is having any off-site indirect impacts on them.

Because there is no evidence of any history of any adverse interactions with ETP species either directly through interaction with mussel farms or indirectly through disturbance effects, the SG60, 80 and 100 requirements are all considered likely to be met.

	Direct effects			
b	Guide post	Known direct effects of the UoA are likely to not **hinder recovery** of ETP species.	Direct effects of the UoA are **highly likely** to not **hinder recovery** of ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species.
	Met?	Yes	Yes	Yes
Rationale				

As noted in the rationale for SIa above, there is both anecdotal information from the fishery indicating that there are no direct impacts on ETP species and also independent monitoring reports for important sites for ETP species in Limfjorden that provide a high degree of confidence that there are no significant detrimental direct effects of mussel cultivation on ETP species. No ETP species colonise the mussel farms; no physical interactions between mussel farms and ETP species have ever been recorded in Limfjorden; bird populations are not affected by the mussel farms; and the site selection process ensures that mussel farms are not located in areas where there could be ETP species on the seabed. The SG60, 80 and 100 requirements are all therefore likely to be met.

	Indirect effects			
c	Guide post		Indirect effects have been considered for the UoA and are thought to be **highly likely** to not create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the UoA on ETP species.
	Met?		Yes	Yes
Rationale				

Indirect effects on ETP species, such as competition for food or other resources, does not occur in this fishery. Mussel farming increases the biomass of mussels in Limfjorden and does not deplete food availability in the water column. No actions are taken as part of the cultivation operations that could indirectly affect ETP species (such as scaring shellfish-eating birds away from farm areas). The SG 80 and 100 requirements are therefore likely to be met.

References

Sections 7.3.1.2, 7.3.1.3 & 7.3.1.4 of this report.

Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.3.2.2 PI 2.3.2 – ETP species management strategy

PI 2.3.2		The UoA has in place precautionary management strategies designed to: - meet national and international requirements; - ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guide post	There are **measures** in place that minimise the UoA-related mortality of ETP species, and are expected to be **highly likely to achieve** national and international requirements for the protection of ETP species.	There is a **strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be **highly likely to achieve** national and international requirements for the protection of ETP species.	There is a **comprehensive strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to **achieve above** national and international requirements for the protection of ETP species.
	Met?	Yes	Yes	No
Rationale				

For the purposes of an MSC assessment, "measures" are individual management actions or tools which may manage impacts either deliberately or coincidentally; a "strategy" is a cohesive, deliberate and effective management approach designed to addressing unacceptable impacts (full definitions are given in the MSC CRv1.3). A "comprehensive strategy" is not defined but can be taken to mean management arrangements that exceed those of a "strategy".

The management of potential impacts on ETP species arising from the cultivation of mussels includes both industry practices (measures) and statutory controls that form part of a strategy.

The statutory procedure for determining the location and operation of mussel farms in Limfjorden minimises the risk of them having an adverse effect on ETP species.

The management strategy in place for determining the location of mussel farms ensures that they are located away from sensitive parts of Natura 2000 sites such as eelgrass beds, and any key locations for ETP species in Limfjorden. This minimises the risk of any direct interaction between the mussel farms and ETP species, should this ever occur. The EU Wild Birds Directive and Habitats and Species Directive provide a strategy for protecting both the habitats important to ETP species as well as individuals wherever they occur (EC, 1992, 2009)

The mussel farms themselves are static, and present little hazard to any mobile ETP species in the area. It is reported by mussel farmers that there are currently no interactions between the mussel farms and shellfish eating ducks (notably Eider duck), and thus no need for any action to discourage predation (Petersen *et al.*, 2021).

The SG60 and SG80 requirements are likely to be met by the measures and strategy in place.

b	**Management strategy in place (alternative)**			
	Guide post	There are **measures** in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **strategy** in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **comprehensive strategy** in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.
	Met?	NA	NA	NA

Rationale

This scoring issue need not be scored because requirements for protection or rebuilding for all of the ETP species that are known to occur in the area are provided through national ETP legislation or international agreements.

c	**Management strategy evaluation**			
	Guide post	The measures are **considered likely** to work, based on **plausible argument** (e.g.,general experience, theory or comparison with similar fisheries/species).	There is an **objective basis for confidence** that the measures/strategy will work, based on **information** directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a **quantitative analysis** supports **high confidence** that the strategy will work.
	Met?	Yes	Yes	No
Rationale				

Sufficient quantitative information is available from the absence of any reports of interactions between mussel farms and ETP species, the known distribution of ETP species, and from monitoring of ETP bird species within Natura 2000 sites in Limfjorden to conclude with a high degree of certainty that mussel farms do not represent a threat to the protection and recovery of these species (A. P. Nielsen *et al.*, 2015; Nielsen *et al.*, 2018a, 2018b, 2021; Nielsen, Olsen and Nielsen, 2020).

The absence of any records or anecdotal accounts of interactions with ETP species gives additional certainty to the conclusion that the mussel farms will not affect the status of these species at all. Quantitative monitoring of the non-target species that colonise mussel farms and of ETP species in the area (such as bird populations) is carried out to determine their status and would enable fishery-related mortality to be detected.

The SG60 and SG80 requirements are likely to be met.

d	**Management strategy implementation**			
	Guide post		There is some **evidence** that the measures/strategy is being implemented successfully.	There is **clear evidence** that the strategy/comprehensive strategy is being implemented successfully and **is achieving its objective as set out in scoring issue (a) or (b).**
	Met?		Yes	No
Rationale				

Based upon this information about the location and nature of the mussel farms, and the nature of the ETP species in the area, there is an objective basis for confidence that the risk to ETP species from mussel farms is very low, and thus that the management strategy will work. The absence of any reports of interactions between mussel farms and ETP species, and the absence of any concerns about such impacts from eNGOs provides evidence that this is the case.

The evidence available is adequate to meet the SG80 requirements but does not seem adequate for SG100.

e	**Review of alternative measures to minimise mortality of ETP species**			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species,

		related mortality of ETP species.	species and they are implemented as appropriate.	and they are implemented, as appropriate.
	Met?	Yes	Yes	No
Rationale				

The scoring comments below are prefaced by the observation that there is no evidence of any interaction between the UoAs and any ETP species in Limfjorden. The assessment team has therefore considered the strategic (EU) framework for monitoring, managing and mitigating impacts.

The process for reviewing the effectiveness of the mitigation measures in place for managing impacts of EU fisheries on ETP species is set out in Article 4 and Article 31 of EU Regulation 1241/2019. These require: -

Article 4

Targets

1. Technical measures shall aim to ensure that:

(a) catches of marine species below the minimum conservation reference size are reduced as far as possible in accordance with Article 2(2) of Regulation (EU) No 1380/2013.

(b) incidental catches of marine mammals, marine reptiles, seabirds and other non-commercially exploited species do not exceed levels provided for in Union legislation and international agreements that are binding on the Union.

(c) the environmental impacts of fishing activities on seabed habitats are in line with point (j) of Article 2(5) of Regulation (EU) No 1380/2013.

2. The extent to which progress was made towards those targets shall be reviewed as part of the reporting process set out in Article 31.

[…]

Article 31

Review and reporting

1. By 31 December 2020 and every third year thereafter, and on the basis of information supplied by Member States and the relevant Advisory Councils and following evaluation by STECF, the Commission shall submit a report to the European Parliament and to the Council on the implementation of this Regulation. That report shall assess the extent to which technical measures both at regional level and at Union level have contributed to achieving the objectives set out in Article 3 and reaching the targets set out in Article 4. The report shall also refer to advice from ICES on the progress that has been made, or impact arising from innovative gear. The report shall draw conclusions about the benefits for, or negative effects on, marine ecosystems, sensitive habitats and selectivity.

In addition to these requirements, Annex XIII of the Regulation requires EU Member States to establish schemes for monitoring both the interactions of fishing vessels with cetaceans (Part A); seabirds (Part B); and marine turtles (Part C).

This legislation has only been recently introduced. The evidence from its predecessor Regulation (812/2004) is that this process for regular review of the management strategy in response to information gathered by EU Member States has worked effectively and has resulted in the implementation of a management regime that has considerably reduced fishing impacts on marine mammals.

As well as this triennial review, the EU TAC Regulation is subject to annual review, which provide a more regular opportunity to review the status of ETP species and where necessary impose prohibitions to prevent them from being landed (though this does not consider the practicality of alternative measures).

EU fisheries legislation establishes a requirement to monitor the interactions between fisheries on an ongoing basis, and that measures to minimise impacts on non-target fish species are reviewed at least every 3 years, which is likely to satisfy the SG60 and SG80 requirements.

The period for review and reporting of interactions for ETP species is, however, every 3 years, so the requirement for biennial review is not met and SG100 requirements appear not to be satisfied.

References

Section 7.3.1.3 of this report.

Draft scoring range	**≥80**
Information gap indicator	**More information sought.** The key information sought will be evidence of a review of alternative measures.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.3.2.3 PI 2.3.3 – ETP species information

PI 2.3.3		Relevant information is collected to support the management of UoA impacts on ETP species, including: - Information for the development of the management strategy; - Information to assess the effectiveness of the management strategy; and - Information to determine the outcome status of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guide post	Qualitative information is **adequate to estimate** the UoA related mortality on ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Qualitative information is **adequate to estimate productivity and susceptibility** attributes for ETP species.	Some quantitative information is **adequate to assess** the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.	Quantitative information is available to assess with a high degree of certainty the **magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status** of ETP species.
	Met?	Yes	Yes	Yes
Rationale				

Some quantitative information is available from the absence of any anecdotal reports of interactions between mussel farms and ETP species, the distribution of these species (Petersen *et al.*, 2021) and from monitoring of ETP bird species within Natura 2000 sites in the Limfjord to conclude with a high degree of certainty that they do not represent a threat to the protection and recovery of these species; the absence of any records of interactions with ETP species gives additional certainty to the conclusion that the mussel farms will not affect the status of these species at all.

On the basis of this information it is likely that the SG60, SG80 and SG100 requirements will be met.

b	**Information adequacy for management strategy**			
	Guide post	Information is adequate to support **measures** to manage the impacts on ETP species.	Information is adequate to measure trends and support a **strategy** to manage impacts on ETP species.	Information is adequate to support a **comprehensive strategy** to manage impacts, minimise mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives.
	Met?	Yes	Yes	No
Rationale				

Sufficient information is available from monitoring of the species found in shellfish farms and the status of ETP species in the Limfjord to measure trends in the abundance of these species, and to detect the occurrence of ETP species in shellfish farms. This information is likely to meet the SG60 & SG80 requirements.

In the absence of a “comprehensive strategy” the SG100 requirements are not likely to be met.

References

Sections 7.3.1.2, 7.3.1.3 & 7.3.1.4 of this report.

Draft scoring range	**≥80**
Information gap indicator	**More information sought** Confirmation of the information available about ETP species interactions (if any occur at all) will be sought at the site visit.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.3.2.4 PI 2.4.1 – Habitats outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	Yes	Yes	Yes
Rationale				

The “commonly encountered habitat” impacted by the mussel farms is the seabed beneath the mussel farm. The mussel farms are static, so each farm has an impact that is related to its geographic extent.

The client reports that the sites where the farms are located were deliberately chosen to be in sheltered shallow waters (roughly 6-9m deep). The seabed in these areas is muddy. The waters in Limfjorden typically stratify in the summer, resulting in oxygen depletion near the seabed. This oxygen depletion results in a depauperate benthic community in many parts of Limfjorden (Jørgensen, 1980).

The main effect that mussel farms are likely to have on marine habitats is through the smothering of the seabed with faecal or pseudofeacal material from the farm (Filgueira, Grant and Petersen, 2017).

Studies of mussel farms in Limfjorden indicate that any effects on seabed habitats are likely to be confined to an area of 1-200m around each farm . Given that the UoA mussel farms occupy an area of under 2km² in the entire Limfjord (total area in excess of 1,500km²), any impacts on habitats are highly unlikely to be significant (or even detectable) at the regional or bioregional level.

The faecal material from mussel farms is known to decompose rapidly. There is thus evidence that the fishery is highly unlikely to reduce habitat structure to the point where there would be serious or irreversible harm (because the spatial extent of the impact is limited by the current extent of mussel farm and the area that may be affected; and the impact would be reversed quickly by the decomposition of faecal material if mussel farming ceased).

The SG 60, 80 and 100 requirements are likely to be met because there is evidence that the habitat impacts from the fishery are highly unlikely to adversely affect habitat structure in a seriously or irreversibly.

	VME habitat status			
b	Guide post	The UoA is **unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	NA	NA	NA
Rationale				

Mussel farms in Limfjorden are sited away from areas where VME seabed habitats may be found (such as eelgrass beds and sensitive habitats in Natura 2000 sites), to minimise the risk of direct impacts of the activity on habitats. The farms are anchored and immobile, and thus have very limited contact with the seabed.

There is no evidence, therefore, of any interaction with VME habitats and this SI is not scored.

	Minor habitat status			
c	Guide post			There is **evidence** that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			Yes
Rationale				

As noted above, the mussel farms are anchored and immobile. There are therefore no “minor” habitats that may be subject to occasional interactions with the mussel farms.

References

Sections 7.3.1.4 & 7.3.1.5 of this report.

(Jørgensen, 1980; Filgueira, Grant and Petersen, 2017)

Draft scoring range	**≥80**
Information gap indicator	**More information sought** At the site visit more information will be sought about the seabed character and habitats in the vicinity of the mussel farms.
Overall Performance Indicator scores added from Client and Peer Review Draft Report stage	
Overall Performance Indicator score	
Condition number (if relevant)	

7.3.2.5 PI 2.4.2 – Habitats management strategy

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
Scoring Issue		SG 60	SG 80	SG 100
a	**Management strategy in place**			
	Guide post	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a **strategy** in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	Yes	Yes	Yes
Rationale				

The principal management strategy in place is the statutory site selection process for mussel farms that ensures that eelgrass beds and Natura 2000 sites are not impacted. This constraint on site location has been implemented specifically to minimise habitat impacts. The anchoring of the farms ensures that any direct impacts on the seabed are limited to a small area and would be reversed if the farm was removed.

The mussel farm site selection process ensures that any VME habitats are not subject to direct impacts from mussel farming, and there is thus no need for a “move-on rule” for VME habitats.

The strategy in place manages impacts to ensure that the fishery does not cause serious or irreversible harm to habitats, and is likely therefor to meet the SG60, 80 and 100 requirements.

b	**Management strategy evaluation**			
	Guide post	The measures are **considered likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on **information directly about the UoA and/or habitats** involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on **information directly about the UoA and/or habitats** involved.
	Met?	Yes	Yes	No
Rationale				

It is apparent that site location constraints represent a strategy for managing habitat impacts; this strategy is based upon information about the habitats involved, and the nature of the fishery. Mussel farms are static, they are located away from VMEs and sensitive habitats, and the UoA farms are located in areas that are subject to seasonal oxygen depletion which results in an impoverished benthic community.

This information provides an objective basis for confidence that this strategy will work, and there is clear evidence (from the location of mussel farms outside sensitive areas) that the strategy is being implemented successfully. There is no evidence of testing of this strategy however.

It is therefore likely that the SG60 and 80 requirements will be met. SG100 might be met if there is evidence of testing (for instance from the MUMIHUS and BONUS/OPTIMUS projects) to support a high level of confidence that this strategy will work.

c	**Management strategy implementation**			
	Guide post		There is **some quantitative evidence** that the measures/partial strategy is	There is **clear quantitative evidence** that the partial strategy/strategy is being

			being implemented successfully.	implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		Yes	Yes
Rationale				

The implementation of the site selection process and the location of mussel farms away from sensitive habitats in Natura 2000 sites and eelgrass beds provides clear evidence that the strategy in place for managing habitat impacts is being implemented successfully.

The SG80 and SG100 requirements are therefore likely to be met.

d	**Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs**			
	Guide post	There is **qualitative evidence** that the UoA complies with its management requirements to protect VMEs.	There is **some quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is **clear quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	NA	NA	NA
Rationale				

In the absence of interactions with VMEs there is no need to score this SI.

References

Sections 7.3.1.4 & 7.3.1.5 of this report.

(Jørgensen, 1980; Filgueira, Grant and Petersen, 2017)

Draft scoring range	**≥80**
Information gap indicator	**More information sought** At the site visit evidence of "testing" of the management strategy will be sought.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.3.2.6 PI 2.4.3 – Habitats information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat		
Scoring Issue		SG 60	SG 80	SG 100
a	**Information quality**			
	Guide post	The types and distribution of the main habitats are **broadly understood**. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the types and distribution of the main habitats.	The nature, distribution and **vulnerability** of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	Met?	Yes	Yes	Yes
Rationale				

Limfjorden is well studied, and the nature, distribution and vulnerability of all main habitat types are known. Information about the distribution and status of these habitats is also known in a European context through the administrative and monitoring requirements associated with Natura 2000 sites. Particular attention is paid to vulnerable habitat types.

Changes in vulnerable habitat distributions in Limfjorden are monitored over time (for instance, for bird habitats, eelgrass bed distribution and the extent of macroalgae in Limfjorden), and information is collected on a regular basis that would enable changes in the status of these habitat types to be detected. This information is reported regularly by DTU-Aqua.

The SG60, 80 and 100 requirements appear to be fully met by the information available about habitats.

b	**Information adequacy for assessment of impacts**			
	Guide post	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA:	The physical impacts of the gear on all habitats have been quantified fully.

		consequence and spatial attributes of the main habitats.	Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	
	Met?	Yes	Yes	No
Rationale				

Accurate information is available about the location of shellfish farms in Limfjorden relative to sensitive habitats (see Figure 7, Figure 8 & Figure 9).

The direct and indirect effects of mussel farming on marine habitats are understood, and the extent of impacts within and around mussel farms is being monitored and modelled as part of an ongoing research programme (outlined in section 7.3.1.5.2). The full impact of the fishery on habitats has not, however, been fully quantified.

The SG60 and SG80 requirements are likely to be met by the information available.

	Monitoring			
c	Guide post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in all habitat distributions over time are measured.
	Met?		Yes	Yes
Rationale				

The extent of habitats in Limfjorden are regularly monitored (such as eelgrass beds, macroalgal beds and the extent of marine habitats in Natura 2000 sites), and the location of all mussel farms is known. Regular monitoring of habitat distributions in Limfjorden is carried out by DTU-Aqua, both at the scale of Limfjorden and as part of investigations of potential impacts of shellfish farming on marine habitats and ecosystems.

This information is likely to meets the SG80 and SG100 requirements.

References

(A. P. Nielsen *et al.*, 2015; Dinesen *et al.*, 2015; P. Nielsen *et al.*, 2015b, 2015a; Nielsen *et al.*, 2017, 2018b, 2018a; Eigaard *et al.*, 2020; Nielsen, Olsen and Nielsen, 2020)

Section 7.3.1.4.5 of this report.

Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.3.2.7 PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	**Ecosystem status**			
	Guide post	The UoA is **unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Yes	Yes	Yes
Rationale				

The most likely ecosystem impacts to arise from mussel farming in Limfjorden are through the effect of the increased mussel biomass on the abundance of phytoplankton and on nutrient cycles.

The current scale of mussel farming in Limfjorden is likely to minimise any ecosystem effects that the fishery may have; and the small biomass of mussels presently in cultivation relative to the wild stock is likely to reduce this effect still further. The maximum biomass of mussels in the UoA is around 1,300t; the biomass of wild mussels in the nearby Lovns Bredning Natura 2000 site is estimated at over 40,000t; and the total biomass of mussels in Limfjorden is typically in excess of 400,000t.

In recent years research has been carried out in Limfjorden to determine whether mussel cultivation has a detrimental effect on the ecosystem (for instance through localised phytoplankton depletion and disturbance of benthic chemistry) or whether the effects are beneficial. The conclusion is presently that mussel farms forma a useful contribution to reducing eutrophication and improving water quality in Limjorden (Bergström *et al.*, 2020; Holbach *et al.*, 2020). Any impacts on seabed ecosystem function is considered to be localised, short-term and reversible in a period of less than 5 years.

The scientific information available at present suggests that the ecosystem effects of mussel farms in Limfjorden are likely to be localised. This research provides some evidence that the current level of mussel farming activity is highly unlikely to be disrupting key elements of the ecosystem, and may even be beneficial, helping to restore the ecosystem to a more natural (i.e. non-eutrophied) condition.

The available evidence indicates that mussel farming in Limfjorden at the current scale is highly unlikely to disrupt the ecosystem to a serious or irreversible extent.

The SG60, SG80 and SG100 requirements appear likely to be fully met by the body of evidence available, and the site visit will provide an opportunity to discuss this with scientists in the area.

References

Section 7.3.1.5 of this report. Støttrup et al, 2010; Stadmark & Conley 2011; Markager et al, 2006; Nielsen et al, 2016; Petersen et al, 2014; Holmer et al, 2015; Carstensen et al, 2013; Petersen et al, 2013; Timmermann et al, 2015.

Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	

Condition number (if relevant)	

7.3.2.8 PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary which take into account the **potential impacts** of the UoA on key elements of the ecosystem.	There is a **partial strategy** in place, if necessary, which takes into account **available information and is expected to restrain impacts** of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a **strategy** that consists of a **plan**, in place which contains measures to **address all main impacts of the UoA** on the ecosystem, and at least some of these measures are in place.
	Met?	Yes	Yes	No
Rationale				

The Government strategy of ensuring that mussel farms are located away from sensitive areas, and for limiting their size, serves to constrain any ecosystem impacts that mussel farming may have in Limfjorden. The provisions of the Water Framework Directive would act to prevent mussel farming from having a detrimental effect on the "Good Ecological Status" of Limfjorden ecosystem.

The combination of site selection and the management strategy provided by the Water Framework Directive is likely to meet the SG60 and SG80 requirements.

As noted in PI2.5.1 above, there is evidence that mussel farms can improve water quality, and a policy framework for determining site location and scale to optimise this benefit is being developed (Bergström *et al.*, 2020; Holbach *et al.*, 2020). It is not presently clear if this is a "plan" *sensu* SG100, so this will be investigated further at the site visit.

b	**Management strategy evaluation**			
	Guide post	The **measures** are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems).	There is **some objective basis for confidence** that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved.	**Testing** supports **high confidence** that the partial strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved.
	Met?	Yes	Yes	Yes
Rationale				

The management strategy in place serves to restrain any potential impacts of mussel cultivation, and there is evidence from the location of mussel farms and the progress with the Water Framework Directive requirements that this strategy is being implemented successfully, as well as information about the ecosystem that indicates that it will work (there is evidence that mussel farms have negligible impact on water chemistry or ecosystem function in Limfjorden).

The SG60 and SG80requirements are therefore likely to be met.

It also appears likely that the testing of mussel farm impacts on the ecosystem in recent research will meet the SG100 requirements for this SI.

	Management strategy implementation			
c	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?		Yes	Yes
Rationale				

Information about the selection of cultivation sites in appropriate locations, coupled with scientific studies which show that ecosystem effects are small-scale and localised provides evidence that the strategy for restraining ecosystem impacts is being implemented successfully.

This information is likely to meet the SG80 and 100 requirements:

References

Section 7.3.1.5 of this report. Støttrup et al, 2010; Stadmark & Conley 2011; Markager et al, 2006; Nielsen et al, 2016; Petersen et al, 2014; Holmer et al, 2015; Carstensen et al, 2013; Petersen et al, 2013; Timmermann et al, 2015.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	≥80
Information gap indicator	**More information sought** Confirmation will be sought at the site visit that there is a “plan” in place to address ecosystem impacts that has been tested.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.3.2.9 PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	**Information quality**			
	Guide post	Information is adequate to **identify** the key elements of the ecosystem.	Information is adequate to **broadly understand** the key elements of the ecosystem.	
	Met?	Yes	Yes	
Rationale				

Information on the location and extent of the key elements of the ecosystem is available from scientific studies of species, habitats and ecosystems in the area that have been carried out for over a century. These studies provide a broad understanding of the key elements of the ecosystem.

The main impacts of mussel farming on the key elements of the ecosystem (water quality and specifically phytoplankton and nutrient concentrations) are monitored on a routine basis in order to meet the Danish Government's obligations under the EC Water Framework Directive. The effect of mussel farming on these aspects of the ecosystem has been investigated and is presently the subject of further research. An ecosystem model is currently being developed to predict the likely effects of expansion of the industry, and the results of this work are expected to be published in 2017.

The Mumihus project (2011-2014) in Limfjordenen showed that the mussel farms had a positive effect on the ecosystem through the filtering of phytoplankton and suspended matter, which were reduced on average by 13-30% and >50% within the farm area (Nielsen et al. 2016). According to 3D model results, the improvement of Secchi depth due to mussel filtration was also evident on basin scale (Petersen et al. 2014). Mussel filtration and the subsequent production of faecal material resulted in an increased biodeposition below the culture unit, but due to the removal of organic particles from the surrounding waters, the effects on basin scale were a net reduction in total sedimentation (Petersen et al. 2014). The extension of enhanced nutrient regeneration, enhanced sediment oxygen uptake and accumulation of organic matter at the farm is restricted to the sediments in immediate vicinity of the mussel lines and is of limited magnitude compared with unfarmed reference sites (Holmer et al. 2015). This is probably due to the eutrophic conditions with frequent oxygen depletion events, high nutrient concentrations, high sedimentation rates, organic-rich sediments with a sparse benthic infauna, and rapid nutrient regeneration in the water column and the sediments (Carstensen et al. 2013; Holmer et al. 2015). The regeneration of nutrients on the mussel lines and in the sediments contributes at the maximum with 114 kg N/d and during most of the production season the farm is a net sink of N (8–41 kg N/day) (Holmer et al. 2015). However, after 1 year the farm became a nutrient source and it was recommended to harvest the mussels within the first year of the production cycle (Holmer et al.2015). Harvest of mussel biomass removes nutrients from the fjord corresponding to 16 t N and 0.7 t P. These findings have been reported in two notes to the Ministry recommending the use of mitigation mussel cultures on a National level (Petersen et al. 2013; Timmermann et al. 2015)

The Danish Shellfish Centre (DTU Aqua) and other Baltic Sea partners have been granted a new EU BONUS project (2017-2019) with the title: Optimization of mussel mitigation cultures for fish feed in the Baltic Sea (OptiMus). The overall goal of OptiMus is to provide scientific documentation for the potential and impact on the coastal environment of mussel aquaculture, which will be met through a number of specific objectives:

- *Document ecosystem goods and services provided by mussel farming in the Baltic.*
- *Assess impact of mussel bio-deposition underneath mussel farms.*
- *Provide multi-criteria tool for optimal site selection of mussel farming in relation to marine spatial planning in the Baltic.*
- *Optimize production capacity, security and cost efficiency of mussel farming through development of new methods and tech transfer from the Western to the Central Baltic.*
- *Develop cost-efficient techniques for processing mussels into fish feed.*
- *Test mussel meal as a marine protein ingredient in fish feed.*
- *Explore the socio-economic barriers, solutions and perspectives in using mussel farming as a mitigation tool in relation to eutrophication.*

The study sites are Limfjordenen, Horsens Fjord, Swedish W Coast and Greifswald Bay.

In summary, Limfjorden ecosystem is well studied and the key elements of the ecosystem are understood. There is ongoing research to further improve understanding of the ecosystem and the impacts of mussel farming.

All of the SG60 and SG80 requirements are met.

	Investigation of UoA impacts			
b	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but **have not been investigated** in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and **some have been investigated in detail**.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and **have been investigated in detail**.
	Met?	Yes	Yes	Yes
Rationale				

As noted in SIa above, the Mumihus project (2011-14) investigated the ecosystem impacts of mussel cultivation in Limfjorden, and this work is being carried forwards in the new EU BONUS project.

These extensive and detailed investigations of ecosystem interactions in Limfjorden exceed the SG60, 80 and 100 requirements: not only can interactions be inferred, they have been monitored and measured. A score of 100 is appropriate.

	Understanding of component functions			
c	Guide post		The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are **known**.	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are **understood**.
	Met?		Yes / No	Yes / No
Rationale				

As noted in SIa above, the Mumihus project (2011-2014) and the ongoing EU BONUS projects described above have identified the main functions of the ecosystem components and the impacts of the fishery on these components have been investigated and understood.

The evidence available (see scoring of the relevant PIs above) shows that the impacts of mussel farming on non-target, ETP species, and habitats are known; there is sufficient information available about these Components to conclude that mussel farming is highly unlikely to adversely affect them. Ongoing research is being carried out to better understand ecosystem impacts (summarised in Scoring Issue (a) above).

The SG80 and 100 requirements are met by the information available about impacts on ecosystem components.

	Information relevance			
d	Guide post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components **and elements** to allow the main consequences for the ecosystem to be inferred.

	Met?		Yes	No
Rationale				

The impacts of mussel farming in Limfjorden on the ecosystem components is the subject of ongoing scientific research (summarised in Scoring Issues a and b above). The main consequences for the ecosystem can be understood for this research, and it is clear that any effects are very small-scale and localised. The SG80 requirements are therefore met.

	Monitoring			
e	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		Yes / No	Yes / No
Rationale				

The location of shellfish farming activity is governed by licensing procedures, and any changes in the operation of the fishery would therefore be detected (and in fact the implications of changes for the ecosystem would have to be considered before such changes took place). Evidence is available that past and ongoing research projects (described under Scoring Issue a) would detect any actual changes in ecosystem function around mussel farms.

Limfjorden is closely monitored, and mussel farming specifically is being studied and monitored closely, so that any increase in risks to the ecosystem would be detected swiftly. The SG80 requirements are therefore met.

References

Section 7.3.1.5 of this report. Støttrup et al, 2010; Stadmark & Conley 2011; Markager et al, 2006; Nielsen et al, 2016; Petersen et al, 2014; Holmer et al, 2015; Carstensen et al, 2013; Petersen et al, 2013; Timmermann et al, 2015.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.4 Principle 3

Principle 3 of the Marine Stewardship Council standard states that:

> *"The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable."*

In the following section of the report the broad context of the fishery management system for the unit of assessment is considered in respect of: the legal framework for fisheries management; consultation roles and responsibilities; the roles of different management organisations; long term objectives for the fishery; the incentives that the management system creates for sustainable fishing; and the procedures in place to review the management system and ensure that it is operating effectively.

7.4.1 Principle 3 background

7.4.1.1 Overview

Limfjorden mussel farming fishery takes place within Denmark's territorial waters. The Danish Government is responsible for its management, within the legal and policy context set by the European Union (EU). As a Member State of the EU, Denmark must ensure that the management of fishery resources is consistent with the objectives of the EU Common Fisheries Policy (CFP).

The Danish government department responsible for management of shellfish fisheries is the Ministeriet for Fødevarer, Landbrug og Fiskeri (Ministry for Food, Agriculture and Fisheries). Within the Ministry, Fiskeristyrelsen (the Danish Fisheries Agency) is responsible for the operational management of Denmark's fisheries, including this fishery.

Within Denmark's Miljøministeriet (Ministry for the Environment), Styrelsen for Vand og Naturforvaltning (Agency for Water and Nature Management) and Miljøstyrelsen (the Environmental Protection Agency) are responsible for implementing the government's policies concerning nature and the environment.

Details of the management system that are relevant to this MSC assessment are summarised below, based on information gathered before the site visit and from published material.

7.4.1.2 Fishing rights & licensing

Mussel cultivation can only take place in areas that are licensed by the Danish Government. Applications for cultivation in a particular area are made to the Ministeriet for Fødevarer, Landbrug og Fiskeri, in Copenhagen. The applications are screened to ensure that they do not adversely impact upon conservation features (such as Natura 2000 sites) and existing mussel farms, before being advertised for public consultation over a 6-week period and issued for consultation to other Government departments.

If, at the end of the consultation period, there are no significant concerns about a new farm area, a licence for cultivation is issued. Licences are issued for a period of 10 years.

Mussel farmers are required to deposit a bank guarantee (currently DKK200,000) before they carry out any cultivation activity. This guarantee is intended to pay for the costs of removing cultivation equipment in the event of the farming business becoming insolvent.

The mussel farmer is required to mark out the boundaries of their licensed area and to commence cultivation within a year of being issued with their licence. If they do not do this, their licence is rescinded.

7.4.1.3 Fishing locations

Mussel cultivation activity is limited to the licensed areas in Limfjorden. Cultivation activity is only permitted within these licensed areas and cannot take place elsewhere. The Unit of Assessment area covers just over 1.8km^2.

Compliance with the licence requirements for each mussel farm is checked by the Fiskeristyrelsen Fishery Officers, who ensure that each mussel farm is marked out by buoys in the correct locations within 12 months of becoming licensed. Ongoing surveillance ensures that farming activities are confined to the authorised cultivation areas.

7.4.1.4 Legislation and Regulation

As a member of the European Union, the Danish Government is required to ensure that the management of all fishery resources is compatible with the requirements of the EC Common Fisheries Policy (CFP). The objective of the CFP is

"*to provide for sustainable exploitation of living aquatic resources and of aquaculture in the context of sustainable development, taking account of the environmental, economic and social aspects in a balanced manner.*" The EC CFP also formally transposes the provisions of the United Nations Convention on the Law of the Sea (UNCLOS) into enforceable Community law.

The Danish Government set out its long term objectives for the mussel fishery by establishing Advisory Committee for Mussel Production in 2005 with clear and explicit terms of reference set out in the Fisheries Act (at s6a) "…*to promote sustainable economic development of fishing and farming of mussels…including establishing rules on fishing and farming….*"[3]. These objectives are complemented by those set out in the EC Habitats Directive, which has the long term objective of promoting the conservation of biodiversity throughout the EC. Both the Danish legislation and the EC Habitats Directive set out provisions for wide stakeholder engagement in decision making processes.

Mussel farming areas are licensed under section 67 of the Fishing Act 2006 (Law number 2738 of 26th April 2006), which is implemented and administered by the Ministry for Environment and Food. Licences can be issued for both mussel and oyster cultivation.

The Protection of Nature Act (1992) can be applied within the entire fisheries zone and EEZ. According to the Planning Act from 2000 it is imposed on the county councils to elaborate and implement plans for the quality and use of coastal waters. These plans are, in part, based on the concept of "environmental quality objectives" as described in guidelines on water quality planning from the Environmental Protection Agency (1983). According to these guidelines, all bays and fjords and other coastal areas out to a depth of 6 m or at least within 1 NM from the shore are to be considered part of the country's responsibility regarding environmental protection and water quality.

The exploitation of natural resources and raw materials and the use of the seabed for construction of any form are regulated according to a number of different laws. Normally an Environmental Impact Assessment in accordance with the EU-directive has to be carried out by the applicant. With respect to the management of marine fisheries, a coastal zone extending 3 NM from the low water line is defined in the Sea Fisheries Act. Within this zone the Sea Fisheries Act has laid down restrictions mostly on the use of different fishing gears. However, since Denmark is part of the European Union the fishery is managed within the Framework of the CFP. The Danish Commission of Commercial Fisheries with members from the Ministry of Food, Agriculture and Fisheries, The Fishermen's Organizations and the PO's manage the national fisheries. There is no distinction between coastal and high sea fisheries; all fisheries follow the same regulations with a few exceptions.

The EU Water Framework Directive was accepted by the Danish Parliament in December 2003 and the work to implement the directive continues on schedule. Denmark has been divided into 12 water districts and the responsible local authorities (counties) have been nominated. This new directive is not expected to increase the number of monitoring programmes in the coastal zone since such programmes have been running for the last 20 years. At present it is not clear to what degree the implementation of the Water Framework Directive will affect fishing and aquaculture in the coastal waters in Denmark.

Limits on fishing localities are discussed in section 7.2 above.

7.4.1.5 Administrative arrangements

The mussel cultivation fishery in Limfjorden is administered by the Danish Government fisheries department (Fiskeristyrelsen). This organisation is responsible for licensing cultivation areas.

The key decision making body for Danish shellfisheries is the Advisory Committee on mussel production (which has a remit that extends to include mussel cultivation). This Committee was established by amendments to the Fisheries Act in 2005 with the aim of promoting the sustainable management of the mussel fisheries in Denmark. Both the Advisory Committee and these objectives for the management of the fishery were proposed and adopted following a formal review of the management system that was carried out by an independent Committee that was commissioned by the Danish Government in 2004 (report in Ministeriet for Fødevarer, Landbrug og Fiskeri, 2004).

The Advisory Committee includes a wide range of stakeholders (including Government Departments, environmental NGOs (WWF and DSNC), as well as representatives of the fishing industry (including Limfjorden mussel fishers' association Centralforeningen for Limfjorden and the Danmarks Fiskeriforening Producent Organisation (Danish Fishermen's Producer Organisation, DFPO), and technical experts from DTU Aqua) and was established to respond to any issues identified in relevant research. This Committee meets on a regular basis to discuss fishery management

[3] Danish Fisheries Act (Consolidated Act no 372 of 26/04/2006), Available from: https://www.retsinformation.dk/Forms/R0710.aspx?id=8370&exp=1

issues and to agree management measures and strategies to respond to them. The membership and rules of procedure for the Committee are published on the Fiskeristyrelsen website (Fiskeristyrelsen, 2021b).

Explanations of the actions of this Committee are published as minutes on the Fiskeristyrelsen website, along with the supporting information that has been taken into account when making decisions. These minutes show that the Committee is able to respond to all relevant issues in its regular meeting and also by holding extraordinary meetings to respond rapidly to serious issues in a timely fashion.

7.4.1.6 Harvest controls

Harvest controls for an enhanced fishery are inevitably different to those for a wild fishery. For a “Catch and Grow” fishery, the key harvest control issue is whether the initial capture of stock from the wild fishery is likely to ensure that exploitation rates are appropriate.

It is noted in section 7.2.1.1 that the capture of mussel larvae from the wild stock by spat collectors is highly unlikely to impair the reproductive capacity of the mussel stock in Limfjorden. This is because the quantity of larvae removed from the wild stock is likely to be very low, and the cultivated stock contributes to the larval stock of Limfjorden by spawning before it is harvested.

The key harvest control in place for the mussel cultivation industry in Denmark is the constraint on the size of individual mussel cultivation areas, and the number of areas that are licensed for cultivation. There are presently 41 licensed sites in Limfjorden, averaging around 20ha in extent.

Licence conditions for each mussel farm operator restrict the operator to the use of seed from Limfjorden area; they cannot import any seed from outside the area. Typically, mussel farms are self-sufficient in seed, and any movements of seed mussels between farms tend to be localised.

The location of cultivation areas is determined following screening to ensure that they do not adversely impact upon conservation features, landscape, and other uses of the sea (such as recreation or other fishing activities).

7.4.1.7 Monitoring, Control and Surveillance

Monitoring and surveillance of mussel farming activity is limited, since the mussel farming fishery requires very few controls or regulations. Fiskeristyrelsen monitor new farms to ensure that they are correctly buoyed (in the right location) and to ensure that cultivation activity commences within a year of the area being licensed.

The quality of farmed mussels is analysed before harvesting takes place, to ensure that there is no risk to human health. Biotoxins from harmful algal blooms are considered by the industry to be a major concern in Limfjorden (Ahsan & Roth, 2009).

The quantity of mussels harvested from each farm is reported to Fiskeristyrelsen. These reports are cross-checked with sales notes from shellfish buyers, to provide a verifiable record of the quantity of mussels produced.

7.4.1.8 Consultation and Dispute Resolution

All new mussel farms are subject to consultation before they are established (see section 7.4.1.2).

Disputes between mussel farmers and other sectoral interests can be formally discussed at the Mussel Advisory Committee established by the Danish Government in 2005.

No reports of any disputes involving the mussel farming industry have been brought to the attention of the assessment team.

7.4.2 Principle 3 Performance Indicator scores and rationales

7.4.2.1 PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: - Is capable of delivering sustainability in the UoA(s); - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework		
Scoring Issue		SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management			
	Guide post	There is an effective national legal system **and a framework for cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and **organised and effective cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and **binding procedures governing cooperation with other parties** which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Yes	Yes	Yes
Rationale				

Limfjorden mussel farming fishery takes place within Denmark's territorial waters. The Danish Government is responsible for its management, within the legal and policy context set by the European Union (EU). As a Member State of the EU, Denmark must ensure that the management of fishery resources is consistent with the objectives of the EU Common Fisheries Policy (CFP). The objective of the CFP is "*to provide for sustainable exploitation of living aquatic resources and of aquaculture in the context of sustainable development, taking account of the environmental, economic and social aspects in a balanced manner.*" The EC CFP also formally transposes the provisions of the United Nations Convention on the Law of the Sea (UNCLOS) into enforceable Community law.

The Danish Government set out its long term objectives for the mussel fishery by establishing the Advisory Committee for Mussel Production in 2005 with clear and explicit terms of reference set out in the Fisheries Act (at s6a) "*…to promote sustainable economic development of fishing and farming of mussels…including establishing rules on fishing and farming….*". These objectives are complemented by those set out in the EC Habitats Directive, which has the long term objective of promoting the conservation of biodiversity throughout the EC. Both the Danish legislation and the EC Habitats Directive set out provisions for wide stakeholder engagement in decision making processes.

Mussel farming areas are licensed under section 67 of the Fishing Act 2006 (Law number 2738 of 26th April 2006), which is implemented and administered by the Ministeriet for Fødevarer, Landbrug og Fiskeri (Ministry for Food, Agriculture and Fisheries). Licences can be issued for both mussel and oyster cultivation.

The fishery is located entirely within Danish waters, it takes place in fixed locations, and the stock is sessile; it is neither a straddling nor migratory stock. The fishery is managed under Danish fisheries legislation and does not require cooperation with other parties, apart from other branches of Danish central and local Government.

The national and EC legislation applying to this fishery creates a system that binds the Danish Government to the delivery of the requirements of MSC Principles 1 and 2.

This legal system is therefore likely to meet the SG60, 80 and 100 requirements.

b	Resolution of disputes			
	Guide	The management system incorporates or is subject by	The management system incorporates or is subject by	The management system incorporates or is subject by

	post	law to a **mechanism** for the resolution of legal disputes arising within the system.	law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the UoA.	law to a **transparent mechanism** for the resolution of legal disputes that is appropriate to the context of the fishery and has been **tested and proven to be effective**.
	Met?	Yes	Yes	Yes
Rationale				

The creation of an Advisory Committee for Mussel Production in 2005 by the Danish Government provided a proactive system for avoiding legal disputes. This Committee has a remit that covers all bivalves, including both wild and cultivated stocks.

The Advisory Committee has a wide membership including the fishing industry, mussel farmers, WWF, DN, environment and fisheries ministries, as well as a range of other groups, This Committee is an integral part of the management system and provides a transparent mechanism for dispute resolution through negotiation, discussion and administrative measures.

The recent complaint to the EC by DN demonstrates that there is a transparent and accessible mechanism for disputes about fishery management (in this case arising from concerns about habitat impacts of the mussel dredge fishery) to be addressed within the management system at the EC as well as at the domestic level.

The combination of domestic and EC mechanisms for formal and transparent dispute resolution in this fishery is likely to meet all of the SG60, 80 and 100 requirements.

	Respect for rights			
c	Guide post	The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	Yes	Yes	Yes
Rationale				

No one is dependent on this fishery for food. All fishing within the UoC is commercial.

Shellfish farming licences are issued on an equitable basis to applicants that apply for them and meet the requirements of the application and site selection process.

This management system represents an explicit and formal commitment to the legal and customary rights of those individuals dependent upon the fishery for their livelihood. The SG60, 80 and 100 requirements are therefore likely to be met.

References

EU CFP Regulation 1380/2013; Fisheries Act 2005; section 7.4.1 of this report.

Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.4.2.2 PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **generally understood**.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for all areas** of responsibility and interaction.
	Met?	Yes	Yes	Yes
Rationale				

Management processes for the bivalve fisheries are straightforward and explicitly defined in Danish fisheries legislation for all areas of responsibility and interaction and are summarised briefly below.

Danish shellfishery management is under the competence of the Danish Government Ministeriet for Fødevarer, Landbrug og Fiskeri (Ministry for Food, Agricuture and Fisheries). Within the Ministry, Fiskeristyrelsen (the Danish Fisheries Agency) is responsible for the operational management of Denmark's fisheries, including this fishery.

Fisheries management advice is provided by the Danish Technical University Aquatic Sciences department (Danmarks Tekniske Universitet – Aqua, abbreviated to DTU-Aqua).

The key decision-making body for Danish shellfisheries is the Advisory Committee on mussel production. This Committee was established by amendments to the Fisheries Act in 2005 with the aim of promoting the sustainable management of the mussel fisheries in Denmark. This Committee has a remit that covers all bivalves, including wild and cultivated stocks, and has a broad membership that covers statutory organisations, industry bodies and environmental NGOs.

All of the organisations involved in the management processes have therefore been identified. Their roles and responsibilities are well understood and cover all areas of responsibility and interaction, likely meeting the SG60, 80 and 100 requirements.

b	**Consultation processes**			
	Guide post	The management system includes consultation processes that **obtain relevant information** from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information and **explains how it is used or not used**.
	Met?	Yes	Yes	No
Rationale				

An integral component of the management system for this fishery is the Advisory Committee on mussel production (which has a remit that includes wild and cultivated bivalve fisheries). This Committee provides a mechanism for wide stakeholder consultation and involvement in the management of the Danish shellfisheries and ensures that all relevant information, including local knowledge (from both fisheries representatives and other stakeholders) informs management of the fishery. The minutes of the Committee provide evidence that this information has been considered.

Public consultations are carried out over the location of individual mussel farms prior to their licensing. This consultation process provides an opportunity for all interested parties to be involved in decisions about the scale and location of mussel farming activity in Limfjorden. All consultation documents are available within the public domain.

The SG60 and 80 requirements are likely to be fully met.

SG100 does not appear to be met because there is no explanation of how information is used or not used in the management system.

	Participation			
c	Guide post		The consultation process **provides opportunity** for all interested and affected parties to be involved.	The consultation process provides **opportunity and encouragement** for all interested and affected parties to be involved, and **facilitates** their effective engagement.
	Met?		Yes	Yes
Rationale				

An integral component of the management system for this fishery is the Advisory Committee on mussel production (which has a remit that includes wild and cultivated bivalve fisheries). This Committee provides a mechanism for wide stakeholder consultation and involvement in the management of the fishery, both encouraging and facilitating their effective engagement.

The SG 80 and 100 requirements are both likely to be met by the consultation processes in place.

References

Fisheries Act 2005, section 7.4.1 of this report, Fiskeristyrelsen, 2021b.

Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.4.2.3 PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Fisheries Standard, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach, are **implicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach are **explicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are **explicit** within **and required by** management policy.
	Met?	Yes	Yes	Partial
Rationale				

As a member of the European Union, the Danish Government is required to ensure that the management of all fishery resources is compatible with the requirements of the EC Common Fisheries Policy (CFP). The objective of the CFP is "*ensure that fishing and aquaculture activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies.*" The EC CFP also formally transposes the provisions of the United Nations Convention on the Law of the Sea (UNCLOS) into enforceable Community law.

The Danish Government set out its long term objectives for the Danish shellfisheries by establishing Advisory Committee for Mussel Production in 2005 with clear and explicit terms of reference set out in the Fisheries Act (at s6a) "…*to promote sustainable economic development of fishing and farming of mussels, oysters and other molluscs, including establishing rules on fishing and farming ….*". These objectives are complemented by those set out in the EC Habitats Directive and the earlier Birds Directive, which has the long term objective of promoting the conservation of biodiversity throughout the EC. Both the Danish legislation and the EC Habitats Directive set out provisions for wide stakeholder engagement in decision making processes. Other environmental legislation, such as the Water Framework Directive and the Marine Strategy Framework Directive set clear objectives (such as attaining "Good Ecological Status") that are explicit within management policy.

National and EC fisheries legislation and coupled with EC nature conservation legislation therefore set out clear and explicit long term objectives to guide decision making that are consistent with MSC Principles and Criteria, which is likely to meet the SG60 and 80 requirements.

SG100 appears to be only partially met because although these objectives are precautionary, there is no evidence that they are required by management policy.

References

EC CFP Regulation 1380/2013; Fisheries Act 2005; section 7.4.1 of this report.

Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.4.2.4 PI 3.2.1 – Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	**Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery-specific management system.	**Short and long-term objectives**, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system.	**Well defined and measurable short and long-term objectives**, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system.
	Met?	Yes	Yes	No
Rationale				

The short and long-term objectives set out by the EC CFP and by the Danish Government for shellfisheries nationally are explicit within the fishery's management system. .

In summary, the objective of the EU CFP is "ensure that fishing and aquaculture activities are environmentally sustainable in the long-term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and of contributing to the availability of food supplies."

The Danish Government set out its objectives for the Danish shellfisheries by establishing the Advisory Committee for Mussel Production in 2005 with clear and explicit terms of reference set out in the Fisheries Act (at s6a) "…*to promote sustainable economic development of fishing and farming of mussels, oysters and other molluscs, including establishing rules on fishing and farming ….*".

These objectives are complemented by those set out in the EC Habitats Directive and the earlier Birds Directive, which has the long term objective of promoting the conservation of biodiversity throughout the EC. Both the Danish legislation and the EC Habitats Directive set out provisions for wide stakeholder engagement in decision-making processes. Other environmental legislation, such as the Water Framework Directive and the Marine Strategy Framework Directive set clear objectives (such as attaining "Good Ecological Status") that are explicit within management policy and are being delivered through local plans (such as Catchment Management Plans under the WFD).

Evidence of the local application of these management objectives can be seen in the regulations controlling the location and development of mussel farming that have been established to deliver the national objective of promoting the sustainable economic development of mussel fishing and farming, and to ensure that fishing and farming activity within Natura 2000 sites is compatible with their wildlife species and habitats. These objectives ensure, for example, that mussel farms are not established in existing mussel fishery areas, nor within parts of Natura 2000 sites which could be adversely affected by mussel farming.

Long and short-term objectives are consistent with achieving the outcomes of MSC Principles 1 and 2 and are explicit within the management system. The SG60 and 80 requirements are therefore likely to be fully met.

SG100 would be met if these objectives were measurable.

References

EC CFP Regulation 1380/2013; Fisheries Act 2005; Ministeriet for Fødevarer, Landbrug og Fiskeri, 2015a, section 7.4.1 of this report.

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.4.2.5 PI 3.2.2 – Decision-making processes

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are **some** decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are **established** decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	Yes	Yes	
Rationale				

The key decision making processes for this fishery are those established by the Fisheries Act amendments in 2005 that create the Advisory Committee on mussel production (which has a remit that extends to wild and cultivated bivalve fisheries). This Committee includes a wide range of stakeholders and was established to respond to any issues identified in relevant research. This Committee meets on a regular basis to discuss fishery management issues and to agree management measures and strategies to respond to them.

The decision-making process governing the creation of shellfish farms involves site screening to avoid areas that are important for wildlife or human use, followed by public consultation and finally an independent decision on whether or not a cultivation area should be licensed. These decision-making processes follow a formal procedure that has been implemented to ensure that the objective of developing shellfish farming is compatible with other aspects of Limfjorden. As such they constitute a strategy for achieving the objectives for this fishery.

These decision-making processes appear to meet the SG60 and 80 requirements.

b	**Responsiveness of decision-making processes**			
	Guide post	Decision-making processes respond to **serious issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to **all issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	Yes	Yes	No
Rationale				

Explanations of the actions of the Advisory Committee on mussel production are published as minutes on the Fiskeristyrelsen website (at https://fiskeristyrelsen.dk/raad-og-udvalg/muslingeudvalget/moedereferater/#c82273), along with the supporting information that has been taken into account when making decisions.

It is evident that decisions on the management of the mussel farming industry in Limfjorden takes account of the wider implications of this activity (such as effects on Limfjorden ecosystem, detailed in section 7.3.1.5.2 of this report and the scoring of PI 2.5.1).

These minutes show that the Committee is able to respond to all relevant and important issues in its regular meeting and also by holding extraordinary meetings to respond rapidly to serious issues in a timely fashion.

The available evidence is likely to meet the SG60 and 80 requirements.

SG100 does not appear to be met because there is no evidence that all issues are taken into account.

	Use of precautionary approach			
c	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Yes	
Rationale				

The management system for the fishery is precautionary; this can be seen in the regulations controlling the location and development of mussel farming that have been established to deliver the national objective of promoting the sustainable economic development of mussel fishing and farming, and to ensure that fishing and mussel farming activity within Natura 2000 sites is compatible with their wildlife species and habitats. Site selection decisions use the best available information, provided by DTU-Aqua, and also require public consultation which ensure that all stakeholders have an opportunity to inform the decision-making process.

These decision-making processes are likely to fully satisfy this SI.

	Accountability and transparency of management system and decision-making process			
d	Guide post	Some information on the fishery's performance and management action is generally available on request to stakeholders.	**Information on the fishery's performance and management action is available on request**, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders **provides comprehensive information on the fishery's performance and management actions** and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	Yes	Yes	No
Rationale				

The key stakeholder interaction in the management of Limfjord mussel farming activity lies in the site selection process. All sites are subject to a 6-week period of public consultation before they are licensed. Decisions on site selection are publicised and take account of information emerging from research and monitoring of habitats and ecosystems in Limfjorden.

Information about fishery performance (landings of shellfish for each production area) are available on the Fiskeristyrelsen website for all fishing years since 2001, including the current fishing year.

Meetings of the Mussel Advisory Committee are provided with reports of fishery performance and progress with research on other issues that are relevant to its management (for example the agenda for the meeting in February 2014 included an update on the complaint about assessment of the mussel fishery, the management of fishing in a Natura 2000 site, and reports on a range of research projects and initiatives associated with the management and development of the industry). The minutes of the meetings of the Advisory Committee are published and provide a record of how the management system has responded to findings and recommendations submitted to the Committee.

The level of reporting and accessibility of information is likely to meet the SG60 & 80 requirements.

	Approach to disputes			
e	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	Yes	Yes	Yes
Rationale				

There is no evidence that the fishery or management system has shown any disrespect or defiance of the law, nor repeatedly violated any laws or regulations necessary for the sustainability of the fishery. There is also no evidence of any legal challenges against the management system or any judicial action.

The management system has a proactive, inclusive and accessible approach to taking decisions about the siting of shellfish farms. This includes site screening prior to public consultation before any decision is taken about licensing a site.

The management system in place and the information available indicating an absence of legal disputes demonstrates that the fishery and management system meets the SG60, 80 and 100 requirements.

References

Section 7.4.1 of this report; Ministeriet for Fødevarer, Landbrug og Fiskeri, 2013, 2015a, 2015b, 2016; Fiskeristyrelsen, 2021a, 2021b.

Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI.

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.4.2.6 PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance **mechanisms** exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance **system** has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A **comprehensive** monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Yes	Yes	Yes
Rationale				

A comprehensive monitoring, control and surveillance system is in place, with inspections by the Fisheries Agency and ad-hoc post-landing checks of mussel landings from farms against reported landings. Surveillance of mussel farms at sea, and land-based observations of landings from the farms also takes place.

The key document in landings control is the sales note, which is completed for all landings. This contains a significant number of items of information relating to the landing, including the quantity of mussel and their source. All notes are sent to the Fisheries Agency and are linked to records of fish landings and fishing activity at sea.

Fiskeristyrelsen fishery officers are locally based around Limfjorden and carry out patrols on land and at sea to verify the accuracy of landings records, inspect processing facilities, and inspect vessels operating on shellfish farms.

The level of monitoring of cultivation activity by on-site fishery officers and through the administrative controls in place for monitoring landings and sales ensures that relevant management measures, strategies and rules are enforced.

The SG60, 80 and 100 requirements all appear to be met by the comprehensive system in place.

b	**Sanctions**			
	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, **are consistently applied** and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and **demonstrably** provide effective deterrence.
	Met?	Yes	Yes	Yes
Rationale				

The only issues of non-compliance that could arise from mussel cultivation would be either the incorrect location of the farm (which is checked by Fiskeristyrelsen staff), or the use of mussel dredges from a shellfish farming vessel, which would be a fisheries offence.

In cases of non-compliance with fisheries regulations, a range of penalties can be applied by the authorities including heavy economic sanctions and even a loss of licence. Corrective actions are consistently applied and severe infractions are tried in the courts, which over time have developed a consistent practice in this regard.

There is reported to be a very high level of compliance with regulations, which demonstrates that the combination of sanctions and the risk of detection provide an effective deterrent, likely to meet the SG60, 80 and 100 requirements for this SI.

c	**Compliance**			
	Guide post	Fishers are **generally thought** to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	**Some evidence exists** to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a **high degree of confidence** that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	Yes	Yes	Yes
Rationale				

Compliance with fisheries regulations is reported at the national level by Fiskeristyrelsen on an annual basis as a PDF until 2016 and now in an interactive database (Fiskeristyrelsen, 2021a). The annual report indicates that the shellfish fisheries comply well with all regulations, with no issues of non-compliance.

As noted above, the only non-compliance issue that could arise from the operation of a shellfish farm would be either its incorrect location, or mussel dredging by a shellfish farming vessel. There are no reports of either of these situations arising. The level of compliance appears to meet the SG60 and 80 requirements.

The collaboration of the shellfish farming industry with the scientific community that is researching ecosystem interactions in the fishery is helping to provide information that is important to the management of this fishery and seems likely to meet the SG100 requirements.

d	**Systematic non-compliance**			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		Yes / No	
Rationale				

Compliance with fisheries regulations is reported at the national level by Fiskeristyrelsen on an annual basis (Fiskeristyrelsen, 2021a). The annual report indicates that the shellfish fisheries comply well with all regulations, with no issues of non-compliance. Local Fiskeristyrelsen enforcement staff have also confirmed that compliance with regulations by the mussel farmers is very good. There is no evidence of systematic non-compliance by the mussel farming industry in Limfjorden.

References

EC CFP Regulation 1380/2013; Fisheries Act 2005; Fiskeristyrelsen, 2021a; section 7.4.1 of this report.

Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

7.4.2.7 PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate **some** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **key** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **all** parts of the fishery-specific management system.
	Met?	Yes	Yes	Yes
Rationale				

All parts of the management system for shellfisheries in Denmark were formally reviewed by an independent committee in 2004. In response to this review the Danish Government established an Advisory Mussel Committee which now meets at regular intervals to review the management of bivalve fisheries. This Advisory Committee includes a wide range of organisations, including Government Departments, environmental NGOs (WWF and DN), as well as representatives of the fishing industry, and technical experts.

A review of the management system in 2018 resulted in the Danish Government adopting a new mussel management strategy ("*Målsætninger og forvaltningsprincipper for muslinge- og østersskrab og øvrig muslinge- og østers produktion i og udenfor Natura 2000 om- råder*") in 2019 which sets out new measures (aimed mostly at the wild capture fishery) for improving the sustainable management of all Danish mussel and oyster fisheries (Fiskeristyrelsen, 2019)

At the EU level, the decadal review of the Common Fisheries Policy was completed in 2013. This review resulted in a new CFP Regulation that was implemented on 1st January 2014 which gives greater importance to the principles of ecosystem based management, the reduction of discarding, and greater stakeholder engagement in fisheries management.

The review of the fishery management system demonstrates that there are mechanisms in place that are able to evaluate all parts of the management system, and the Advisory Committee has maintained this level of scrutiny of the management system, likely meeting the SG60, 80 and 100 requirements.

b	**Internal and/or external review**			
	Guide post	The fishery-specific management system is subject to **occasional internal** review.	The fishery-specific management system is subject to **regular internal** and **occasional external** review.	The fishery-specific management system is subject to **regular internal and external** review.
	Met?	Yes	Yes	Yes
Rationale				

The creation of the Advisory Committee, which includes stakeholders from a wide range of interest groups (including the fishing industry and environmental groups) has created a mechanism for regular internal and external review of all parts of the management system for the fishery. The Committee meets at least twice per year, and also holds extraordinary meetings as and when necessary (Fiskeristyrelsen, 2021b) The SG60, 80 and 100 requirements are therefore likely to be met.

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Draft scoring range	**≥80**
Information gap indicator	Information sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report stage

Overall Performance Indicator score	
Condition number (if relevant)	

8 Appendices

8.1 References

8.1.1 Published material & reports

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8.2 Assessment information

8.2.1 Previous assessments

This is the first assessment of this fishery.

8.2.2 Small-scale fisheries

This fishery is conducted entirely within Limfjorden and thus within 12 nautical miles of the Danish coast (see Figure 1). The client currently operates 4 boats: 1 larger vessel (*Lykke*, 15m LOA x 6m beam); and three smaller “service” vessels (*Elnoka*, 8m x 2.6m; *Elvira*, 11.8m x 4.6m; and *Nor*, 6.9m x 3.25m).

Table 10: Small-scale fisheries

Unit of Assessment (UoA)	Percentage of vessels with length <15m	Percentage of fishing activity completed within 12 nautical miles of shore
1 & 2	75%	100%

8.3 Evaluation processes and techniques

8.3.1 Site visits

A site visit will take place remotely, in the week commencing 1st November 2021. Please contact fisheries-ca@lr.org if you would like to speak with the audit team please notify us as soon as possible, and before the end of the consultation period for submission of information (see below) – we can then arrange appropriate discussion opportunity

8.3.2 Stakeholder participation

The Announcement Comment Draft Report (ACDR) for this fishery is now available for consultation on the fishery's Track a Fishery page. Please note this does not represent a final outcome, and the scores are based on a review of documents submitted by the client in the Client Document Checklist – we fully recognise changes may be necessary following the site visit and stakeholder comments. Stakeholders can submit comments on the report, which will be published on the MSC website ahead of the site visit. As this is a first assessment, stakeholders have 60 days to submit comments, using the MSC Stakeholder Input form. The deadline for information submission is therefore 22/10/2021 at 5pm UTC.

8.3.3 Evaluation techniques

1. Public Announcements

The assessment was publicly announced on the **23rd August 2021** at the MSC website as well as sent by email in the MSC Fishery Announcements newsletter to all registered recipients. The announcement was also distributed to all LR stakeholders via the LR Mailchimp system. This was also the method used for consultation on subsequent steps (e.g. peer reviewers' announcement, new UoA, etc.). See Section 8.5 of this report for a detailed list of all consultations that took place at different stages along the process.

At this time, LR also announced the assessment site visit dates and location, as well as the assessment team. This was done according to the process requirements in MSC's Fisheries Certification Process v2.2, and in the MSC Fisheries Standard v2.01. Together, these media presented the announcement to a wide audience representing industry, agencies, and other stakeholders. Meetings and conference calls held during the site visit constituted the main tool in guaranteeing the participation of relevant stakeholders.

The fishery assessment team will hold a remote site visit with the clients and interested stakeholders during the week commencing **1st November 2021**. If you would like to talk to the assessors, **please advise us of your interest at your earliest convenience before the site visit**, giving the following details:

- your name and contact details;
- your association with the fishery;
- the issues you would like to discuss (in order for us to arrange appropriate representation).

Enquiries should be sent in the first instance to:

LR Fisheries Department

fisheries-ca@lr.org

2. Information gathering

The assessment team reviewed documents sent by the client ahead of the remote visit (landings data, internal records of quota monitoring, sales notes and other relevant documents generated after landing, country-specific fisheries and environmental regulations, science and advice reports and other scientific publications). See section 8.1 for a detailed list of references used. Discussions with the clients and management agencies will centre on the content within the provided documentation. In cases where relevant documentation is not provided in advance of the meeting, it will be requested by the assessment team and subsequently supplied during, or shortly after the meeting. The assessment team and the client will set up meetings with the relevant stakeholders during the site visit, as per MSC Fisheries Certification Process v2.2, Section 8.3.2.

3. Scoring

Scoring was performed according to the procedure established in MSC Standard v2.01 7.10. In the Standard v2.01 default assessment tree used for this assessment, the MSC tree has 28 PIs: six in Principle 1; 15 in Principle 2; and

seven in Principle 3. The PIs are grouped in each principle by 'component.' Principle 1 has two components, Principle 2 has five, and Principle 3 has two. Each PI consists of one or more 'scoring issues;' a scoring issue is a specific topic for evaluation. 'Scoring Guideposts' define the requirements for meeting each scoring issue at the 60 (conditional pass), 80 (full pass), and 100 (state of the art) levels.

The process for scoring individual Performance Indicators is set out in MSC FCP v2.2 section 7.17.

The scoring presented in this report has not been reviewed by stakeholders, peer reviewers or the client – these steps will all take place from here onwards.

Stakeholders are encouraged to review the scoring presented in this assessment and use the Stakeholder Input Form to provide evidence to the team of where changes to scoring are necessary.

8.3.4 Modified assessment tree

A modified assessment tree (for enhanced bivalve fisheries, MSC standard v2.01 Annex SB) has been used for this assessment, as detailed in section 4.2 of this report.

8.4 Peer Review reports

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report stage

8.5 Stakeholder input

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report stage

8.6 MSC Technical Oversight

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Public Comment Draft Report

8.7 Conditions

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report stage

8.8 Client Action Plan

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Public Comment Draft Report stage

8.9 Surveillance

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report stage

8.10 Risk-Based Framework outputs

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be drafted at Client and Peer Review Draft Report stage

8.11 Harmonised fishery assessments

The MSC Fisheries Certification Process v2.2 (FCP) sets out procedures for ensuring consistency of outcomes in overlapping fisheries (see Annex PB of the FCP). The intention of this process is to maintain the integrity of MSC fishery assessments.

The audit team have consulted the guidance issued on the MSC's interpretation log to identify the harmonisation requirements for this fishery (see https://mscportal.force.com/interpret/s/article/What-are-the-MSC-requirements-on-harmonisation-multiple-questions-1527586957701). For each overlapping fishery, LR have considered harmonisation requirements for each PI using the table below.

8.11.1 MSC Directions for harmonisation between overlapping MSC fisheries

Table 11: MSC directions for harmonisation between overlapping MSC fisheries

PIs / SIs	Harmonise?	Comments
All P1 PIs	Yes	P1 always considers the impacts of all fisheries on a stock, so any fisheries which have the same P1 species (stocks) should be harmonised.
PI 2.1.1a	Partially	For stocks that are 'main' in both UoAs, harmonise status relative to PRI (at SG60, 80 and 100), and if below PRI, harmonise cumulative impacts at SG80 (not at SG60).
PI 2.2.1a	Partially	For stocks that are 'main' in both UoAs, harmonise status relative to BBL (at SG60, 80 and 100), and if below BBL, harmonise cumulative impacts at SG80 (not at SG60).
PI 2.3.1a	Partially	Harmonise recognition of any limits applicable to both UoAs (at SG60, 80 and 100), and cumulative effects of the UoAs at SG80 and SG100 (not at SG60).
PI 2.4.1b	Partially	Harmonise recognition of VMEs where both UoAs operate in the same 'managed area/s' (as in SA3.13.5).
PI 2.4.2a,c	Partially	Harmonise scoring at SG100, since all fishery impacts are considered (not at SG60 or 80).
All P2 PIs	Yes, if ->	Two UoAs are identical in scope, even if the UoCs are different (e.g. separate clients).
PIs 3.1.1-3	Yes, if ->	Both UoAs are part of the same larger fishery or fleet, or have stocks in either P1 or P2 which are at least partially managed by the same jurisdiction/s (nation states, RFMOs or others) or under the same agreements. Harmonisation may sometimes be possible for those management arrangements that apply to both UoAs (noting the limitations accepted in GPB3).
PIs 3.2.1-4	Yes, if ->	Both UoAs have stocks within either P1 or P2 which are at least partially managed by the same jurisdiction/s (nation states, RFMOs or others) or under the same agreements. Harmonisation is needed for those management arrangements that apply to both UoAs, e.g. at the RFMO level but not the national level in the case of two separate national fleets both fishing the same regional stock.

MSC fisheries overlapping fisheries have been identified as fisheries operating within Limfjorden in Denmark. The certified MSC Fisheries with overlapping UoCs to the UoAs under assessment here are detailed below in Table 12 with the relevant PIs that require harmonisation. The scores awarded for the MSC fisheries were analysed during this assessment audit (see Table 14) and any differences in scoring are explained in Table 15.

Table 12: List of overlapping fisheries

Fishery name	Certification status and date	Assessment Tree / CR Version	Performance Indicators to harmonise*
Limfjord blue shell mussel (rope grown)	Certified – Cert expiry October 2022	CR v1.3	NA
DFPO Limfjord mussel and cockle fishery	Certified - Cert expiry July 2021	CR v1.3	NA
DFPO Limfjord oyster dredge	Certified – Cert expiry November 2022	CR v1.3	NA
Muslingeriet Rope Grown Mussel Fishery(this fishery)	In assessment	V2.01	NA

* Only MSC Fisheries using the same version of the assessment tree (v2.0 or v2.01) need to be harmonised (in accordance with MSC FCP v2.2 Annex PB 1.2.1).

Table 13: Overlapping fisheries supporting information

Supporting information	
- Describe any background or supporting information relevant to the harmonisation activities, processes and outcomes.	
Was either FCP v2.2 Annex PB1.3.3.4 or PB1.3.4.5 applied when harmonising?	No
Date of harmonisation meeting	NA
If applicable, describe the meeting outcome	
Although this assessment and those of the overlapping fisheries use different versions of the MSC assessment tree, the findings of the assessment team broadly concur with those of the assessment teams for the already-certified fisheries. No harmonisation meetings have been necessary at this point in the assessment process.	

Table 14: Scoring comparison for overlapping fisheries (grey shading indicates PIs that are not scored; green shading an unconditional "pass" score).

Performance Indicators (PIs)	This assessment	Limfjord blue shell mussel (rope grown)	DFPO Limfjord mussel and cockle fishery	DFPO Limfjord oyster dredge
	CRv2.01	CR v1.3	CR v1.3	CR v1.3
	UoA 1 & 2	UoC 1 & 2	UoC1 – Mussels	UoC 1 - Oysters
1.1.1			80	96
1.1.2			100	80
1.1.3			-	NA
1.2.1			80	85
1.2.2			90	85
1.2.3			80	90
1.2.4			80	80
2.1.1			80	80
2.1.2			80	100
2.1.3			80	85
2.2.1			80	80
2.2.2			80	80
2.2.3			80	80
2.3.1	≥80	100	100	100
2.3.2	≥80	85	95	95
2.3.3	≥80	85	85	85
2.4.1	≥80	100	100	100
2.4.2	≥80	95	100	100
2.4.3	≥80	95	90	95
2.5.1	≥80	80	90	90
2.5.2	≥80	90	90	90
2.5.3	≥80	90	90	90
3.1.1	≥80	100	100	90
3.1.2	≥80	95	90	95
3.1.3	≥80	80	90	90
3.1.4	≥80	80	80	80
3.2.1	≥80	80	90	90
3.2.2	≥80	85	90	95
3.2.3	≥80	100	100	100
3.2.4		80	80	80
3.2.5 / 3.2.4	≥80	100	100	100

Table 15: Rationale for scoring differences

If applicable, explain and justify any difference in scoring and rationale for the relevant Performance Indicators (FCP v2.2 Annex PB1.3.6).
If exceptional circumstances apply, outline the situation and whether there is agreement between or among teams on this determination.

8.12 Objection Procedure

This section of the report has been intentionally left blank. It will be completed as the assessment process progresses in accordance with the following directions from the Marine Stewardship Council: -

To be added at Public Certification Report stage

8.13 Template information and copyright

This document was drafted using the ‘MSC Reporting Template v1.2’.

Template version control

Version	Date of publication	Description of amendment
1.0	17 December 2018	Date of first release
1.1	29 March 2019	Minor document changes for usability
1.2	25 March 2020	Release alongside Fisheries Certification Process v2.2

A controlled document list of MSC program documents is available on the MSC website (msc.org).

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