

**Marine Stewardship Council (MSC) Re-assessment Public
Certification Report**

**Germany Lower Saxony mussel dredge and mussel culture
fishery**

On behalf of

Niedersächsische Muschelfischer GbR

Prepared by

Control Union Pesca Ltd

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Glossary

Acronym	Definition
AIS	Automatic Identification System
ACAP	Agreement on Conservation of Albatross and Petrels
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
BLE	Bundesanstalt für Landwirtschaft und Ernährung
BMMP	Blue Mussel Management Plan
CAB	Conformity Assessment Body
CFP	Common Fisheries Policy
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
CRs	(MSC) Certification Requirements
CU	Control Union (Pesca)
EU	European Union
GT	Gross Tonnage
Ha	Hectares
MEC	ME Certification Ltd
MEP	MacAlister Elliott & Partners Ltd
MSC	Marine Stewardship Council
NABU	Naturschutzbund Deutschland e.V. (Nature and Biodiversity Conservation Union Germany)
NGO	Non-Governmental Organisation
NM	Niedersächsische Muschelfischer GbR
NMUEBK	Niedersächsisches Ministerium für Umwelt, Energie, Bauen, und Klimaschutz (Lower Saxony Ministry of Environment, Energy, Construction and Climate Protection)
nm	nautical mile
NMELV	Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz (Lower Saxony Ministry of Food, Agriculture and Consumer Protection)
RBF	Risk Based Framework
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SFA	Staatliche Fischereiamt (Fisheries Office)
SICA	Spatial Intensity Consequence Analysis
SMC	Seed Mussel Collectors

Acronym	Definition
SPA	Special Protected Area
TMAP	Trilateral Wadden Sea Monitoring
UoA	Unit of Assessment
UoC	Unit of Certification

Executive Summary

This report is the Public Certification Report for the Germany Lower Saxony mussel dredge and mussel culture fishery. The assessment team consisted of Dr Matthew Doggett, responsible for Principle 2, Ulf Löwenberg, responsible for Principle 3, and Kat Collinson, who acted as Team Leader. This assessment was conducted in accordance with the MSC Fisheries Standard v2.0 for procedural stages and version 1.3 scoring.

The fishery was announced on 26th September 2017. The site visit started on the 16th November 2017, in Bremen, where the Risk Based Framework stakeholder meeting took place. This was attended by the client organisation, and main stakeholders, namely non-governmental organisations (NGOs), fishery managers, inspection officers and the MSC. The team then went on to 17th November 2017 in Hooksiel, accompanied by the MSC, to conclude the site visit. Here the team visited mussel vessels in port and spoke with vessel owners regarding operations.

The fishery operates by harvesting mussel seed either from natural spatfall (UoA1) or from floating rope seed collectors (SMCs; UoA2) and relaying the mussels on culture plots for on-growing (UoAs 1 and 2). The gear used for harvest of seed as well as the culture plots is a mussel dredge or beam trawl.

The fishery is subject to regulation by the Niedersächsisches Fischereigesetz (Lower Saxony Fisheries Law), Gesetz über den Nationalpark "Niedersächsisches Wattenmeer" (Law on the National Park "Lower Saxony Wadden Sea) and Niedersächsische Küstenfischereiordnung (Lower Saxony Coastal Fisheries Regulation), amongst others and via individual fisher licences. The Bewirtschaftungsplan Miesmuschelfischerei im Nationalpark "Niedersächsisches Wattenmeer" 2009-2013 (Management Plan Blue Mussel Fishery in the National Park "Lower Saxony Wadden Sea" 2009-2013) regulates the seed mussel fishery while Fischereigesetz and Küstenfischereiverordnung regulate also the culture of blue mussels in the National Park through a number of provisions such as the limitation of the activities to only a few areas.

The Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz (Lower Saxony Ministry of Food, Agriculture and Consumer Protection) (NMELV) is the competent authority for managing the fishery. Together with the Niedersächsisches Ministerium für Umwelt, Energie, Bauen und Klimaschutz (Lower Saxony Ministry of Environment, Energy, Construction and Climate Protection) (NMUEBK) it is responsible for creating the management plan.

Since 1978, the German Government has been working with the Danish and Dutch Governments to protect and conserve the Wadden Sea as a tri-lateral cooperation agreement. Other overarching European management affecting the fishery are the Habitats Directive and Birds Directive (Natura 2000), Water Framework Directive and Marine Strategy Framework. Most of the fishing areas are located within a Natura 2000 and RAMSAR site, which is also a National Park (Nationalpark Niedersächsisches Wattenmeer), and this requires that management is kept under review. The estuarine areas are excluded from the Natura 2000 and the National Park. The fishery is also part of the Dutch-German Wadden Sea World Heritage site recognised by UNESCO.

In relation to Principle 1, the team concluded that the fishery does not have an impact on the target stock and does not involve translocation, as any input of mussel seed must come from inside the Wadden Sea and therefore the same ecosystem as this fishery, hence Principle 1 was not scored.

In relation to Principle 2, the fishery has no 'retained species'. 'Bycatch species' were evaluated using the RBF, and determined by stakeholders to be primarily green crab, common starfish and Pacific oyster. ETP species indirectly interacting with the fishery were identified as eider duck,

oystercatchers, common and harbour seals and harbour porpoises. The habitats, both intertidal and subtidal are monitored and the Wadden Sea is a well-studied ecosystem.

The fishery's strengths include a strong conservation framework, as outlined above, precautionary management of the seed fishery, and comprehensive monitoring, the Black Box system being able to track all vessels' movements and activities within the fishery and National Park. Its main weakness is the lack of agreement between key stakeholder groups in the implementation of the new fishery management plan and management processes. Additionally, although all PIs scored SG80 or above, a non-binding recommendation was raised during this re-assessment to provide improved monitoring of all bycatch species in the fishery.

The aggregate scores for each Principle have been preliminarily determined to be as follows: Principle 2: 89.3 (UoA 1), 89.7 (UoA 2) and Principle 3: 90.5. No PI scored <80, so no new conditions. One recommendation was however raised during this re-assessment process.

The provisional determination of the team is that this fishery is in conformity with the MSC Principles and Criteria for sustainable fishing.

1 Authorship and Peer Reviewers

The assessment team for this assessment were:

Kat Collinson - Team Leader

Kat Collinson has a Master's degree from King's College University in Aquatic Resource Management. She has worked on a number of MSC pre- and full assessments including North Menai Strait mussel fishery, Vietnam Ben Tre clam hand gathered fishery and Schleswig Holstein mussel fishery. Kat has also been involved in fishery improvements projects (FIPs) and has recently been involved in a project studying the habitat use and niche partitioning in two species of juvenile shark using active and passive tracking and diet stable isotope analysis.

Kat has also been the Manager of MSC Chain of Custody (CoC) projects at CU Pesca and has undertaken over 150 assessments and therefore will also act as the team's expert on the traceability for the fishery. Kat has successfully completed MSC team leader training in both v1.3 and v2.0. She has also received training in the Risk Based Framework (RBF) via the MSC online training modules.

Dr Matthew Doggett – Principle 2

Dr Matthew Doggett has a PhD in marine ecology with 10 years' experience in understanding the interactions of marine species in both temperate and tropical environments. Matt has worked specifically in the coastal environment (including the intertidal) where he has led trawl surveys, mammal observations, habitat surveys, intertidal sampling and benthic studies for environmental impact assessments and research for coastal industries. He is an expert in ecosystem interactions and the effects on anthropogenic inputs upon those interactions. Matt has recently worked on the re-assessments of the Dee Estuary and Burry Inlet cockle fisheries. Dr Doggett was primarily responsible for the Principle 2 scoring in this fishery.

Ulf Löwenberg – Principle 3

Ulf Löwenberg has a Master's degree from the University of Hamburg in Fisheries Science. He is a fisheries biologist with more than 30 years' experience in the fisheries sector. This has included more than 15 years' experience in fisheries and advisory projects, including extensive work in Africa and 8 years' project management. Ulf has been involved in a number of MSC pre-assessments, full assessments and surveillance audits based in Europe. These include Swedish Skagerrak and Kattegat herring fishery, North Sea Saithe Trawl fishery and Western Baltic Spring Spawning Herring fishery.

Ulf is now a freelance fisheries consultant and has worked for private and governmental clients on a number of projects in Europe and Africa. A recent project based in Mauritania, which Ulf was responsible for, was titled 'Management advice in the fisheries sector'. This included support to the Fisheries Ministry in relation to development and implementation of fisheries management plans.

Peer reviewers

The MSC Peer Review College compiled a shortlist of potential peer reviewers to undertake the peer review for this fishery. Two peer reviewers were selected from the following list:

- Andrew Hough;
- Deirdre Hoare;
- Julian Addison;
- Martin Louis Van Brakel;

- Rob Whiteley;
- Terry Holt.

A summary of their experience and qualifications is available via this link:
<https://fisheries.msc.org/en/fisheries/germany-lower-saxony-mussel-dredge-and-mussel-culture/@assessments>

2 Description of the Fishery

2.1 Units of Assessment (UoA) and Scope of Certification Sought

2.1.1 UoA and Proposed Unit of Certification (UoC)

CU Pesca confirms that the fishery under assessment is within the scope of the MSC Fisheries Standard (7.4 of the MSC Certification Requirements v2.0):

- The target species is not an amphibian, reptile, bird or mammal;
- The fishery does not use poisons or explosives;
- The fishery is not conducted under a controversial unilateral exemption to an international agreement;
- The client or client group does not include an entity that has been successfully prosecuted for a forced labour violation in the last two years;
- The fishery has in place a mechanism for resolving disputes, and disputes do not overwhelm the fishery;
- This fishery is enhanced (catch and grow);
- The fishery is not an introduced species-based fishery as per the MSC FCR 7.4.4.

A description of the Units of Assessment is provided in Table 1 and Table 2. There are two UoAs for this assessment, as there are two distinct operational activities, affected by different management measures and with different effects on the surrounding ecosystem. The relaying and harvesting from the culture plots has been included in both UoAs, but all component activities of each UoA are evaluated separately where necessary. In the absence of 'other eligible' fishers, the UoC is the same as the UoA.

Table 1. Unit of Assessment (UoA) 1

Species	Blue shell mussel (<i>Mytilus edulis</i>)
Geographical range	FAO area 27, ICES Area IVb – in the German part of the Wadden Sea around Niedersachsen / Lower Saxony
Method of capture	Dredging and trawl nets for wild seed, which is then relayed on culture plots and harvested by dredge when grown (bottom culture).
Stock	Wadden Sea blue mussel stock
Management System	Blue Mussel Fishery Management Plan for the Wadden Sea National Park of Lower Saxony
Operators	Niedersächsische Muschelfischer GbR
Other eligible fishers	None

Table 2. Unit of Assessment (UoA) 2

Species	Blue shell mussel (<i>Mytilus edulis</i>)
Geographical range	FAO area 27, ICES Area IVb – in the German part of the Wadden Sea around Niedersachsen / Lower Saxony
Method of capture	Spat / seed collectors are deployed as settlement substrata for larval mussels, which are then transferred to culture plots and harvested by dredge when grown (bottom culture).
Stock	Wadden Sea blue mussel stock
Management System	Blue Mussel Fishery Management Plan for the Wadden Sea National Park of Lower Saxony
Operators	Niedersächsische Muschelfischer GbR
Other eligible fishers	None

In the previous assessment cycle, a third UoA was presented, regarding “translocation” of seed into the fishery. This has been removed from the reassessment and a rationale for this decision is given in section 2.3.3.

2.1.2 Final UoCs

The final UoCs are as detailed in Section 2.1.1

2.1.3 Total Allowable Catch (TAC) and Catch Data

The fishery is not managed via a TAC. Catch data are given in Table 3.

Table 3. TAC and Catch Data

TAC	Year	N/A	Amount	N/A
UoA share of TAC	Year	N/A	Amount	N/A
UoC share of total TAC	Year	N/A	Amount	N/A
Total green weight harvest by UoC	Year (most recent)	2016	Amount	2127 tonnes
	Year (second most recent)	2015	Amount	3983 tonnes

2.1.4 Scope of Assessment in Relation to Enhanced Fisheries

In conjunction with fishery information provided by the client, including operations, gear and harvest information, the team used “Table C1: Scope criteria for enhanced fisheries” from the MSC Fisheries Certification Requirements (version 1.3) to determine if the fishery under assessment was

eligible to be evaluated under the Enhanced Bivalve Fisheries methodology". The criteria for enhanced fisheries are provided below in Table 4.

Table 4. MSC scope criteria for enhanced fisheries.

A	Linkages to and maintenance of a wild stock
A1	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.
A2	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.
A3	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.
A4	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.
B	Feeding and Husbandry
B1	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-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.
B2	In CAG systems, production during the captive phase does not routinely require disease prevention involving chemicals or compounds with medicinal prophylactic properties.
C	Habitat and ecosystem impacts
C1	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

The team confirms here how the criteria are met:

Linkages to and maintenance of a wild stock

The fishery relies on the capture of target species from the wild environment;

The species are native to the geographic region the fishery operates within;

There are reproductive components of the stock from which the fishery's catch originates that maintain themselves without having to be restocked every year. In this case, the spat naturally settle on the sea floor or 'spat collectors', not only maintaining the stock, but enhancing it.

Feeding and husbandry

This fishery is considered a Catch-and-Grow (CAG). In this case, the 'captive phase' is the capture of spat onto seed/spat collectors:

The feeding of the mussels at this stage is only by natural means, as the mussels filter feed from the water column;

No disease prevention involving chemicals or compounds with medicinal prophylactic properties are used in this fishery.

Habitat and ecosystem impacts

As this fishery uses ropes, which are suspended in the water column, this can be considered to be 'habitat modified', as the ropes provide further substrate on which mussel spat can settle and grow. These structures are reversible as ropes are removed from the water every year to avoid loss of ropes during winter storms. The team therefore concluded that serious or irreversible harm to the natural ecosystem's structure and function is not caused by these structures which are therefore within the 'enhanced fisheries' scope.

2.2 Overview of the fishery

2.2.1 The Client fishery

The Wadden Sea is an intertidal zone in the south-eastern part of the North Sea. It lies between the coast of north-western continental Europe and the range of Frisian Islands, forming a shallow body of water with tidal flats and wetlands. The German Wadden Sea, Lower Saxony, lies between the Dutch part of the Wadden Sea and another German part (Schleswig-Holstein).

The fishery is conducted by members of the Niedersächsische Muschelfischer GbR, which represents four mussel fishing companies operating five vessels (four licensed fishing vessels and one for “farming activities”, see Table 5. The mussel fishery has traditionally been based on the fishery of wild mussel seed in the subtidal and in the intertidal (UoA 1) although seed mussel collectors (SMC) consisting of ropes or nets are increasingly being used due to low productivity of wild mussel beds (related to the expansion of the non-native Pacific oyster in the intertidal as well as poor spat fall) (UoA 2). Occasionally seed mussels can be sourced from inside the Wadden Sea from MSC certified fisheries (Netherlands blue shell mussel fishery, CUP-F-021 and Schleswig-Holstein blue shell mussel fishery, MRAG-F-0072). The input of seed mussels into the fishery is fully traceable and monitored, allowing source identification from the consumption mussel sold out of the fishery latterly. Seed brought in to the Lower Saxony fishery may be sold latter for human consumption or for further culturing. In either case, this is covered by Chain of Custody, when there is a change of ownership. Any movement activity in or out of the fishery is strictly monitored and documented. In the original assessment, this was identified to be classed as translocation. The assessment team evaluated this and decisions made on translocations and other MSC certified fisheries in the Wadden Sea and came to the conclusion that any sourcing of mussel seed from within the Wadden Sea ecosystem does not constitute a translocation. A full rationale of this decision can be found in Section 2.3.3.

2.2.2 History of the fishery and its management

Up to the early 20th century, the mussels were almost exclusively collected by hand on the tidal flats as they became dry with the falling tide. With the advent of the First World War, there was an increasing demand for domestically produced nutritious foods. The mussels on the tidal flats were harvested in large quantities; this took place partly at low tide with pitchforks, but increasingly at high water with landing nets or towed equipment, the so-called Muscheldredgen or -dredschen. By this time, the existing transport infrastructure meant sales on a regional level were possible and the mussels were sold in northern Germany as part of the war food rations. The mussel production and processing were clearly defined by government guidelines and was operated by specially founded companies.

The Lower Saxony mussel industry has continued to develop, supplying the major markets of the Rhineland, Belgium and France. The Lower Saxony mussels have been increasingly marketed through the Dutch mussel auction.

Blue mussel beds (*Mytilus edulis*) are important biogenic structures in the Wadden Sea ecosystem, serving as diverse habitat and as an important food source for a number of species, especially mussel-eating birds. Since the introduction of the Pacific oyster (*Crassostrea gigas*) to the German Wadden Sea at the end of the 1990s, the expansion of this species’ range has resulted in most of the traditional wild mussel beds becoming unfishable. This in conjunction with poor spat fall and the closure of some areas used for mussel seed fishery, has resulted in mussel seed availability becoming a limiting factor of the production of mussels. As an alternative, seed mussel collectors operate with a substrate, such as rope or netting in the water column.

Mussel culture has a long tradition in Lower Saxony and its present legal structure has evolved over decades, but no customary rights of relevance could be identified besides the formal legal framework. The management of the Lower Saxony blue mussel fishery is enacted by a complex administrative framework. The Lower Saxony Fisheries Law and regulation for blue mussels and the Blue Mussel Fishery Management Plan for the Wadden Sea National Park of Lower Saxony compose the main fisheries management instruments. Overarching European management affecting the fishery are the Bird- and Habitat Directive (implemented through Natura 2000), and the Water Framework Directive. The Niedersächsische Ministerium für Ernährung, Landwirtschaft, Verbraucherschutz und Landesentwicklung, has primary responsibility for the fisheries. The Staatliche Fischereiamt Bremerhaven (SFA) is the governmental organisation in the field. The Fisheries Office (SFA) issues permits for the fishery. The Niedersächsische Muschelfischer GbR has its own rules and regulations. Part of these rules is the requirement of a functioning black box aboard each vessel.

The fishery regulations and the management plan (Bewirtschaftungsplan Miesmuschelfischerei) contain several measures that regulate the impact of the fishery on mussel beds. Of the 102 stable mussel locations (Standorte) in the intertidal, 29 are closed for seed mussel fisheries and the remaining 73 sites are mostly covered by stable mussel beds, which have been colonised by Pacific oysters. In the instance that the mussel fishery wishes to collect seed mussels from any new spatfall, the fisher must apply for a licence, the application for which will be reviewed by the Fisheries Directorate (that will also consult the National Park authorities). During this process, the location and size of the mussels are assessed and seed mussels larger than 4 cm are not permitted to be fished. Generally no more than one or two mussel locations will be fished in a given year. In recent years there have also been several years where no mussel locations (in the intertidal) have been fished at all. Licences are issued for a specific vessel in a specific period and a specific area marked by co-ordinates; vessel activity within the areas are monitored via VMS. New spatfall can occur on the edges of the 102 mussel locations covered by the Bewirtschaftungsplan Miesmuschelfischerei, but most new seed mussel beds are temporary and located in completely different areas (see Figure 6). The management plan covers 102 stable locations, of which 29 are closed for shellfish farming. The remaining 73 are mostly covered by stable old mussel beds (with oysters).

In the subtidal the rule that seed mussels that will be translocated to culture plots should be no larger than 4 cm also applies. However in the subtidal a fishery for consumption mussels is allowed when the mussels have passed the minimum size of 5 cm. This means that in the subtidal in principle nearly all mussels located by the mussel sector can be fished; only beds with mussels between 4 and 5 cm are exempted. As in the intertidal in all cases a licence is needed and licences are issued for a specific period and a specific area marked by co-ordinates.

These measures above are also relevant to the potential habitat impacts of the fishery and are considered in both sections with respect to the relevant receptors.

Full details on the management framework of the fishery are given in Section 1.1.

2.2.3 Gear and operation of the fishery

The Lower Saxony mussel industry captures spat fallen on either natural substrates or on artificial substrates, both of which however would be considered wild. Once collected, the spat are then relayed on to cultivation beds for on-growing.

Mussel fisheries can take place year-round. Fishing for mussel seed in the eulittoral area is not permitted between 15th December and 31st March. However, due to growth rates and spawning of the mussels, the main activities take place from May-December. During March to May, mussel

fishers will clean their plots, relay mussels on the plots, and take care of the spat collectors (ropes). Mussel seed is generally fished twice a year, in the autumn on the newly formed spat beds; and sometimes a second time the following spring, in the remaining beds.

Mussels are caught with mussel dredges or trawl nets. Vessels operate two or four dredges, or two trawl nets at a time. The dredge consists of a metallic net that is supported by a steel bar frame (Figure 1). The net is dredged along the sea bottom. When the net is full it is emptied into the boat hold. The same gear is used for the seed fishery as for the fishery on the mussel plots. A trawl net with tickler chains is used in muddy areas. The use of the seed mussel collector (SMC) to capture mussel seed from the water column is promoted as an alternative for bottom dredging.



Figure 1. Example of a mussel dredge used by the fishery (source Matthew Doggett).

The other part of the fishery (UoA 2) uses artificial substrates known as Saatmuschelgewinnungsanlagen (SMC) (Figure 2). These are stable frameworks that float near the water surface, held in place by long plastic pipes or buoys and anchors to the sea floor. The ropes or nets that make up the substrates naturally attract mussel larvae seasonally which then develop into young mussels. With special equipment, these are carefully harvested through brushing and used for stocking the cultivation beds. The SMC require a location in the Wadden Sea which has sufficient water depth to ensure that the networks do not touch the ground at low tide. Currently, they are all located in the Jade estuary, outside the National Park. Likewise, the SMC must be able to accommodate the direction of flow and have sufficient distance from one another so that the harvesting vessels can pass between them. The collection of spat on SMCs and further on-growing is an enhanced fishery of the type Habitat Modified (HM). A trial for longline SMCs began in 2004 as a potential to compensate for the development of Pacific oysters (*Crassostrea gigas*) beds, which were steadily growing, reducing numbers of mussels available to the fishery. The trial was successful, and so began the SMC part of the fishery.



Figure 2. SMCs in operation (photo from Schleswig-Holstein mussel fishery) and floats and anchors used in the fishery in Hooksiel, Lower Saxony (source Matthew Doggett)

During winter the nets are hauled into harbour areas, where they remain and lines must be completely removed from the water, due to the risk of losing them in storms or other bad weather conditions. Lines are last brushed in October and then towed to Wilhelmshaven to be stored over winter. This is a very labour-intensive activity and the costs for operating this part of the seed collection in the fishery is much higher than for dredging/trawling for seed (UoA 1).

Following seed collection, mussels are laid onto culture plots to ‘grow out’. During this process, half grown mussels are usually transplanted several times to other culture plots. Vessels are used to deposit mussels onto the designated culture plots. This happens by bringing water into the ship and opening the valves on both sides of the hold (Figure 3).

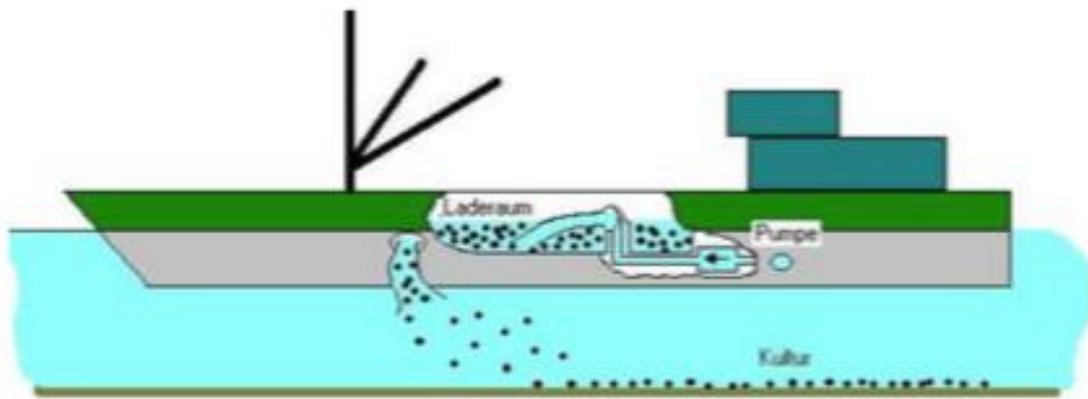


Figure 3. Schematic of a vessel unloading mussels onto a culture plot (source: <http://www.muschelfischer.de>)

The fishing vessels vary between 135 and 345 Gross Tonnage (GT). A vessel list for the fishery can be found below (Table 5). Figure 4 shows an example of one such vessel active in the fishery.



Figure 4. One of the fishing vessels, “Anna” (source: <http://www.muschelfischer.de>)

Table 5. Client group vessel list¹.

Vessel Name	Call Sign	Title	Length (metres)	Vessel function in the fishery
Anna	DQUQ	NOR 214	35.0	Fish for seed mussels
Andrea	DCWH	NOR 204	34.0	Fish for seed mussels
Royal Frysk	DCZY	HOO 70	45.5	Fish for seed mussels
Siebennus Gerjets	DCYE	HOO 71	38.5	Fish for seed mussels
Charlotte	DGEC2	GRE 115	45.0	Fish for seed mussels
Janne	PEZR	YE 23	40.0	“Farming” work
Ursula	DCRB	GRE 27	36.0	“Farming” work

2.2.4 Fishing areas and seasons

The fishery and culture takes place in ICES subarea IVb, in the German part of the Wadden Sea. Lower Saxony coastal waters are situated between Schleswig-Holstein (Elbe-Estuary) in the east and the German-Netherlands boarder (Ems-Estuary) in the west. All operations take place within the 12 nautical mile (nm) zone and are governed by Lower Saxony legislation. The major part of the area of operation is part of the National Park “Lower Saxony Wadden Sea”, which at the same time is a Natura 2000 site and part of the Dutch-German Wadden Sea World Heritage site recognised by

¹ “Ursula” is an old mussel vessel. In Lower Saxony five mussel vessels are allowed (four fishing licences). So it is possible to replace one of the usual vessels by another. So theoretically, for example it is possible to replace “Charlotte” by “Ursula”. All of these vessels are not active at same time.

UNESCO. Fishing is forbidden in 26% of the National Park (subtidal and intertidal areas collectively)² and there are also other parts of the National Park which are not fished, although it is not restricted by law and due to the lack of mussel beds. Additionally areas may not be accessible due to unsuitable water conditions (i.e. too shallow/deep or water flow too strong) or because the area is designated for other users, like shipping lanes or cables. In reality, the potential “fishable” areas (where the seed fishery and rope cultures could take place) constitutes 35% of the National Park area. Out of the 35% of fishable area, only about 2% of that is actually used for seed collection. The stock includes wild mussel beds, and mussels on mussel culture plots. A small part of the annual spatfall is harvested and transferred to the culture plots. Seed mussels are preferably collected from unstable year-1 mussel beds.

The mussel seed fishery is in autumn, usually September (only allowed in relatively exposed areas with a higher risk of storm damage and/or starfish predation in autumn and winter), and in spring (March/April). The spring monitoring shows the stock size after winter as a basis for the mussel monitoring (it determines the minimum stock size that is used as the minimum size for the management plan). The SMC-season is between March and November, with harvesting taking place from June/July-October. The entire harvest season is from 1st July to 15th April the following year. Figure 5 and Figure 6 demonstrate the scale of the fishery within Lower Saxony waters.

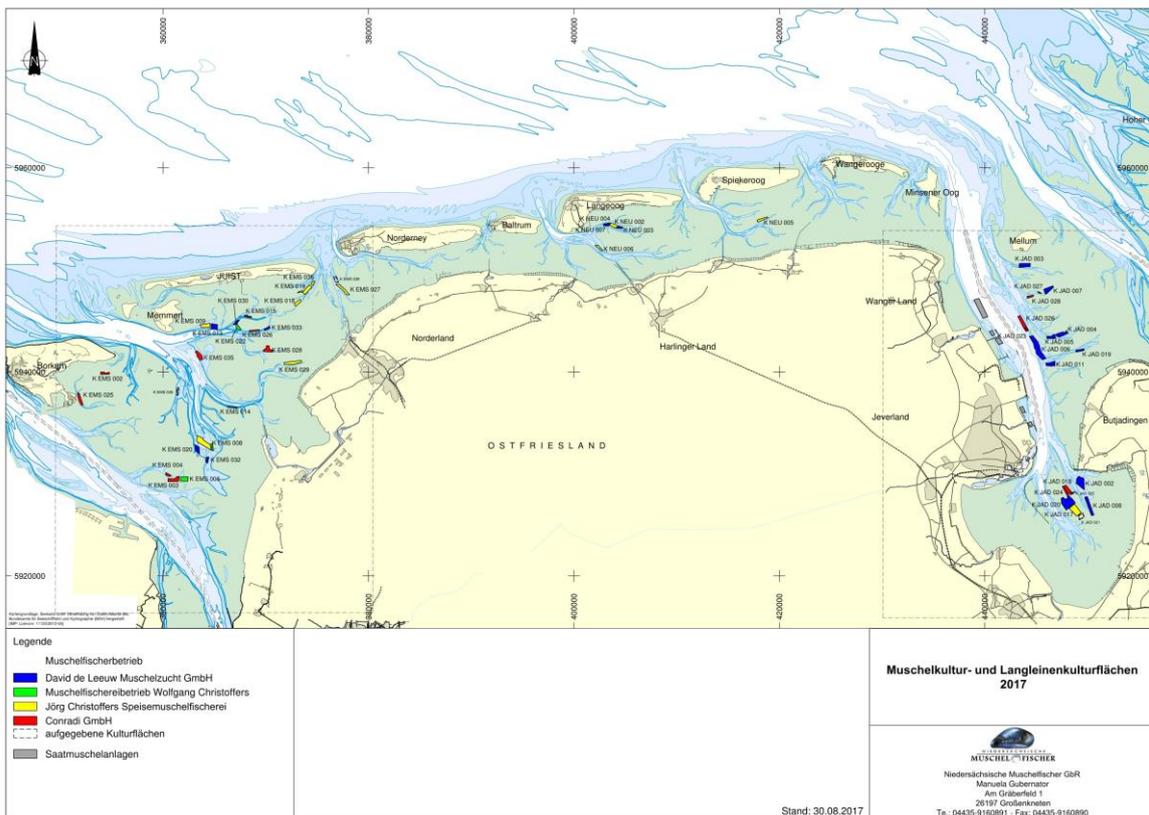


Figure 5. Maps of culture plots in the fishery (summary over the years 2007-2016)

² Nationalparkgesetz Niedersächsisches Wattenmeer and additional the Bewirtschaftungsplan Miesmusselfischerei im Nationalpark “Niedersächsisches Wattenmeer 2009-2013” (Management Plan Blue Mussel Fishery in the National Park “Lower Saxony Wadden Sea” 2009-2013 (see section 1.1 for more information on the management of the fishery.

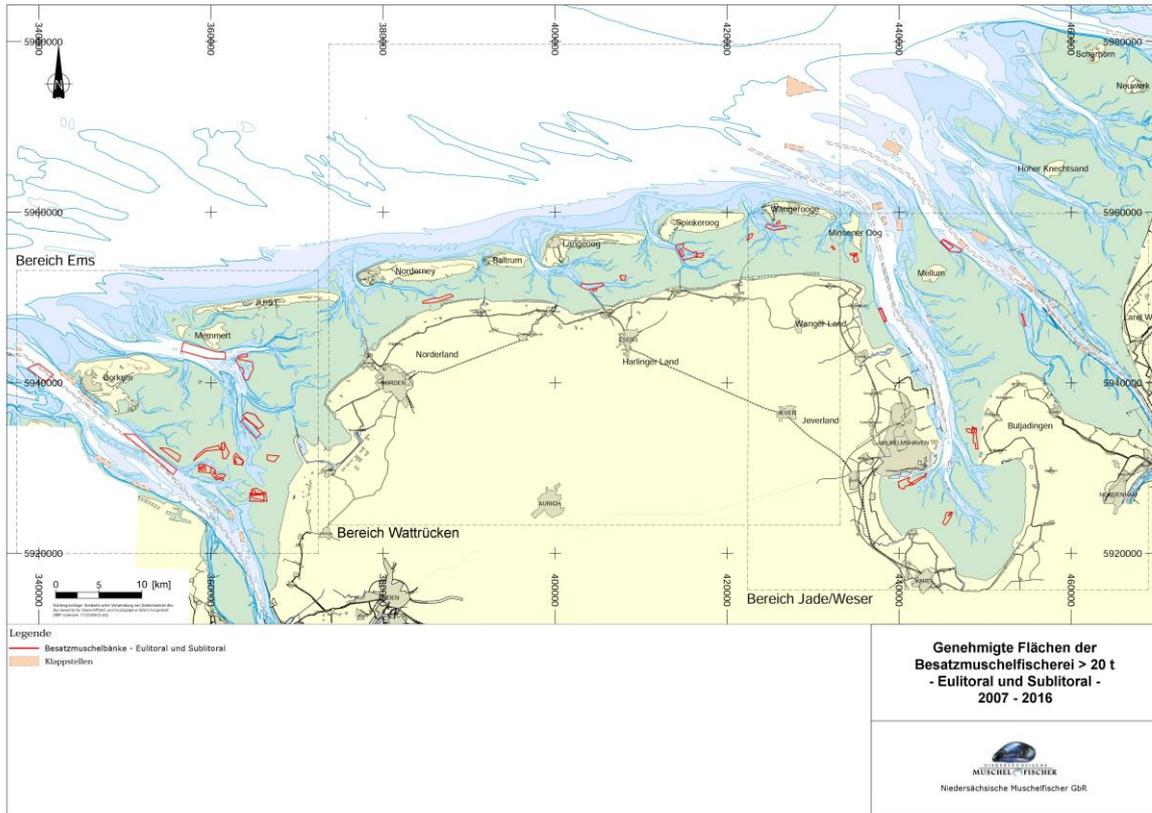


Figure 6. Maps of seed mussel fishery (summary over the years 2007-2016)

2.3 Principle One: Target Species Background

According to the MSC Certification Requirements and Guidance (version 2.0), for a catch and grow enhanced bivalve fishery such as this, the team should evaluate whether or not the fishery has an impact on the target stock biomass, and whether it includes translocations. If the team concludes that there is no impact on the biomass of the target stock and no translocations, then the team may choose not to score Principle 1 (see clause SB2.1.4 of MSC Certification Requirements (CRs) version 2.0).

2.3.1 Potential impact of planktonic spat collection

The team considered that the mussels taken from the SMCs would not otherwise settle within the ecosystem – i.e. this is ‘additional’ to the target stock. In relation to impacts on the target stock therefore, the issue is only around fishing of wild seed beds. The additional risk of SMCs in providing habitat for non-native species appears to the team to be minimal since such habitat is already extensively available via natural mussel beds, culture plots and other hard substrata such as coastal protection, ports, harbours, pontoons etc.

2.3.2 Potential impact of seed mussel dredging

All the mussels fished from seed beds are relayed to culture plots, where there are better growing conditions, i.e. better food supply and lower mortality, and are latterly cultivated. Depending on the original size, the mussels remain on the culture for at least one year, but usually two years to reach optimal market size. Mussels start to spawn from their first year and spawn multiple times a year so during this time they will spawn several times (Thompson, 1979; Sprung, 1983). The mussels re-laid

on the culture plots from the SMCs will also spawn in the same way – providing a supplementary spawning biomass on top of ‘natural’ reproduction.

A key question remains, however, the extent to which subtidal seed beds would persist in the absence of fishing. Fishery-independent surveys and monitoring of subtidal beds in the Wadden Sea remain limited because they are obviously more difficult to find and evaluate than intertidal beds. There has however been some scientific work³ in the Wadden Sea over the years, which suggests that while the location of subtidal beds is persistent, the biomass of mussels on these beds is highly variable (by several orders of magnitude), depending on factors such as the amount of spatfall, ice winters, parasitism and predation as well as fishing pressure (Dankers and Koelemaj, 1989; Obert and Michaelis, 1991; Nehls and Thiel, 1993).

It has also been known that seed beds have been found by the fishermen but have disappeared before they were fished, which also suggests that seed fishing is not the primary cause of destabilisation. There is no evidence of extensive stable subtidal mussel beds in the area (i.e. beds with continual mussel biomass present), although two areas are reportedly known which may be persistent mussel beds. In other areas (e.g. Morecambe Bay, the Exe estuary – see MEC, 2016a; MEP, 2012; Dare 1976) seed mussel beds are known with certainty to be naturally ephemeral (i.e. although the beds tend to form in the same areas, the biomass from a given settlement does not persist and at any given time there may or may not be mussels present). Although it is not certain that these observations can be extrapolated to the Wadden Sea, they are consistent with the patterns reported by scientists for the Wadden Sea as summarised briefly above.

Overall, the key point is the general agreement that the biomass on subtidal seed beds is, and always has been, ephemeral and highly variable – i.e. that although the location of the beds may be persistent, the presence and biomass of mussels in these areas is likely to be highly variable and unpredictable. There is clearly not a lack of recruits, as shown by the colonisation of the SMCs – the issue in terms of natural seed availability seems to be rather that the mortality of newly settled and juvenile mussels on subtidal beds is naturally very high. This is also supported by data from elsewhere; e.g. Dare (1976) reported annual mortalities of 74% for 25 mm mussels and 98% for 50 mm mussels on an exposed, low-lying intertidal mussel bed. Potential sources of natural mortality are erosion, smothering by mobile sediment or predation (notably starfish, also crabs and eider ducks); starfish predation seems to play a key role in this ecosystem, as described further below.

It certainly cannot be ruled out that the fishery plays some role in disrupting the development of these beds – i.e. they may potentially be more ephemeral (disappear quicker) than they would be in the absence of fishing (which is logical, given that the fishery is removing biomass). Reise and Buschbaum (2017) state that it is a rare occurrence that an entire bed would be removed by starfish predation, suggesting that, for example, the starfish may be able to remove beds which have been fished more easily (which again, would seem logical; conversely it contradicts the information in Nehls et al. (2011) on a bed which disappeared before it could be fished at all). Nevertheless, given the more persistent biomass on the culture plots, it is clear that the fishery is not impacting significantly on the overall mussel stock biomass or on recruitment. In fact, given that seed mussels are removed from the natural beds where they are likely to suffer from high natural mortality, and re-laid in areas where they are subject to a measure of husbandry to try and minimise mortality (details given below), the fishery may well be adding to the total mussel biomass in the system, or at the very least compensating in terms of biomass for any loss of natural subtidal beds due to fishing plus other factors.

³ This work is well-summarised at http://www.ukmarinesac.org.uk/communities/biogenic-reefs/br4_4.htm

2.3.3 Translocations

As mentioned in Sections 2.1.1 and 2.2.1, UoA 3 described in the original MSC [Publication Certification Report](#) (PCR) has been removed from this assessment. The rationale behind this is that the mussel seed entering into the Lower Saxony mussel fishery is from MSC certified sources (Netherlands blue shell mussel fishery, CUP-F-021 and Schleswig-Holstein blue shell mussel fishery, MRAG-F-0072), and therefore already assessed. Further to this, as a result of the initial assessment, the fishery voluntarily ceased to use seed from outside the Wadden Sea (as part of the 2014 – 2018 blue mussel management plan), which can be regarded a translocation and has originally been assessed under UoA 3. As the fishery continues not to translocate mussels, but only uses mussels from within the Wadden Sea ecosystem, this UoA has been removed. Supplementary rationales to this conclusion is provided below.

The blue mussel (*Mytilus edulis*) is distributed along the entire geographical range of the Wadden Sea, where for management purposes a number of stocks are identified including the blue mussel stocks of the Netherlands, Lower Saxony, Schleswig-Holstein and Denmark (Figure 7). A study carried out by GIMARES (Gittenberger, 2015) presents a valid documented risk assessment that demonstrates that the movement of mussels from outside the Lower Saxony Wadden Sea (but still within the Wadden Sea area) to Lower Saxony is highly unlikely to introduce diseases, pests, pathogens or non-native species into the surrounding ecosystem.

The current system along this part of the North Sea coast runs from the southwest to the northeast (Figure 8) so tends to transport organisms from west to east along the Wadden Sea. In the opposite direction, movement of mussels has been a common practice for many decades. Hence there is strong connectivity in both directions, whether natural or manmade.

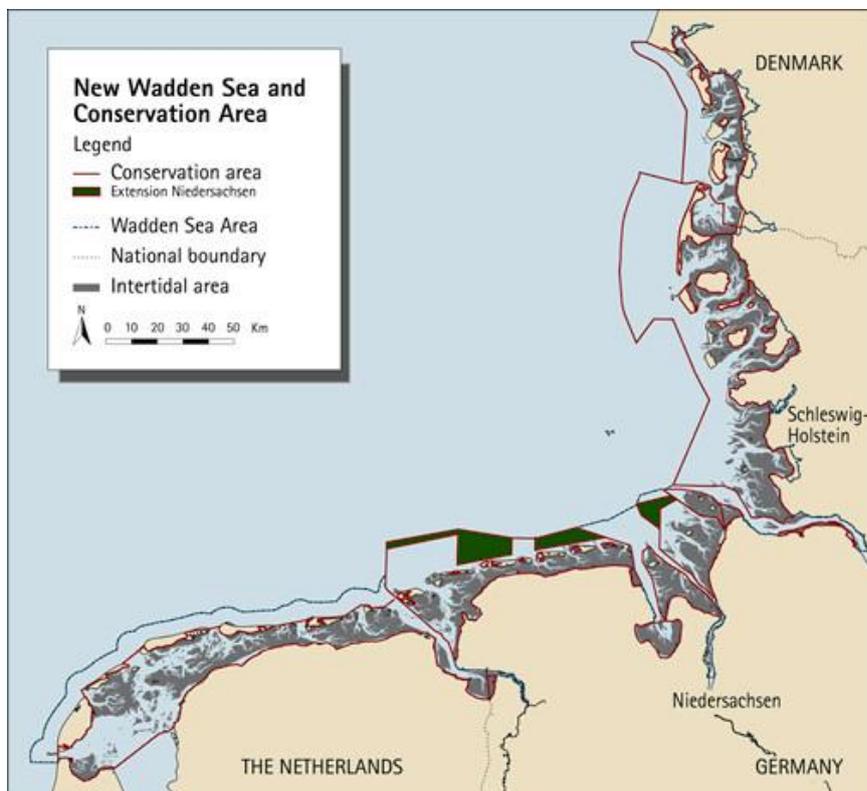


Figure 7. Wadden Sea Cooperation Area (source [Wadden Sea World Heritage](#))

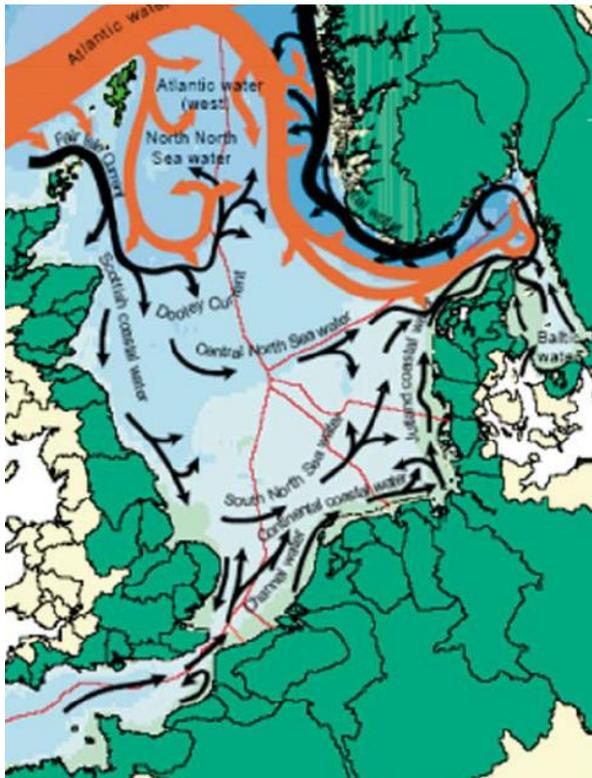


Figure 8. General circulation pattern in the North Sea. The width of arrows is indicative of the magnitude of volume transport (red arrows relatively pure Atlantic water currents, black arrows North Sea water and coastal water currents). The drainage system of the North Sea basin is indicated by the different contributing river catchments (green) (source: [Research Gate](#)).

The ecosystem and genetic consequences of this movement of mussels in relation to the MSC has been evaluated already in the wider context of import of mussels into the Oosterschelde from MSC-certified fisheries further afield, as part of the certified ‘Mussel Translocation into the Oosterschelde’ assessment. More information on this assessment is available here: <https://fisheries.msc.org/en/fisheries/mussel-translocation-by-members-of-the-vereniging-van-importeurs-van-schelpdieren-into-the-oosterschelde/@@assessments> (MEC, 2016b). The information available is examined in detail in this report, and concludes that there are no likely impacts.

Input of seed mussel into this fishery travel a maximum of approximately 225 miles along the coast (85 miles from northeast from the Schleswig-Holstein mussel fishery to Lower Saxony, or 225 miles east from the Netherlands blue shell mussel fishery (Figure 9).



Figure 9. The MSC Wadden Sea mussel fisheries (source Google Earth).

2.3.4 Conclusion

Overall, in relation to Principle 1, the team concluded that i) the fishery has no significant impact on the mussel stock and ii) movements within the Wadden Sea are all within the same ecosystem and therefore do not constitute translocation. Therefore, the team decided that Principle 1 is not required to be scored in the fishery. **Note that mussels being sourced from the Wadden Sea are from MSC certified sources F-CUP-021 – Netherlands blue shell mussel fishery and MRAG-F-0072 – Schleswig-Holstein blue shell mussel fishery). The fishery’s traceability system is robust enough to determine the seed source if not from Lower Saxony and so eligible to be sold as MSC (see section 4 for more details on fishery traceability).**

2.3.5 Low Trophic Level (LTL) species

The target species for this assessment is not a key Low Trophic Level (LTL) species, as it does not meet the requirements for key LTL species defined in paragraphs SA2.2.8 – SA2.2.10 of the MSC Fisheries Certification Requirements v2.0. The blue mussel stock is not involved in a large portion of the trophic connections in the ecosystem, a large volume of the energy passing between lower and higher trophic levels does not pass through this stock, and there are many other species at this trophic level through which energy can be transmitted from lower to higher trophic levels. Further to this, it is not one of the species types listed in Box SA1, nor does it form dense schools.

2.4 Principle Two: Ecosystem Background

2.4.1 Designation of species under Principle 2

The fishery's impact of non-target species is analysed differently if the species is retained or discarded by the fishery, or considered Endangered, Threatened or Protected (ETP). These are defined as follows:

Retained species (MSC Component 2.1): species that are retained by the fishery (usually because they are commercially valuable or because they are required to be retained by management rules).

Bycatch species (MSC Component 2.2): organisms that have been taken incidentally and are not retained (usually because they have no commercial value).

ETP (Endangered, Threatened or Protected) species (MSC Component 2.3) are assigned as follows:

- Species that are recognised by national ETP legislation
- Species listed in binding international agreements (e.g. CITES, Convention on Migratory Species (CMS), ACAP, etc.).

The term "main", is used in this assessment. In the MSC context, these are typically species identified as those which constitute over 5% of the total catch, or which can be considered as vulnerable, or of particularly high value to the fisher. Should vulnerable or valuable species been found in the fishery, these would have been designated as 'main' if they made up more than 2% of the total catch.

Exceptions to the rule may apply in the case of exceptionally large catches of bycatch species.

2.4.2 Retained species

In Lower Saxony, seed mussels are collected for culture in two ways, either:

- Seed mussels are fished with mussel dredges or nets following natural spatfall in intertidal or subtidal areas (UoA 1); or
- Suspended mussel culture (SMC) is used to collect mussel spat using ropes and nets (UoA 2).

When seed mussels are fished they are relocated on the culture plots, which means that any species caught with the mussels are also returned to the sea and there are no retained species. The same applies for the collection of seed mussels from SMC installations; some tunicates may grow on the mussels or ropes and small crabs and starfish may live between the mussels but none are retained.

On the mussel culture plots where seed mussels are relocated for on-growing prior to final harvest, the same principal applies. If mussels are moved between plots during the on-growing phase, any other species are transported with them and returned to the sea. The only stage of the fishery during which bycatch occurs is the final harvest stage. At this stage of the fishery there is some bycatch of species which are not returned to the sea.

2.4.3 Bycatch species

The only stage of the mussel fishery operations during which bycatch of species might occur is during the harvesting of mussels for consumption. At all other stages such as subtidal or intertidal seed fishing, collection from SMC installations or during movement of mussels between bottom-

culture plots, all biota are returned to the water with the mussels over the culture plots and are not removed from the Wadden Sea ecosystem.

Bycatch species encountered during the harvest of mussels from culture plots consist of slipper limpets, crabs, starfish, barnacles and some Pacific oysters. The only species that might sometimes be encountered in significant quantities when harvesting mussels from plots catches are common starfish (*Asterias rubens*), shore crabs (*Carcinus maenas*) and Pacific oyster (*Crassostrea gigas*). The quantities of these species encountered during the final harvest are not recorded and were assessed under the first MSC assessment using the RBF. They have been considered here in the same way as a precautionary approach, as was also the case under the MSC Schleswig-Holstein blue-shell mussel fishery assessment. Starfish and crabs may be attracted to the culture plots due to the high densities of their preferred food, the blue mussel. During the harvest process, larger organisms are sorted from the mussels on board the fishing vessels via the washing equipment and inspection belt but it is almost impossible to return 100% of the bycatch. That which remains is considered negligible and must be since the presence of these species in mussels at auction has a negative effect on the final price.

Minor bycatch species can include flatfish but the percentages are reported to be so low as to be considered negligible; the low fishing speed means most flatfish evade capture. At the stakeholder meeting for the fishery re-assessment in Bremen in November 2017, there was no suggestion from any stakeholder that these other species should be considered as main bycatch during the SICA assessment of bycatch impacts.

Shore (or green) crabs and common starfish are both very common species in the coastal waters of the North Sea (Garcia 2015; Morris 2007; MarLiN 2017; Klein Breteler 1976; Bolle et al. 2012). Stocks of both species are very large (natural populations of both range between Norway and Senegal) and both species are very fecund. The Pacific oyster is a non-native species that has become established in the Wadden Sea, particularly within intertidal mussel beds; it is highly fecund (MarLiN 2017; Herbert 2016; Troost 2010). These species may be removed from the mussel fishery's bottom-culture plots within the Lower Saxony which cover <0.4% of the total National Park area, or <0.09% of the total Wadden Sea area. None of these main bycatch species are of conservation concern (in terms of their rarity) or have protected status. Pacific oysters are identified during annual surveys of the intertidal mussel beds and are monitored throughout the Wadden Sea as they encroach on natural habitats and may disrupt certain ecosystem processes (Nehls 2007).

When harvested consumption mussels are taken to auction in Yerseke, a sample is taken to determine the composition and net content of each load. Bycatch quantities are so low in the samples (it is in the seller's financial interest to minimise this as they are not compensated for the estimated bycatch content) that they are not recorded in detail. An estimate from the Head of the Yerseke Mussel Auction states that in a typical 50,000 kg load of mussels, a few dozen crabs or starfish may occur, oysters only rarely (van Zantvoort, N., pers. comm.).

2.4.4 ETP species

Endangered, Threatened or Protected species (MSC Component 2.3) are defined as species either (i) recognised by national ETP legislation, or (ii) listed in binding international agreements (e.g. CITES, Convention on Migratory Species (CMS), ACAP, etc.).

In the present assessment, the main group of species that are relevant here are birds, which are protected under the designation of Special Protected Areas (SPAs) and marine mammals which are protected under the designation of Special Areas of Conservation (SACs). Both SPAs and SACs are part of the Natura 2000 (N2k) network of sites of ecological importance and, depending on their

precise locations, contribute toward achieving Good Ecological status under the EU Marine Strategy Framework Directive (MSFD) or Water Framework Directive (WFD). The N2k sites relevant to the present assessment include:

- Niedersächsisches Wattenmeer und angrenzendes Küstenmeer / Lower Saxony Wadden Sea and adjoining territorial sea, SPA (DE2210401);
- Nationalpark Niedersächsisches Wattenmeer / Lower Saxony Wadden Sea National Park, SAC (DE2306301).

The Lower Saxony Wadden Sea and adjoining territorial sea, SPA is designated for the protection of 71 bird species, a full list of which is available to view (<http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=DE2210401>).

The Lower Saxony Wadden Sea National Park SAC protects several fish and mammal species including:

- Grey Seal (*Halichoerus grypus*);
- Harbour Porpoise (*Phocoena phocoena*);
- Common seal (*Phoca vitulina*);
- Shad (*Alosa fallax*);
- River Lamprey (*Lampetra fluviatilis*);
- Sea-lamprey (*Petromyzon marinus*).

Of all the species that could be considered likely to interact with the fishery, the following ETP species / groups are assessed due to their consideration in the initial assessment and recorded presence or interactions in the fishery by stakeholders (fishers, National Park Administration and NGOs). The species listed below are all monitored as part of the Trilateral Monitoring and Assessment Programme (TMAP) and reported in the Quality Status Reports (QSRs):

- Marine mammals – at potential risk from vessel strike, net entanglement or disturbance.
- Oystercatcher and common eider duck – at potential risk from net entanglement, disturbance and indirect impact on food supply. These are covered by National Park Law as being among the species protected according to Article 4, paragraph 2 of the Birds Directive 79/409/EEC.

The bird population in the Wadden Sea includes breeding birds such as gulls, terns and several species of shore bird, as well as non-breeding, migratory species that use the estuaries as over-wintering sites (Koffijberg 2016; Blew 2016). Bivalves, such as mussels, are an important food source for many of these birds. It has been documented that mussels can comprise ~80 % of the diet of adult eiders (*Somateria mollissima*), oystercatchers (*Haematopus ostralegus*) and the red knot (*Calidris canutus*) (Ens 2004; Koffijberg 2016; Blew 2016; Caldwell 2003; Nehls 2007), although none of these species rely solely on mussels as their food source.

2.4.4.1 Seals

The number of seals in the Wadden Sea is monitored regularly. Counts are synchronised between the three Wadden Sea countries: Denmark, Germany and the Netherlands to obtain a single estimate for the entire Wadden Sea population, and includes the number of pups born. Reports are available from the Wadden Sea Secretariat (<http://www.waddensea-secretariat.org/monitoring-tmap/topics/marine-mammals>) and show the population trends being one of general increase,

perhaps with some stabilisation but increasing numbers of pups (Brasseur 2017; Galatius 2017) (Figure 10 and Figure 11).

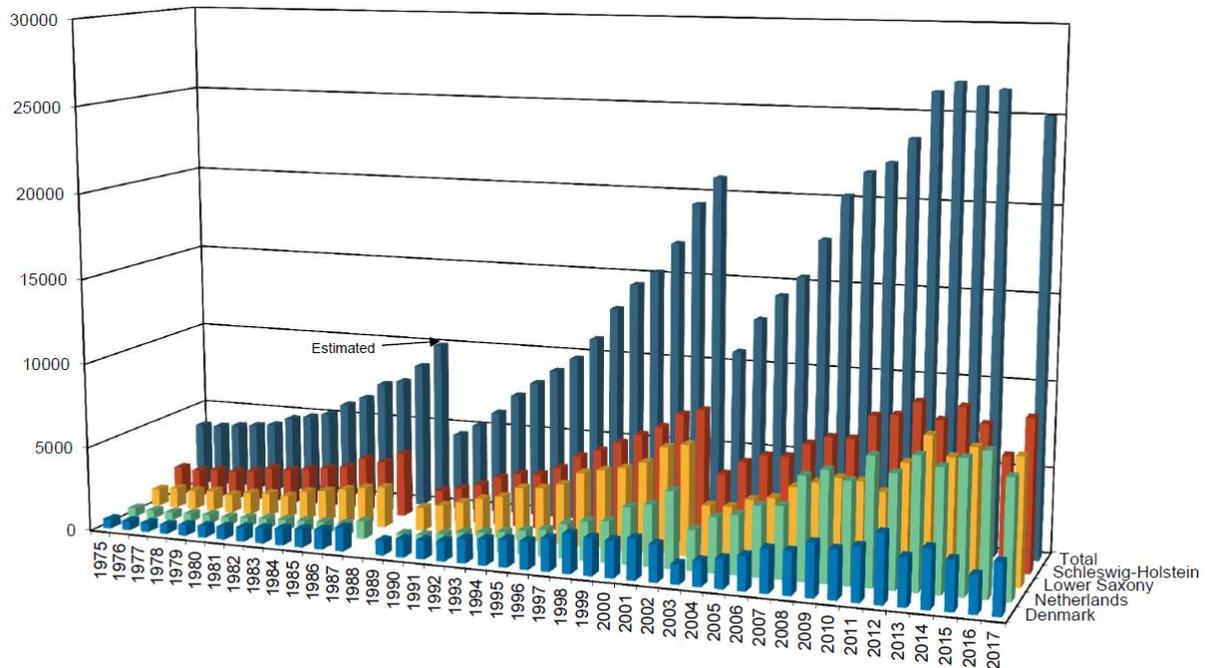


Figure 10. Total number of harbour seals counted in the Wadden Sea during the moult in August, as well as numbers for each region, from 1975-2017. Source: Galatius et al (2017).

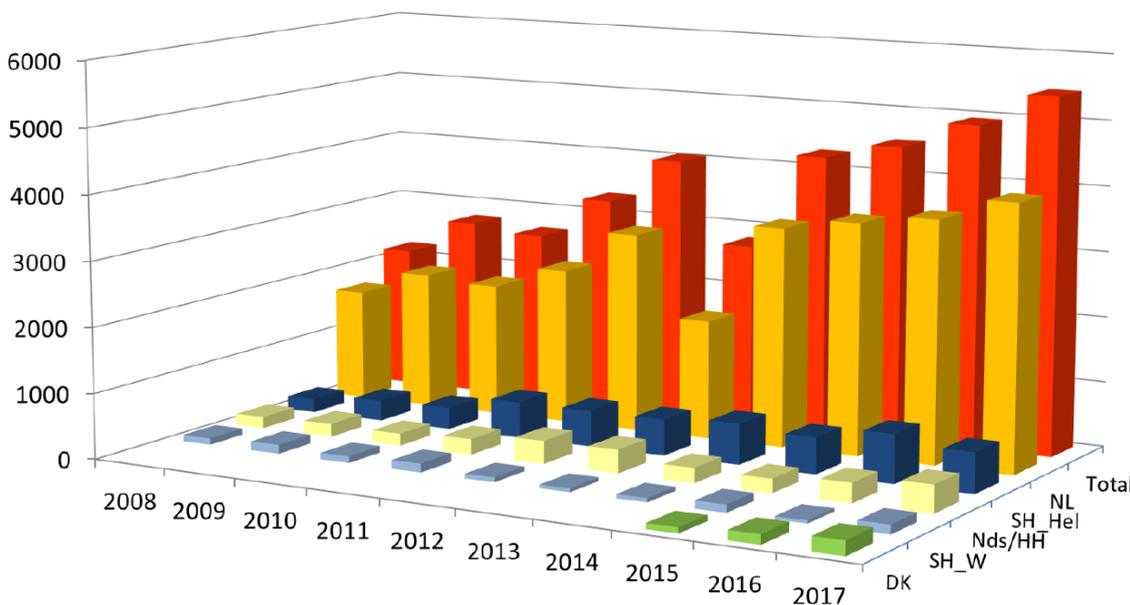


Figure 11. Total number of grey seals counted in the Wadden Sea during the moult, as well as numbers broken down by region, for 2008-2017. Source: Brasseur et al (2017).

Both grey (*Halichoerus grypus*) and common (*Phoca vitulina*) seals are listed as being of ‘Least Concern’ in Europe (Bowen 2016a; Bowen 2016b). Both species have a range that extends throughout the Greater North Sea Ecoregion and beyond. Both species feed on a wide variety of fish species including cod, sole, sand eels, salmon and herring with common seals also taking

cephalopods and crustaceans. The worldwide population of grey seals is estimated as 316,000 mature individuals with some 66,000 mature individuals in the Northeast Atlantic, whilst for common seals the number of mature individuals worldwide is cited as ~315,000 with ~65,000 occurring in the Northeast Atlantic (Bowen 2016a; Bowen 2016b).

Grey seals are most abundant around the UK (which supports 95% of the European population) in the North Sea but can be found around other coasts. Grey seals spend most of the year at sea, sometimes ranging widely to forage. In autumn they form breeding colonies on rocky shores, beaches, in caves, occasionally on sandbanks and on small largely uninhabited islands (JNCC 2017a). Common seals are the most common seal species in Germany and are often seen hauled out on sandflats, in estuaries and on rocky shores. Common seals may range widely to forage but individuals often return to favoured haul-out sites (JNCC 2017b).

Threats to both species of seal include entanglement in fishing gears and pollution, the latter mainly from PCBs and DDT in Baltic populations but also from oil spills etc.; knock-on effects can include immune-suppression resulting in poorer condition of individuals. Grey seals carry the phocine distemper virus but rarely suffer mortality as a result whereas common seal populations have incurred significant mortalities from the virus in the past, particularly during the late 1980s when >18,000 individuals died (IUCN 2007b). Less severe outbreaks have also occurred prior to and since the 1980s. Historically there have been population reduction programmes of both species to limit the impact they have on commercial fishers from net damage to depredation of fish caught in nets, traps or on lines. The licensed killing of individual seals causing damage to fishing gear and catches is still licensed today in many countries (IUCN 2007a; IUCN 2007b).

In the Wadden Sea there is a Trilateral Seal Agreement and Seal Management Plan to maintain the species conservation status through co-ordinated measures and to increase public awareness of the species (CWSS 2003). Full details are available at: <http://www.waddensea-secretariat.org/management/seal-management>.

There are no interactions reported by fishermen, regulatory authorities or any other stakeholders between either seal species and the fishery.

2.4.4.2 Harbour porpoise

The harbour porpoise (*Phocoena phocoena*) is a small cetacean inhabiting continental shelf waters and frequenting shallow bays, estuaries, and tidal channels less than ~200 m depth; it is the dominant marine mammal species in the North Sea. Harbour porpoises eat a wide range of fish and cephalopods with main prey items varying by region. Small schooling fish (e.g. herring) are important but demersal foraging is characteristic in many areas (IUCN 2007c). The species is listed as 'Vulnerable' in Europe by the IUCN but this is noted as being due to the steep decline in Baltic and Black Sea subpopulations whilst there is no evidence to suggest the main North Atlantic population is in decline, with this part of the European population being regarded as of 'Least Concern' (IUCN 2007c).

The harbour porpoise is a CITES Appendix II species, is listed in Annex II and IV of the Habitats Directive (92/43/EEC), Annex II of the Bern convention and Annex II of the Bonn convention. Furthermore, it is the flagship species in the "Agreement on the conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas" (ASCOBANS). The agreement seeks to formalise and coordinate conservation efforts for small cetacean species shared between member countries in the ASCOBANS Area through threat management e.g. bycatch, habitat deterioration, or other anthropogenic disturbances. Given the highly migratory nature of the harbour porpoise, such co-ordinated efforts are necessary to form an effective conservation and management plan (CMP). The

CMP formed under ASCOBANS requires all signatories to engage in habitat conservation and management programmes, surveys and research, pollution mitigation and public engagement. Germany is a signatory to the ASCOBANS agreement.

The Small Cetaceans in the European Atlantic and North Seas projects (SCANS I, II and III) have aimed to map distributions in the northeast Atlantic, often focusing on the North Sea (Hammond 2006; Hammond 2017) (Figure 12 and Figure 13). The most recent population estimate for harbour porpoise in the North Sea is 345,000 individuals. A monitoring programme in the Lower Saxony Wadden Sea is also in place which allows a more detailed understanding of their spatial occurrence relative to the fishery activities (Figure 14) (Gilles 2010).

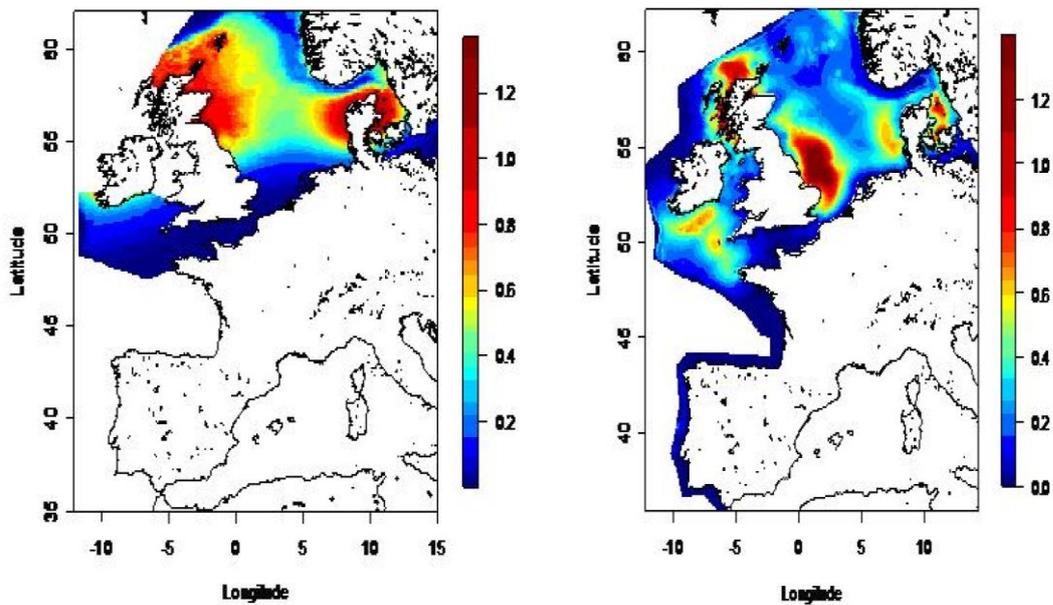


Figure 12. Surface density modelling of harbour porpoise (animals / km²) in 1995 and 2004 from the SCANS and SCANS II projects respectively. Source: Hammond et al. (2006).

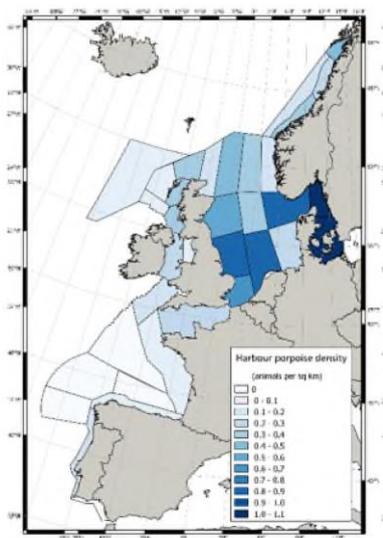


Figure 13. Preliminary results from the SCANS III project of harbour porpoise density (animals / km²) in 2016. Source: Hammond et al. (2017).

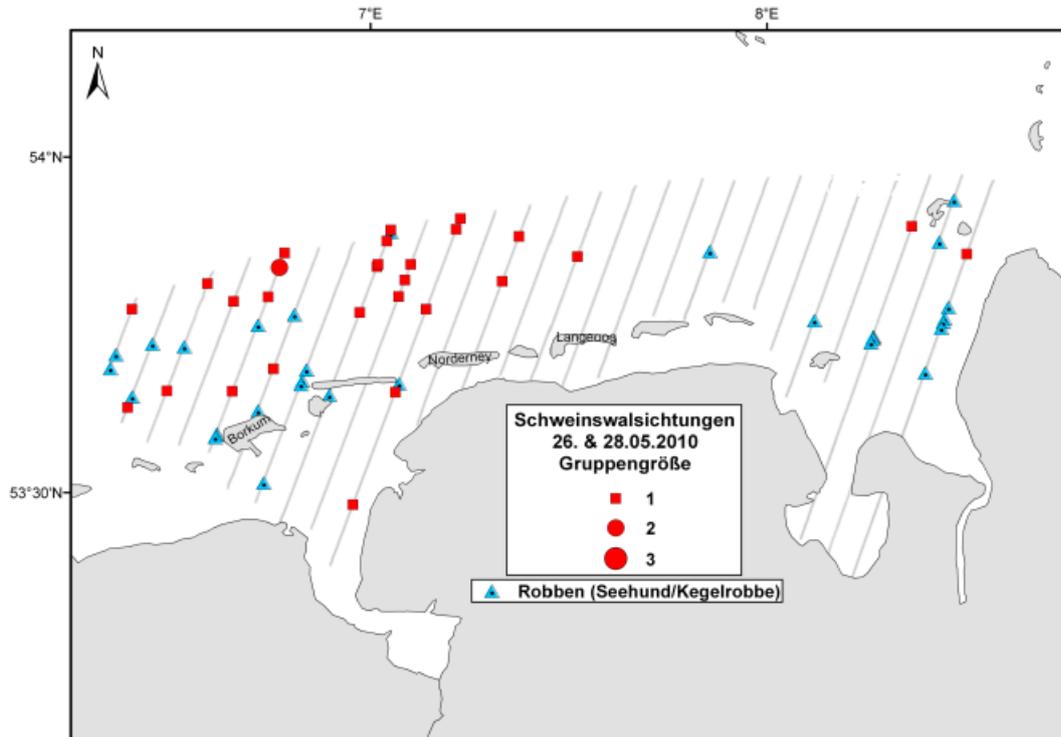


Figure 14. Harbour porpoise sightings with respective group sizes in May 2010. The flown transects are shown as grey lines. Blue triangles also show seals (total 55 animals).

The IUCN cites the most significant threat to harbour porpoises in most areas as incidental bycatch in fishing gear, primarily from gill and trammel nets (although entanglement with creel lines is possible) with estimates of 5,591 porpoises taken annually as bycatch by Danish gill nets in the North Sea between 1987 and 2001 (IUCN 2007c). Harbour porpoise are not always able to detect the nylon mesh of the nets making the risk of entanglement high. As with seal species, there are no interactions reported by fishermen, regulatory authorities or any other stakeholders between harbour porpoises and the fishery.

2.4.4.3 Birds

The fishery may interact with birds either directly or indirectly. The National Park Law specifically lists the oystercatcher (*Haematopus ostraleus*) and common eider ducks (*Somateria mollissima*). The former could be the bycatch of birds in the fishery or the entanglement of birds in collector ropes or nets; neither is reported to occur and both are considered highly unlikely. Disturbance of eider ducks feeding on culture plots has been an issue in the past but presently it is not permitted to scare away them from the plots. Oystercatchers are not disturbed by mussel culture activities since they feed at low tide and fishing activities occur during their absence over high tides.

The remaining potential impact of the fishery on birds is an indirect effect of the fishery through possible influence of their feeding habitats or their food supply. During the 1990s the mussel sector was criticised for the unregulated removal of mussels and thus depleting the food available for shellfish-eating birds (Herlyn 2000). This resulted in birds having to rely on alternative food sources like cockles or worms or migrate from the Wadden Sea to avoid starvation (Ens 2009). These events triggered management measures in the Lower Saxony mussel fishery. Such measures have limited the impacts of the fishery on the intertidal mussel beds that form the main food source for oystercatchers and are an important food source for eider ducks and knot.

Annual surveys have shown the populations of migratory and over-wintering oystercatcher and eider ducks in the Wadden Sea have decreased since the 1990s, including within the Lower Saxony (Figure 15). It is assumed that the decrease was induced by low shellfish stocks in the early 1990s and the reduction in available mussels. However, since the annual mussel surveys undertaken show the biomass and spatial coverage of mussels to be at a ten-year high with biomass some 6x above the minimum set requirements, the reasons behind the declines in both migratory and breeding populations are not apparent (Koffijberg 2016; Blew 2016). In parts of the Lower Saxony Wadden Sea, intertidal mussel beds have been either replaced or heavily encroached upon by reefs of the invasive Pacific oyster (*Crassostrea gigas*). Mussels persist within these reefs and remain available as a food source for oystercatchers. It has also been concluded that the oystercatchers have developed techniques to open smaller oysters and can feed on them at sustainable rates (Markert 2013; Troost 2010); the oyster beds thus form an important new food source for this species. Eider ducks on the other hand cannot feed on oysters and the structure of the oyster beds prevents them from feeding effectively on the mussels contained therein.

Concerning the effects of mussel fishing on the food supply of eider ducks, an important factor in the evaluation of impacts is that eider ducks are diving birds and therefore also feed on subtidal mussel beds including the bottom-culture plots. Thus when seed mussels are fished and relocated to culture plots, they can still be a food source for these birds. Given that the naturally-occurring, subtidal seed mussel beds are often ephemeral with a high likelihood of disappearing during autumn / winter, by moving them to the culture plots it can be argued that the fishery could be extending their availability as a food source for the ducks. It is commonly known that eider ducks do feed on the culture plots. Van Stralen (2008) evaluated the impact of mussel culture on food availability for eider ducks in the Dutch Wadden Sea. It was concluded that the overall food supply was not reduced since the removals were compensated by the extra growth and reduced mortality of mussels on the culture plots. Bult (2004) concluded that mussel culture in the Netherlands resulted on average in a 15% increase of the mussel stock in the Dutch Wadden Sea. Fishing for wild consumption mussels in subtidal habitats rarely occurs and only then on a small scale. The last time any was undertaken was in 2005 when only 160 tonnes were harvested in Lower Saxony.

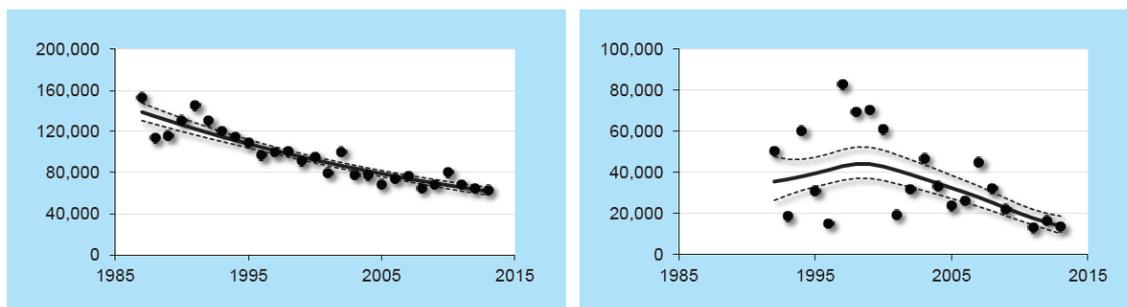


Figure 15. Mean monthly occurrence trends for migratory and wintering oystercatcher (left) and common eider duck (right) in the Lower Saxony Wadden Sea 1987 – 2014. Source: Blew (2016).

2.4.5 Habitats

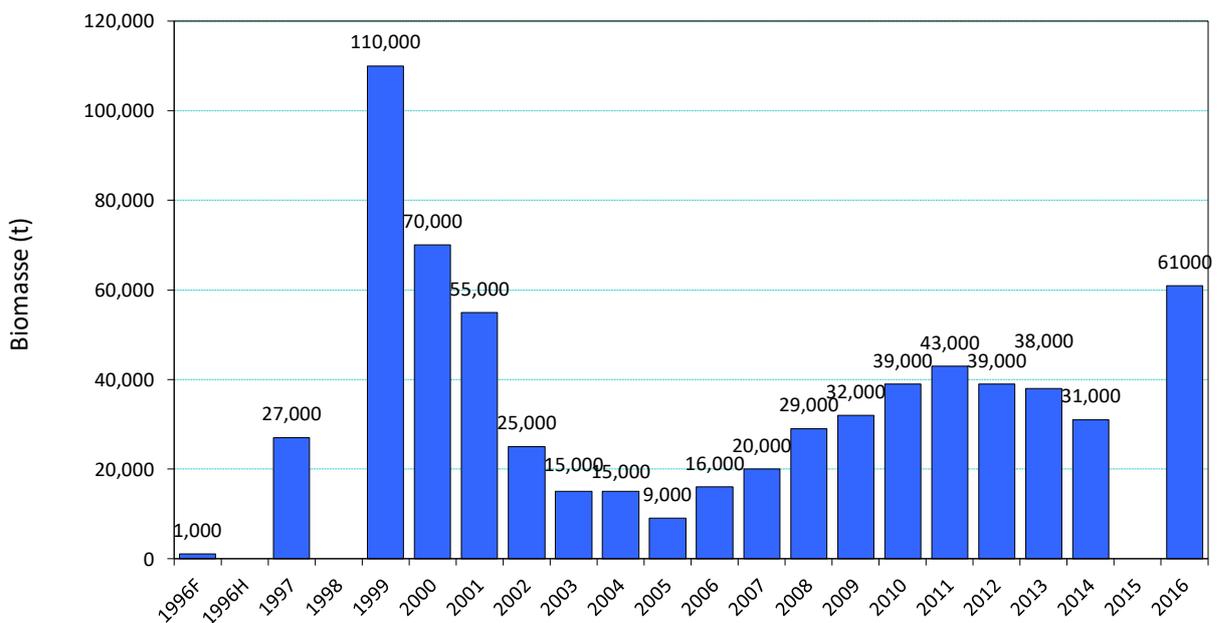
Mussel culture, as practiced in Lower Saxony, involves several activities that could impact on habitats. The assessment team has distinguished the following three impacts: (i) the impact of the seed fishery on bottom habitats (ii) the impact of the spat collection using SMC on bottom habitats and (iii) the impact of the bottom-culture plots on bottom habitats.

The Wadden Sea ecosystem is well studied with numerous surveys and research projects having been undertaken to determine the main habitats types present and their functional processes. The greatest generalisation of these is to split them into intertidal and subtidal habitats. Using the

standard Natura2000 habitat classifications, the intertidal can be classified as ‘H1140 Mudflats and sandflats not covered by seawater at low tide’ whilst the subtidal contains areas of habitat defined as ‘H1110 Sandbanks which are slightly covered by sea water all the time’. Each of these broad habitat types has been designated by Germany under the Habitats Directive. Within these broadscale classifications, mussel beds are considered as biologically distinctive features within habitat type H1140.

As part of the Trilateral Wadden Sea Monitoring (TMAP), the state government conducts a comprehensive annual aerial survey during spring to map the intertidal mussel beds. A proportion (the 29 closed areas) is then ground-truthed before the total spatial area and biomass of blue mussels is calculated. The total biomass and the area of mussel beds are calculated every year and must remain above the 1994 threshold levels of 10,000 t and 1,000 ha. Presently (following the 2016 surveys) the levels are estimated to be ~6x this for biomass (a ten-year high) and ~2x this figure for area (Figure 16 and Figure 17). The pockets of mussels within Pacific oyster beds are not included in this assessment of total mussel biomass, thereby making it quite precautionary in its approach. In general the Lower Saxony Wadden Sea is well mapped and the locations of important habitats, particularly intertidal mussel beds, seagrass beds and historical⁴ *Sabellaria* reefs are known (Figure 18).

Development of the eulittoral mussel population: biomass



Quelle: Dr. Millat, Nationalparkverwaltung 2017

Figure 16. Variations in the intertidal mussel biomass (t) determined in the Lower Saxony Wadden Sea since 1996. Source: Dr. Millat, Nationalparkverwaltung 2017.

⁴ The last evidence of living *Sabellaria* reefs date from the 1990s; since then, no reefs have been detected (Vorberg et al., 2017).

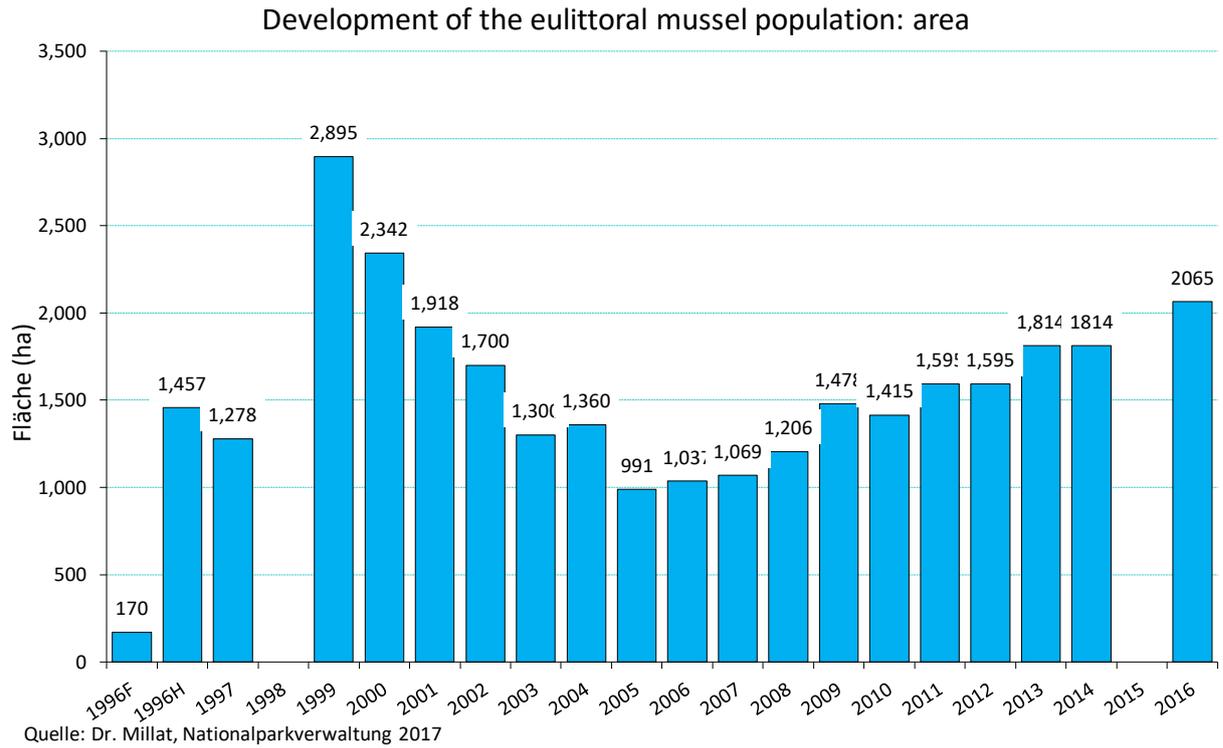


Figure 17. Variations in the intertidal mussel spatial cover (ha.) determined in the Lower Saxony Wadden Sea since 1996. Source: Dr. Millat, Nationalparkverwaltung 2017.

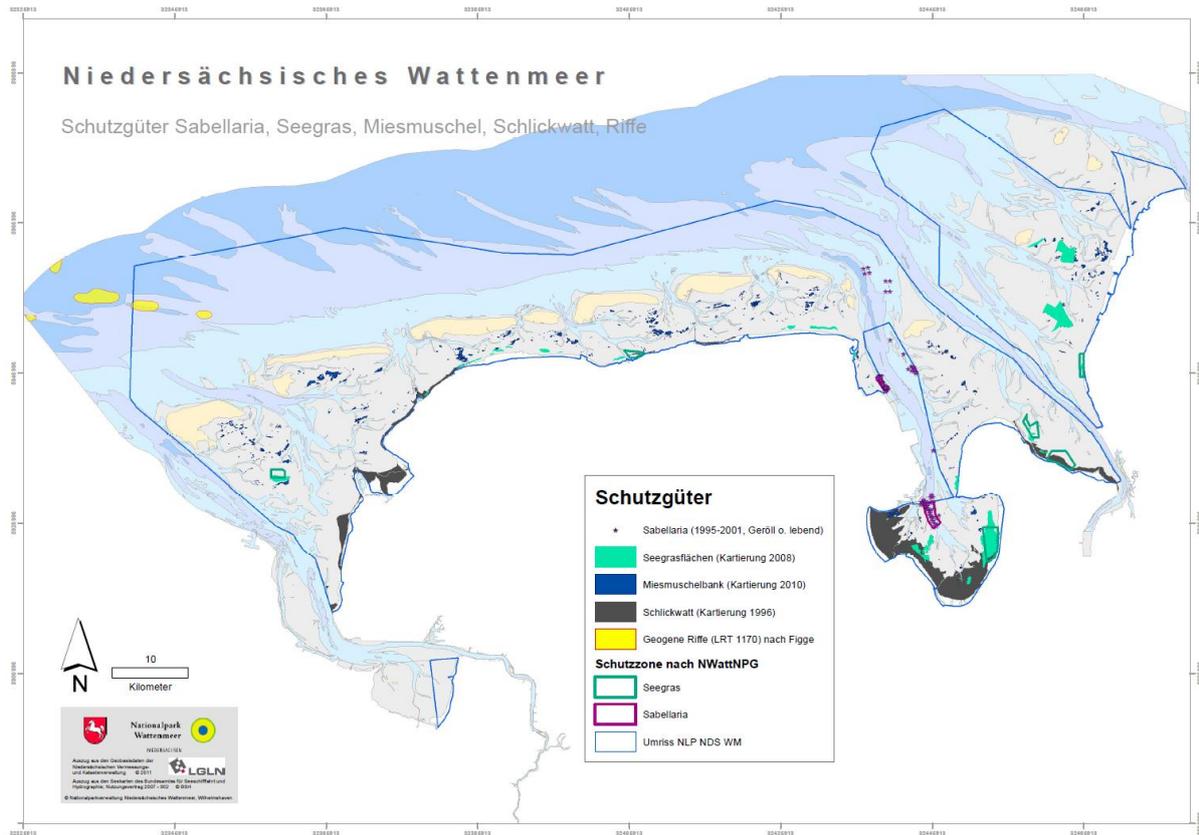


Figure 18. Locations of mussel beds (dark blue), seagrass (green) and Sabellaria (purple) in the intertidal areas of the Lower Saxony Wadden Sea. Source: Nationalpark Wattenmeer.

Subtidal habitats are less well surveyed and the previous MSC assessment required an action plan to map stable subtidal mussel beds to improve information on their occurrence and distribution. Surveys were undertaken and failed to detect any stable subtidal mussel beds in the areas in which the fishery operates (Figure 19) (Stralen 2015; Stralen 2016); this work is continuing to monitor the beds in 2018. Further assessment of the sublittoral habitats, including mussel beds, is planned during the present 2017-2021 Management Plan by the NLWKN (Niedersächsische Landesbetrieb für Water Management, Coastal and Nature Conservation) Coastal Research Centre in cooperation with the National Park Administration.



Figure 19. Stability map for subtidal mussel beds in the Lower Saxony Wadden Sea. Source: van Stralen (2016). Colours in the key denote different categories of stability, the grey colour being ‘category 1’, which is most unstable through to the red colour, which is ‘category 5’, most stable.

2.4.5.1 Seed mussel fishery

In Lower Saxony the mussel (seed) fishery is regulated by government regulations and a national management plan: the “Bewirtschaftungsplan Miesmuschelfisherei”. In the intertidal, there are 102 ‘mussel locations’ which may be comprised of more than one mussel bed. The 102 identified mussel locations comprise those sites where, according to past experience, accumulations of mussels have a good chance to form stable mussel beds. A mussel location may comprise more than one mussel bed. Of the 102 intertidal mussel locations recorded, 29 are off limits to the fishery. Of these locations, 12 are protected by the National Park Authority, 12 are protected by the fishery Management Plan and a further five are voluntarily avoided by the fishery for the purposes of monitoring. Of the remaining 73 intertidal locations potentially open to seed mussel fishing (around the edges of the beds if / when spatfall occurs), only one or two are likely to be fished in any given year with none having been fished since 2009; this results in a very infrequent and small spatial overlap of the fishery with any intertidal mussel beds irrespective of their stability. Furthermore, the mussel fishery regulation only allows fishing of mussels of up to 4 cm shell length (with 25% in weight of bigger mussels permitted). Thus older mussel beds are excluded from fishing and have the potential to stabilise. Since the arrival of Pacific oysters (*Crassostrea gigas*) in the Wadden Sea, any fishing of affected stable intertidal mussel beds is further prevented owing to the high sorting-effort required to remove the oysters from the catch, the potential to damage the fishing equipment, and the lower percentage of mussels harvested.

No spat / seed collection or bottom-culture activities are allowed over or near to sensitive habitats such as seagrass beds or *Sabellaria* reefs. The Wadden Sea Plan (<http://www.waddensea-secretariat.org/management/wadden-sea-plan-2010>) outlines measures to allow for the natural development and distribution of biogenic features such as mussel beds, *Sabellaria* reefs and seagrass beds. It states that mussel fisheries will work with national competent authorities to improve their existing practices and minimise their overall impacts. Under its Management Plan, the mussel fishery is issued permits which outline where and when it can carry out its operations; these areas are determined by the State Fisheries Directorate in consultation (where necessary) with the

National Park Authority. To this end, multiple areas of the Wadden Sea are designated as closed to mussel fishing (Figure 20 and Figure 21).

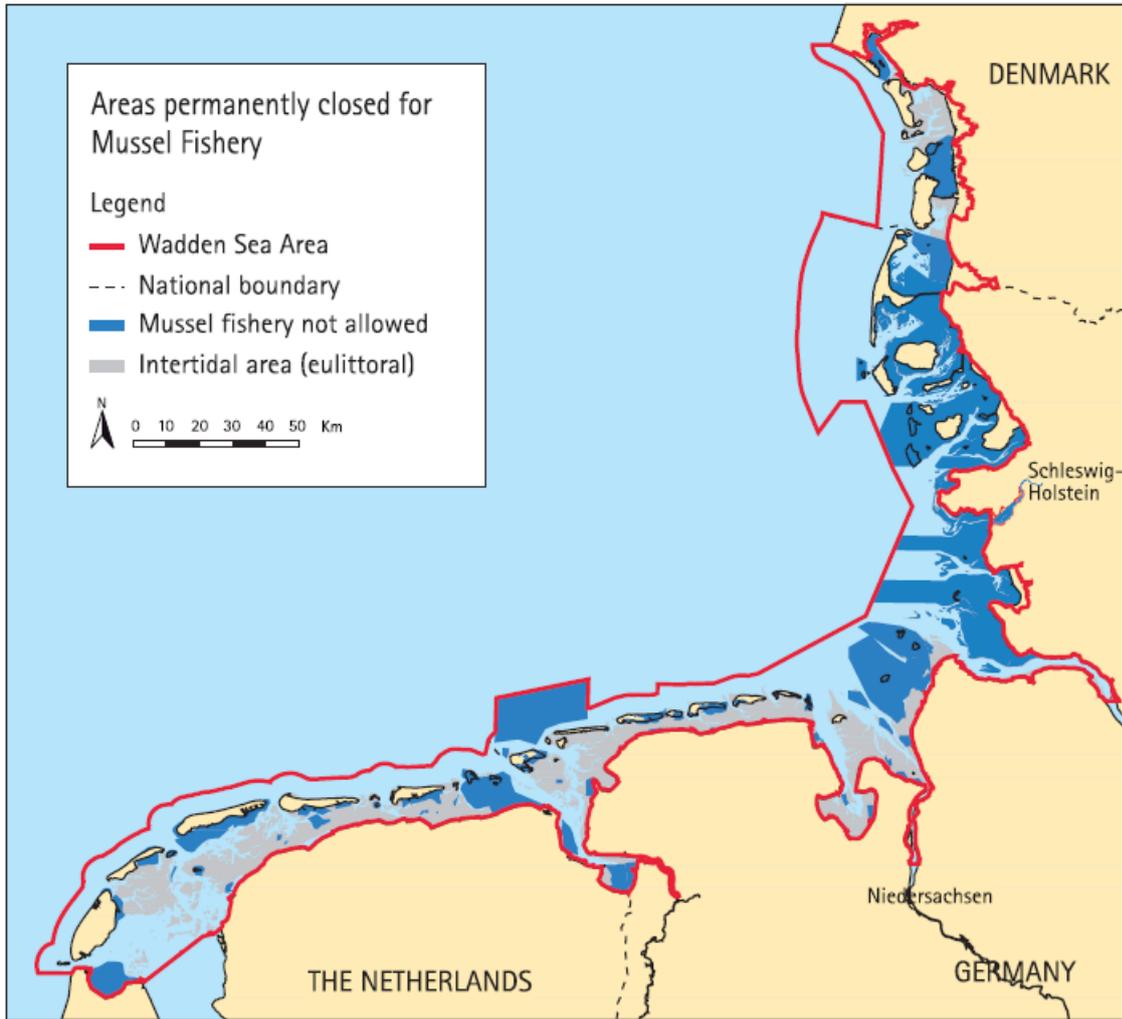


Figure 20. Areas in the Wadden Sea region permanently closed for mussel fishery in 2008. Source: Wolff et al (2010).

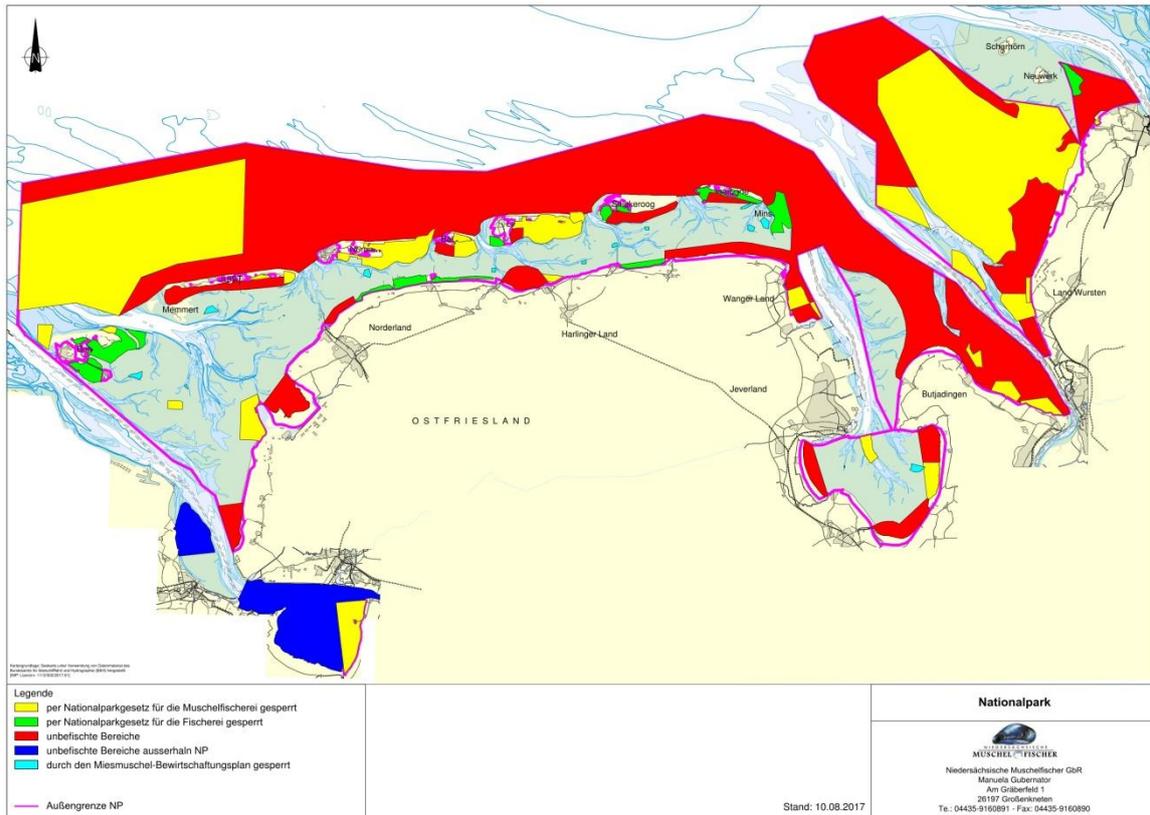


Figure 21. Management areas in the Lower Saxony Wadden Sea showing the areas permanently closed for mussel fishing. Yellow = no mussel fishing by order of the National Park; green = no fishing by order of the National Park; red = unfished by the mussel fishery but fishing is allowed; blue = unfished areas outside the National Park but fishing is allowed; light blue = closed to mussel fishing (the closed stable mussel areas of the management plan) Source: NMGbR.

To put Figure 21 into context, the total area not fished by the mussel fishery amounts to ~231,350 ha, some 66% of the total National Park area. Seed mussels are rarely fished from the remaining areas in the intertidal (see above and Figure 18) and then forming only a very small fraction of the total area potentially open to seed mussel fishing.

In the subtidal, there are closed areas (as directed in National Park law) and also unused areas (due to requirements from other marine industries). The fishery’s activities must be given permission before they can commence, and only when all relevant authorities have been consulted. Those subtidal beds that are fished for seed mussel are recognised by the fishery and the regulatory authorities as ephemeral and would quickly disappear as a result of strong currents and/or winter storms if they were not harvested. This is a recognised phenomenon following mussel spatfall e.g. Morecambe Bay in the UK. It is these harvested seed mussels that are then laid on the licensed bottom-culture plots. The harvest of wild mussels for consumption is a rare event, the last ones harvested in Lower Saxony was in 2005, where only 160 tonnes were taken (Figure 22). This type of harvest is outside the scope of this certification and is not considered eligible to bear the MSC ecolabel.

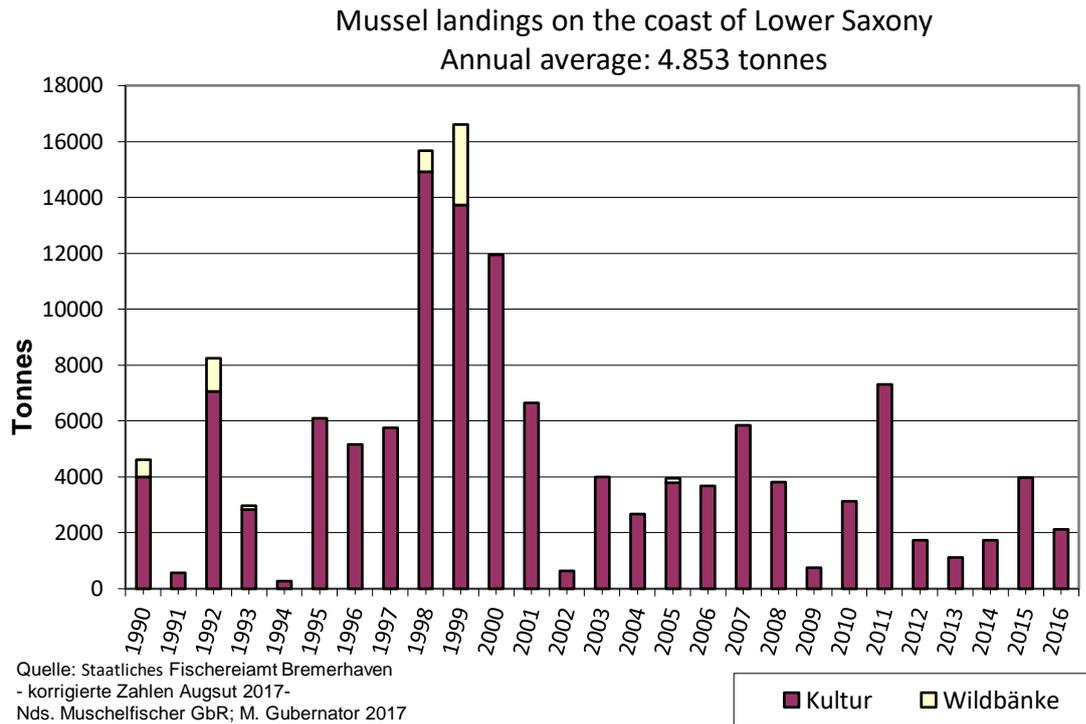


Figure 22. Quantities of cultured and wild mussels harvested in Lower Saxony, 1990-2016.

2.4.5.2 Suspended mussel culture

Suspended mussel culture (SMC) on ropes or nets could have impacts on the habitats beneath the installations and those surrounding them. The physical footprint from the weights and anchors used to fix the installations in place is considered negligible on the scale of the Lower Saxony Wadden Sea and is not considered further. The rain of faeces and pseudo-faeces from suspended mussel culture (SMC) crops could lead to organic enrichment of the sediments below mussel farms where there is little water flow. This can create organic enrichment of the benthos leading to anaerobic and acidic conditions which result in elevated levels of sulphides and ammonium (Tenore 1985). These conditions can cause declines in the abundance of large, deep-burrowing species of molluscs, echinoderms, crustaceans and polychaetes, and a shift in food webs away from predominantly suspension-feeding organisms in favour of deposit-feeding faunas. The severity of benthic impacts, however, is not consistent as studies have revealed effects varying from severe impacts on all examined parameters to low impacts on only few of the parameters (Hatcher 1994) whilst other studies did not detect any significant effects (Crawford 2003).

In the Netherlands the fast expansion of SMC prompted a range of impact studies under the framework of the PRODUS project (Project Sustainable Shellfish Fishery). Kamermans (2008) described the ecosystem impacts of SMC and investigated the effects of the deposition of organic material on the sediment and fauna beneath spat collectors (Kamermans 2010). During a different field study underneath a mussel rope-culture in Mattenhaven (Oosterschelde), no changes between the seafloor underneath the rope-culture and the reference area were detected (Seip 2014). The studies determined that as SMC are located in areas with relatively strong currents, this resulted in no accumulation of organic material (Kamermans 2014).

Subsequent to the initial MSC assessment of the Lower Saxony Mussel Fishery, external advice was sought on understanding the potential impacts of SMC on the seafloor and its associated benthic species immediately beneath the structures (Manzenreider et al. 2014). Following this advice, a literature review was completed on the total 'free' sulphide (S₂⁻) in surficial (0 – 2 cm) sediments on

the seabeds under the rope-growing sites on installation areas with similar morphological and hydrodynamic characteristics to the UoA (Holstein 2015). The review specifically compared suspended mussel culture (SMC) installations in the Netherlands with those in the Lower Saxony 'Southern Wanger-Reede'. The review determined that, the research in the western Wadden Sea and Oosterschelde showed that effects due to deposition of pseudo-faeces in the vicinity of SMC on the seafloor and benthic species cannot be detected. Hydrodynamic conditions around the Lower Saxony SMC installations are very similar to those included in the Netherlands studies (Holstein 2015).

2.4.5.3 Bottom-culture plots

Bottom-culture of mussels is undertaken only in permitted intertidal and subtidal areas over a very limited portion of the Lower Saxony Wadden Sea. The total area permitted for mussel bottom-culture is capped at 1,300 ha which accounts for <0.4% of the total National Park area (~345,800 ha). If a fisherman wishes to start a new bottom-culture plot, he must accordingly give up an equivalent area from his existing plots as the total area permitted to be fished is fixed within the coastal area of Lower Saxony. To start a new plot a permit must be applied for which there is a procedure to follow:

- Other mussel and shrimp fishermen are consulted.
- The National Park Authority and the Fisheries Directorate assess the benthic habitats to be affected and survey them if necessary. The new plot must not be located over or near to sensitive habitats such as seagrass beds or *Sabellaria* reefs.
- The application is printed in the "Niedersächsisches Ministerialblatt" (another legal requirement).
- The Fishery Directorate has procedures for producing the maps of new and old plots, changes in areas etc. and are available on charts from the Federal Maritime and Hydrographic Agency of Germany.

2.4.5.4 Overall Management

The conservation objectives of the National Park are outlined in the National Park Law (NWattNPG), specifically in Paragraph 2 which states that the natural processes in habitats should persist and that the biodiversity of animal and plant species in the territory of the National Park should be preserved. Paragraph 9 of the NWattNPG states that mussel fisheries are only permitted if they follow a management plan that takes into account the protection directives of the national park. To this end, the present Mussel Fishery Management Plan in force (Bewirtschaftungsplan Miesmuschelfischerei Im Nationalpark "Niedersächsisches Wattenmeer" 2009-2013 – subsequently renewed for a further five years) states that it must observe the protective processes of the National Park and observe its conservation objectives as a designated Natura2000 site. The Management Plan states it aim is to achieve the *"effective and conflict-resolving combination of economic requirements and ecological goals. On the one hand, to ensure the livelihood of the mussel fisheries, sustainable exploitation of the mussel population will be made possible, and on the other, the development of mussel beds, including the specific communities, will be ensured."*

To date the fishery has observed all the nature conservation requirements surrounding its operations and there is no evidence that it has conducted any operations outside of its permit conditions. All vessel movements are monitored using VMS to ensure the fishery operates only within the designated areas.

2.4.6 Ecosystem

The ecosystem in the context of the present fishery assessment is defined as that of the Wadden Sea. Substantial research has been carried out on the Wadden Sea ecosystem by research institutes in Germany, Netherlands and Denmark. This existing information is adequate to identify and broadly understand the key elements of the ecosystem such as benthos, trophic structure and function, community composition, biodiversity and productivity and is summarised in periodical Wadden Sea Quality Status reports, the most recent being published online in [January 2018](#)⁵. In the Netherlands there is currently a project called the Wadden Sea Long-Term Ecosystem Research (WaLTER) which provides advice on fundamental monitoring of the Wadden Sea area and provides the access point to Wadden Sea data (<https://www.walterwaddenmonitor.org/en/>). The Wadden Sea Secretariat based in Willemshaven regularly publishes reports on the status of the Wadden Sea ecosystem and / or individual components (<http://www.waddensea-secretariat.org/>).

Within the Lower Saxony Wadden Sea mussel bottom-culture is limited to less than 0.4% of the total seabed area. Many other industries and stakeholders use the Lower Saxony Wadden Sea putting pressure on the ecosystem. Large port developments are in operation close to seed culture and harvesting areas and these have associated requirements for major capital and maintenance dredging operations. These dredging operations are recognised to be the cause of major problems as the increased suspended sediments increase turbidity and reduce light penetration, affecting primary production and seagrass beds and causing a general decline in the quality of estuaries (Wolff 2010). Sea water extracted for power station cooling will influence local water temperatures upon discharge. Furthermore, permit applications are presently underway to allow the discharge of concentrated saltwater into the area between Hooksiel and Jadeweser Port close to SMC installations whilst cables from proposed wind farms may come into conflict with bottom-culture plots and collectors, as well as the naturally present mussel beds. The many different uses and pressures on the Wadden Sea ecosystem highlight the importance of continual monitoring and research to understand the consequences of the various activities. Consequently, data are available on many of the ecological receptors that could interact with the mussel fishery.

The role of mussels in the ecosystem is described by Dankers and Zuidema (1995) not least their role in water filtration and provision of an important food source for bird species. Bycatch species like crabs, starfish and Pacific oysters have also been studied (Beadman 2004; Morris 2007; MarLiN 2017; Herbert 2016; Markert 2013; Inglis 2003; Klein Breteler 1976; Dolmer 1998). Extensive work has also been done on ETP species like seals, harbour porpoises and marine birds (Markert 2013; Koffijberg 2016; Blew 2016; Hammond 2006; Hammond 2017; CWSS 2003).

The impacts that mussel culture may have on the environment have been studied in many places in the world where mussel culture takes place and published in scientific journals and books. From the research on the impacts of mussel seed fishing, SMC and culture (Ens 2004; Kaiser 1998; Brink 2009; Kamermans 2010; Fey 2008; Holstein 2015; Seip 2014; Craeymeersch 2013; Jacobs 2016; Hatcher 1994; Crawford 2003; Beadman 2004; Wiersinga 2009; Caldow 2003; Prins 1996; Ysebaert 2009; Keeley 2009; Rocha 2009; Inglis 2003; Christensen 2003; Dankers 1995) sufficient information is available on the impacts of the fishery on these components to allow some of the main consequences for the ecosystem to be inferred. Effects of the dredging for seed mussels have been studied in detail in the Netherlands (Ens 2004; Fey 2008; Fey 2007) whilst the persistence of mussel beds in subtidal environments in the Lower Saxony has also been recently investigated (Stralen 2015; Stralen 2016). The potential ecosystem impacts considered in the present assessment include:

⁵ <http://qsr.waddensea-worldheritage.org/>

- Trophic functioning;
- Benthic community diversity;
- Influence over species population dynamics;
- Pelagic interactions e.g. plankton composition;
- Sediment re-suspension from dredging;
- Increase in sedimentation from SMC installations;
- Effect on non-native distributions;
- Nutrient-cycling.

The management measures in place to protect the Wadden Sea Ecosystem are largely the same as those described above in Section 2.4.5 and ensure the fishery has a minimal impact on the ecosystem. These measures and licensing and approval processes (as outlined within the Fishery Management Plan) together with the conservation objectives for the Natura 2000 areas within the Lower Saxony Wadden Sea, form a strategy to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.

2.5 Principle Three: Management System Background

2.5.1 European legislation

As a member State of the European Union, Germany's fisheries are managed through the Common Fisheries Policy (CFP) of the EU. The CFP was first introduced in the 1970s and went through successive updates, the most recent of which took effect on 1 January 2014 (1380/2013). The CFP aims to ensure that fishing and aquaculture are environmentally, economically and socially sustainable and that they provide a source of healthy food for EU citizens. Its goal is to foster a dynamic fishing industry and ensure a fair standard of living for fishing communities. This includes commitments to:

- Fish stocks at maximum sustainable yield (MSY);
- Greater regionalisation (through increased roles for Regional Advisory Councils, including the North Sea Advisory Council (North Sea AC));
- An ecosystem approach to fisheries by ensuring fishing capacity is in line with fishing opportunities and moving more stocks under Long Term Management Plans;
- An obligation to land the fish that is caught (discard ban).

The CFP includes requirements for fishing vessels longer than 12 metres to report their logbook data, including catch data, electronically and to have an approved satellite-based vessel monitoring system (VMS) on board. Fishing vessels longer than 18 metres are also required to have an automatic identification system (AIS) on board. From 1 May 2014, AIS must be on board all vessels over 15 metres in length.

Implementation of the CFP at a national level is left to the individual Member States. National fisheries administrations are responsible for a range of management and regulatory duties, including management of fleet activity, national quota, monitoring and control of all fisheries occurring within national jurisdiction, collection, collation and transmitting of key fishery data, and undertaking at least a base range of scientific monitoring and development work.

Mussels are a non-quota species under the CFP. Therefore, EU technical regulations and yearly regulations establishing TACs do not apply to the mussel culture and fishery. On the other hand, other EU regulations dealing with nature protection, production areas and water quality do apply. There are a number of EU Directives regulating different environmental aspects:

The **Habitats Directive** (Council Directive 92/43/EEC) aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging developments.

The purpose of the **Water Framework Directive** (Directive 2000/60/EC) is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater. It will ensure that all aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands meet 'good status' by 2015.

The aim of the **Shellfish Directive** (Directive 2006/113/EC) is to protect or improve shellfish waters in order to support shellfish life and growth. It is designed to protect the aquatic habitat of bivalve and gastropod molluscs, which include oysters, mussels, cockles, scallops and clams. The Directive requires Member States to designate waters that need protection in order to support shellfish life

and growth. The Directive sets physical, chemical and microbiological requirements that designated shellfish waters must either comply with or endeavour to improve.

The **Maritime Strategy Framework** (Directive 2008/56/EC) outlines a transparent, legislative framework for an ecosystem-based approach to the management of human activities which supports the sustainable use of marine goods and services. The overarching goal of the Directive is to achieve 'Good Environmental Status' by 2020 across Europe's marine environment.

The **Birds Directive** (Council Directive 2009/147/EC) aims to protect all of the 500 wild bird species naturally occurring in the European Union. Urban sprawl and transport networks have fragmented and reduced their habitats, intensive agriculture, forestry, fisheries and the use of pesticides have diminished their food supplies, and hunting needed to be regulated in order not to damage populations.

Natura 2000 is a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types which are protected in their own right; established under the Habitats and Birds Directives. It stretches across all 28 EU countries, both on land and at sea. The aim of the network is to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the Birds Directive and the Habitats Directive.

2.5.2 National legislation

A number of Federal and State Laws and Regulations govern the fishery in German territorial waters. The most important are presented in the following:

The **Gesetz zur Regelung der Seefischerei und zur Durchführung des Fischereirechts der Europäischen Union** (Sea Fisheries Law, 1984) is the basis of commercial fishing at sea, particularly in the German EEZ of North Sea and Baltic. In addition, it regulates tasks and responsibilities for the official fisheries monitoring and control.

The **Seefischereiverordnung** (Sea Fisheries Regulation, 1989) contains details and implementing regulations for the Sea Fisheries Law.

The **Bundeswasserstraßengesetz** (Federal Waterway Act, 1968) covers maritime waterways and inland waters and regulates traffic, maintenance, extension and reconstruction, security etc.

The **Gesetz über Naturschutz und Landschaftspflege** (Federal Nature Conservation Law, 2009) provides the legal basis for the protection of nature and landscape and for the actions of nature protection and landscape conservation in Germany.

The **Niedersächsisches Fischereigesetz** (Lower Saxony Fisheries Law, 1978) regulates the fishery in Lower Saxony coastal and inland waters, the organisation of fishers, the protection and conservation of fish stocks and ecosystem and monitoring and control of the fishery.

The **Niedersächsische Küstentischereiordnung** (Lower Saxony Coastal Fisheries Regulation, 2006) contains details and implements regulations for the Lower Saxony Fisheries Law.

The **Niedersächsisches Naturschutzgesetz** (Lower Saxony Nature Conservation Law, 1994) has the same objectives as the Federal Nature Conservation Law but on state level.

The **Gesetz über den Nationalpark "Niedersächsisches Wattenmeer"** (Law on the National Park "Lower Saxon Wadden Sea", 2001) constitutes the basis for the protection of the National Park. It aims at the preservation, conservation and protection of the characteristic nature and scenery of the

Wadden Sea in front of the Lower Saxon coast, of the natural processes in these habitats and of the biodiversity of animal and plant species in the area of the National Park.

The **Bewirtschaftungsplan Miesmuschelfischerei im Nationalpark “Niedersächsisches Wattenmeer 2009-2013”** (Management Plan Blue Mussel Fishery in the National Park “Lower Saxony Wadden Sea” 2009-2013) of NMELV and NMUEBK regulates fishery and culture of blue mussels in the National Park through a number of provisions such as the limitation of the activities to only few areas. The aim is to enable the unaffected development of the biotope “mussel bed”.

2.5.3 Stakeholders in the fishery

The four mussel fishing companies and their association, the Niedersächsische Muschelfischer GbR (Lower Saxony Mussel Fisher Civil Law Partnership), are of course the principle parties interested in this fishery.

Another stakeholder using the area is the shrimp fishery, operating in the same areas as the mussel fishery/culture. There are however no signs of conflicts; there is even a good cooperation because shrimp fishers report if they detect mussel beds. The only interference exists on the culture plots, from which the shrimp fishery is excluded if mussels are present. Shrimp fishers are therefore contacted by the Fisheries Office before issuing a licence for a culture plot.

Key stakeholders also include the representatives from the State environmental and National Park administration, as well as representatives of environmental/nature conservation non-governmental organisations (NGOs), such as WWF Germany, NABU Lower Saxony etc. (see 3.4.1 for details of stakeholder consultations and Appendix 6 Stakeholders for a full list of stakeholders contacted in the fishery). Whilst the environmental administration is part of the fishery’s management system and has agreed to its procedures and processes for management, the NGOs are not, but for many years have stated their case that they should be. The NGOs, particularly WWF, have some fundamental criticisms. The main point is that the management plan has been extended without conducting a Strategic Environmental Assessment (SEA). According to the competent Ministries (Food, Environment), at the end of the five-year term of a management plan the Ministries conduct a pre-assessment to identify probable significant environmental impacts of the fishery because the law stipulates the SEA only if this is the case. Up to now this was not necessary. Beyond that, the NGOs have the strong interest to further reduce the areas open for the fishery. Presently, these disagreements block the adoption of the new Management Plan (see Section 2.5.4).

2.5.4 Management and consultation

The basis for the management of the mussel fishery and culture are the Lower Saxony Fisheries Law (§ 17), the Lower Saxony Coastal Fisheries Regulation (§ 8), the Law on the National Park “Lower Saxony Wadden Sea” (§ 9) and the Management Plan Blue Mussel Fishery in the National Park “Lower Saxon Wadden Sea” 2009-2013 all aiming at an ecologically and economically sustainable exploitation of the mussel resources. The most important measures are listed below:

Fisheries Law:

It regulates the legal requirements for the permission of the mussel fishery in Lower Saxony waters and the implementation of mussel cultures (bottom and rope cultures).

Coastal Fisheries Regulation

- (i) The total area of culture plots in the coastal waters is limited to 1,300 ha;
- (ii) The number of vessels is limited to five;

- (iii) The fishery for wild stocks of intertidal blue mussels is closed from 1 March to 30 September;
- (iv) Blue mussels from wild mussel beds can only be fished if the shell length is at least 5 cm. In a landing smaller mussels are allowed up to 10% of the total landing weight;
- (v) Blue mussels intended to be used as seed mussels for culture plots may only be fished if the shell length does not exceed 4 cm. However, if spread on a culture plot, 25% of the total weight may be mussels larger than 4 cm;
- (vi) Mussels fished in Lower Saxony for the stocking of culture plots may only be used in Lower Saxony
- (vii) Mussels caught outside the coastal waters of Lower Saxony may be deposited on culture plots in Lower Saxony only with the permission of the Fisheries Office.

National Park Law⁶:

It regulates the fishery in the restricted zone (zone 1). In the other zones (intermediate zone, recreation zone) the fishery is allowed without any restriction. The closed zones add up to about 25% of the National Park surface.

It stipulates that the seed mussel fishery is only permitted under a management plan that is adopted by the competent Fisheries Authority in cooperation with the competent Nature Conservation Authority and shall be extended in accordance with the protective purpose of the law after five years;

The consumption mussel fishery on wild mussel beds is only permitted in the subtidal.

Management Plan 2009-2013 (extended for five years):

- (i) If the mussel stock falls below the values of 1,000 ha of intertidal mussel beds (determined by annual aerial surveys) and of 10,000 tonnes of mussel biomass by more than 10% for two consecutive years, the Staatliche Fischereiamt (SFA) will stop the issue of permits for the seed mussel fishery in the intertidal zone until at least one of the minimum values is reached again;
- (ii) 29 of the 102 intertidal mussel beds with a stable position are closed for the seed mussel fishery;
- (iii) Seed collectors can be used but require the approval of SFA.

New Management Plan

The decision to extend the validity of the Management Plan 2009-2013 for another term of five years has been taken because there were no compelling reasons for substantive changes; the blue mussel stock has been stable for the last 15 years and is far above the limit values. It was however not planned to use the extension period fully because Environmental and Fisheries Administration had the intention to further strengthen the precautionary approach in the seed mussel fishery. The first draft of the new plan was presented in 2014, and the latest draft dates from November 2016. But to date the new Management Plan could not be finalised. This is due to the different perceptions of fishery and Administration on the one hand and the NGOs on the other. While the NGOs insist

⁶ See Figure 21) for the fishing areas.

that a SEA has to be conducted before the Management Plan is put into force, fishery and administration do not see the need for this. In addition, the NGOs demand to considerably increase the area that is closed for the mussel fishery. Since January 2017, the Lower Saxony mussel fishery and representatives of the NGOs have tried to reach an (out-of-court) agreement. A round table has been initialised by the PO that has already met six times - the last meeting took place January 2018 - but so far a consensus could not be reached. It is envisaged that the consultation process will continue.

The latest draft of the new Management Plan specifies the following important changes:

- (i) If the mussel stock falls below the minimum values (see above) the fishery is closed immediately (presently if this happens in two consecutive years) (increase of the precautionary approach);
- (ii) All vessels participating in the seed mussel fishery record their activities year-round with a Black Box installed on board. A map on the spatial distribution of the fishery, as well as an area calculation of the intertidal and sublittoral seed mussel fishery, has to be submitted to SFA for each calendar year until 28 February of the following year.
- (iii) As a voluntary precautionary measure for the duration of the new management plan, NM limits the deposition of mussels on such mussels that have naturally settled in a geographically limited area of the Wadden Sea.

The Fishery already applies these three conditions although the plan has never been formally approved.

Self-management of the fishery

In addition to the voluntary application of the restrictive conditions from the new Management Plan (not in force), and in order to diminish the pressure on the mussel stock, the fishers have fixed additional standards within the scope of their association that are binding for all members:

- (i) Allocation key for seed mussels and culture plots. Each fishing company has a fixed percentage of the seed mussel catch and of the culture plot surface.
- (ii) Large areas that are officially open to the fishery are not used, e.g. no fishing close to tidal flats around islands, no fishing of too small mussel beds, abandoning the fishery on mussel beds that are potentially stable. Effectively, more than 66 % of the National Park area is not used by the mussel fishery, regardless of the legal regulations. In fact, annually at most 2% of the total National Park area is used by the fishery including seed mussel fishery and culture plots.

3 Evaluation Procedure

3.1 Harmonised Fishery Assessment

A review of other MSC overlapping fisheries was completed prior to announcing the fishery. The team looked at other mussel fisheries certified and in assessment in the Wadden Sea (Table 6). Since Principle 1 was not scored for this fishery (see section 2.3) harmonisation of P1 does not apply here.

In relation to Principle 2, since the Wadden Sea is the same ecosystem and mussel harvesting and husbandry techniques are broadly similar, similar scores might be expected. There are, however, differences between fisheries (e.g. regulatory requirements, differences in gears etc.) which mean that strict harmonisation is not appropriate. The team, however, reviewed the scoring of Principle 2 as relevant, and to ensure that any differences in outcome between the fisheries can be explained by genuine differences in the regulation or operation of the fishery (Table 6).

In relation to Principle 3, it is clear that the management framework for the Dutch fisheries is different, since they are in a different jurisdiction. Likewise, since fishery-specific management of mussel fisheries in Germany is at state rather than federal level, the management jurisdictions and regulations for this fishery are different from those in Schleswig Holstein– the National Parks are likewise different. The overarching European management framework is however the same for the Dutch and Schleswig-Holstein fishery. Harmonisation for those elements were therefore required for Principle 3. Difference in scoring is attributed to differences at the fishery-specific level.

Table 6. Wadden Sea mussel fisheries in the MSC programme which may overlap with this fishery.

Fishery name	Status	PCR reference	MSC Requirements assessed under	Overlapping element
Schleswig-Holstein mussel fishery	Certified – undergoing year 1 surveillance	MEC, 2016d (now assessed by MRAG Americas)	v2.0	Parts of P2 (same ecosystem, similar gear, same European legislation applicable but different fishery-specific regulations)
Mussel translocation into the Oosterschelde	Certified –	MEC, 2016b	v1.3 (version 2.0 process)	None (no translocation in this fishery)
Netherlands blue shell mussel fishery (bottom culture)	Certified -	MEC, 2016c	v1.3 (version 2.0 process)	Parts of P2 (same ecosystem, similar gear, same European legislation applicable but different fishery-specific regulations)

3.1.1 Cumulative impacts

The UoA includes the entire mussel fishery in this area, and does not interact with neighbouring fisheries (Schleswig-Holstein), and therefore there are no cumulative impacts to consider in relation to other mussel fisheries.

3.2 Previous assessments

The CAB formerly known as FCI completed the initial certification for this fishery in October 2013. The certification process has subsequently been undertaken by MacAlister Elliott & Partners Ltd (MEP), which changed to ME Certification Ltd (MEC), and is now known as Control Union Pesca (CU Pesca). The first surveillance audit for this fishery was carried out in Hooksiel, Germany in January 2015. This involved a review of updated catch information and an update on the work completed by the fishery against the conditions.

The 2nd Surveillance audit took place in Yerseke, Holland with the client representatives in October 2015. All assessment team members were present on the site visit: Kat Collinson (Team leader) and Ulf Löwenberg. Stakeholders were informed of the site visit on the 10th September and were invited to meet in person or submit comments in writing. No stakeholders contacted the team prior to the site visit taking place or provided submissions; however in January 2016, a stakeholder submission from WWF Germany was received following the publication of the year 2 audit report. The submission noted WWF's intent to comment at the year 3 surveillance. MEC acknowledged this via email.

The 3rd surveillance audit took place in Bremen, Germany in February 2017. Both members of the assessment team were present, as well as the client representatives. The client presented the team with detailed updated information on the fishery prior to the site visit and the team reviewed this during the audit with the client. WWF Germany were notified in advance of the year 3 surveillance audit. WWF Germany decided not to attend the site visit, but did submit comments via email (see [year 3 surveillance report](#)).

The 4th Year surveillance audit was announced on 26th September 2017 with stakeholder announcement sent out 29th September via email. The site visit was confirmed for the 16th November 2017 in Bremen and 17th November 2017 in Hooksiel and timed to follow a stakeholder meeting between the fishery representatives, NGOs and officials on the morning of the 16th. In conjunction with the 4th year audit the assessment team conducted the fishery site visit for this reassessment, which was announced via the MSC website on 26th September 2017 as well.

The fishery made progress on the original 10 conditions raised, and did not fall behind target during its initial certification cycle. Table 7 provides more detail into the status of the closed conditions.

Table 7. Summary of Previous Assessment Conditions

Condition number	Performance indicator (PI)	Status	Condition	Justification
1	2.4.1 (UoA 1)	Closed at year 4 surveillance	Although the impact on mussel beds is restricted by the closure of 29 mussel locations in the management plan the seed fishery in the intertidal could still have an impact on the development of stable mussel beds by removing seed mussels from the mussel locations that are open for the fishery. In the sub-tidal all known concentrations of mussels can be fished under the present management plan. Although it is acknowledged that a large part of the mussels will disappear by natural mortality or other causes it is not certain that this will be always the case. The fishery could prevent the development of stable banks in some areas. The client to develop and implement a comprehensive spatial management strategy with regard to the protection and development of stable mussel beds in both intertidal and sub-tidal.	<p>Throughout the initial certification cycle the client group made comprehensive efforts to produce maps of stable mussel bed areas in the fishery. There have been no changes in the data on sublittoral mussel beds, and another update is foreseen for 2018.</p> <p>Research on the impacts of mussel fishing on the development of stable subtidal mussel beds was carried out in the western Wadden Sea from 2006 to 2012 as part of the PRODUS project (Smaal et al., 2013). In unstable areas, the absence of fishing did not guarantee the survival of mussel beds: mussel spat beds disappeared at the same rate in both the open and the closed sections.</p> <p>The studies cited above demonstrate 1) that mussel fishing as it is currently done by this fishery does not impact on the development of stable mussels beds in the long term; this observation is also supported by the monitoring of stable intertidal mussel beds in Lower Saxony which shows that the number of beds has not declined despite some beds having been fished in previous years. The conclusion was therefore made that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.</p>
2	2.4.2 (UoA 1)	Closed at year 4 surveillance	Under the current management plan 29 mussel sites in the intertidal are closed for fishing. In the mussel sites that are open to the fishery a very limited fishery has taken place. Nevertheless the possible impact of the fishery on the development of stable mussel beds in the open parts of the intertidal should be taken into account in the management strategy. Currently all mussels that are located in the sub-tidal can be harvested (with a licence). This practice could	Based on the above evidence, that the fishery is unlikely to reduce habitat structure and function, the “if necessary” clause in the SI a is evoked, and a management strategy is no longer needed.

			<p>prevent the development of mussel banks in the sub-tidal in certain areas. For both reasons it cannot be concluded that there is a partial management strategy in place that is expected to achieve the SG 80 outcome level of performance. The client is advised further develop and implement a comprehensive spatial management strategy with regard to the protection and development of stable mussel beds in both intertidal and sub-tidal. This strategy could include the development of a map showing chances of development of stable mussel beds.</p>	
3	2.4.3 (UoA 1)	Closed at year 4 surveillance	<p>Information on the impact of mussel seed fishery on the development of stable mussel beds in the intertidal does not include a map that shows where the fishery could prevent the development of these beds. Although the locations where mussels are fished in the sub-tidal are known there is no comprehensive information about the distribution and vulnerability of mussel beds in the subtidal. The client is advised to liaise with the appropriate stakeholders and research institutes in order to collect the necessary information to inform a management strategy with regard to the protection and development of stable mussel beds in both intertidal and sub-tidal. This information gathering should include the development of a map showing chances of development of stable mussel beds.</p>	<p>A stability map for sublittoral mussel habitat exists and the presence of stable mussel beds in the sublittoral have not been found. Another update is foreseen for 2018. There is sufficient data available now to allow the nature of fishery impacts on habitat types to be identified. There is also reliable information on the spatial extent of the fishery's interaction, its timing and location of the use of the fishing gear.</p>
4	2.4.3 (UoA 2)	Closed at year 2 surveillance	<p>Suspended mussel culture like the spat collection on ropes can result in organic enrichment of the seabed through the deposition and accumulation of pseudofaeces under the structures. The level of impacts is highly dependent however on the scale of production and the hydrographic conditions at the culture site. Currently there is no information on the impact of the mussel-spat collection on the local seabed. Client will collate information on the specific features of the sites for suspended mussel culture.</p>	<p>In 2014, the Niedersächsische Muschelfischer GbR commissioned a study which indicated that water flow under SMCs was too strong to accumulate deposits. The total 'free' sulphide (S²⁻) in surficial (0-2 cm) sediments on the seabeds under the rope-growing sites on installation areas with similar morphological and hydrodynamic characteristics to the UoC. Specifically SMC installations in the Netherlands with Lower Saxony 'Southern Wanger-Reede'. The research in the western Waddensea and</p>

			<p>This would include measurements of total ‘free’ sulphide (S²⁻) in surficial (0-2 cm) sediments of the seabed under the sites.</p>	<p>Easterschelde showed that effects due to deposition of (pseudo) faeces in the vicinity of SMC on the seafloor and benthic species cannot be detected. The seafloor underneath different types of SMC in the Wadden Sea and Easterschelde has been sampled, both directly after installation of the SMC and during the peak in biomass on the SMC. During a field study underneath a mussel rope-culture in Mattenhaven (Easterschelde), no changes between the seafloor underneath the rope-culture and the reference area were detected (Seip, 2014).</p>
5	2.5.1 (UoA 3) UoA 3 not included in reassessment	Closed at year 1 surveillance	<p>To receive an unconditional score of 80 a valid documented risk assessment or equivalent environmental impact assessment has to demonstrate that the translocation activity is highly unlikely to introduce diseases, pests, pathogens or non-native species into the surrounding ecosystem. Such a document has not been presented to the team and therefore the translocation of mussel seed (that has originated from spatfall in the Wadden Sea) from the Wadden Sea outside Lower Saxony to the Lower Saxony Wadden Sea does not meet the SG 80 guideposts. The client is advised to have an appropriate assessment carried out of the risks involved with the imports of mussels from the Wadden Sea outside the Lower Saxony Wadden Sea area.</p>	<p>The study carried out by GIMARES presents a valid documented risk assessment that demonstrates that the movement of mussels from outside the Lower Saxony Wadden Sea (but still within the Wadden Sea area and same ecosystem) to Lower Saxony is highly unlikely to introduce diseases, pests, pathogens or non-native species into the surrounding ecosystem.</p>
6	2.5.2 (UoA 3) UoA 3 not included in reassessment	Closed at year 1 surveillance	<p>To receive an unconditional score of 80 a valid documented risk assessment or equivalent environmental impact assessment has to demonstrate that the translocation activity is highly unlikely to introduce diseases, pests, pathogens or non-native species into the surrounding ecosystem. Such a document has not been presented to the team and therefore the translocation of mussel seed (that has originated from spatfall in the Wadden Sea) from the Wadden Sea outside Lower Saxony to the Lower Saxony Wadden Sea does not meet the SG 80 guideposts. The</p>	<p>See condition 5 – same rationale</p>

			client is advised to have an appropriate assessment carried out of the risks involved with the imports of mussels from the Wadden Sea outside the Lower Saxony Wadden Sea area.	
7	2.5.3 (UoA 3) UoA 3 not included in reassessment	Closed at year 1 surveillance	To receive an unconditional score of 80 information on the impact of the imports of mussels should be sufficient to adequately inform the risk and impact assessments required in SG80 management level of performance. The team concluded that such information has not been presented to the team and therefore the current level of information is insufficient to assess the risks involved with the practice of translocation of mussels from the Wadden Sea area outside Lower Saxony to the Lower Saxony Wadden Sea. The client is advised to have an appropriate assessment carried out of the risks involved with the imports of mussels from the Wadden Sea outside the Lower Saxony Wadden Sea area.	See condition 5 – same rationale
8	3.2.2 (All UoAs)	Closed at year 4 surveillance	<p>A number of criteria are defined for decisions in mussel fisheries management, which can be seen as provisions for a precautionary approach. The decision-making process is based on inspections of the site, on the results of the monitoring programme and on other sources. In this sense, it can be said that it is based on the best available basis. Nevertheless, information on some important factors are lacking, such as the direct impacts of sub-tidal seed mussel fishery on the potential development of mussel beds. Such information is not generated, but also no specific restrictions are implemented, which would have to be considered as a consequence of the absence of information under a strictly precautionary approach.</p> <p>The client should liaise with relevant stakeholders to support the adoption of the precautionary approach in decision-making processes related to the management of</p>	<p>Since the raising of this condition at initial certification, the fishery has taken many steps to ensure decision-making is based on the precautionary approach and gathered information deemed lacking at certification, for example the fishery's impact on development of stable mussel beds.</p> <p>A study was commissioned that could demonstrate that seed collectors do not have a negative impacts on the ecosystem below the longlines. This was confirmed by a literature study (H&S Consultancy B.V., (2015).</p> <p>The new management plan has not yet been adopted, but NM continues to apply the precautionary measures proposed by the plan. The third management plan 2009 - 2013 has been renewed till 2019. In the meantime the Ministry is working on a new management plan (2017-2021). In 2017 the management of the blue mussel fishery was external reviewed.</p> <p>A round table between the fishery and a number of NGOs</p>

			<p>the lower Saxony mussel fishery. In particular in aspects related to:</p> <p>The potential risk that the fishery may pose on the development of stable mussel beds in the intertidal and subtidal zones;</p> <p>The introduction of non-native species into the surrounding ecosystem;</p> <p>Decision making processes related to the installations of ropes.</p>	<p>has been organised in order to formulate key points for a long-term and ecologically sound mussel fishery in the National Park by the end of the year. This round table has met 5 times in this year and will continue until the new management plan comes into force. After that on annual meeting of the round table is planned. This shall guarantee the exchange between fishermen, government and nature conservationists.</p> <p>Research is going on as in the last years, this concerns particularly stability maps, aerial surveys, inventory of species diversity, and others.</p>
9	3.2.4 (All UoAs)	Closed at year 1 surveillance	<p>There are information gaps concerning:</p> <p>The immediate impacts of fisheries and sub-tidal stocks;</p> <p>The seed fishery in the intertidal could still have an impact on the development of stable mussel beds by removing seed mussels from the mussel locations that are open for the fishery (see condition 1);</p> <p>Impact of mussel ropes and culture plots on the benthos;</p> <p>Risk of introducing non-native species into the surrounding ecosystem when practicing translocation.</p> <p>The fishery should engage with relevant stakeholders to support the development of a research plan that will focus on the information gaps related to the all Unit of Certification to achieve the objectives consistent with MSC's Principles 1 and 2. This research plan should provide the framework to address condition 1 to 8.</p>	<p>The client used the results of the MSC assessment process to inform on important information gaps in the Lower Saxony mussel fishery and established a research plan on this basis. The research plan was presented to stakeholders at the stakeholder gathering on the 27th January 2015 and to MEP (now CU Pesca) on 9 February 2015.</p>
10	3.2.5 (All UoAs)	Closed at year 4 surveillance	<p>The review is undertaken by the fisheries and the environmental administration, i.e. the two parties responsible for the management system. During the first phase of the Management Plan (1999-2003), there was an advisory council to the research project accompanying the Management Plan, which critically reviewed the plan and its results. This practice, however, which could be regarded as</p>	<p>The client is in permanent contact with the administration, the National Park Board and the competent Ministry, in order to promote the adoption of the new management plan.</p> <p>Efforts have been made to intensify the contacts with NGOs, which will lead to Framework Agreement comparable to that in Schleswig-Holstein. This year 5</p>

			<p>an external review, was discontinued under subsequent plans, as it was felt that a suitable solution had been reached. A system of more regular and formalized internal reviews and of regular or occasional external evaluations of the management system should be introduced.</p>	<p>stakeholder meetings have been held in order to find a common basis.</p> <p>Research results are broadly discussed with the administration and external stakeholders in order to evaluate the necessity to include them in the management plan. In 2017 the first external audit of the management plan has been undertaken.</p> <p>The results of this audit can be summarised as follows:</p> <p>The objectives of the valid management plan (2009-2013) have been achieved;</p> <p>The new management plan (2017-2021) envisages only tightening of conditions;</p> <p>Since the last certification a number of improvements in the management with regard to an ecological sustainability.</p> <p>It is envisaged that an external audit will be organised every four to five years.</p>
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3.3 Assessment Methodologies

This assessment was conducted in accordance with the MSC Fisheries Standard v2.0 for procedural stages and version 1.3 scoring. The MSC Full Assessment Reporting Template: Enhanced bivalve fisheries 1.0 was used. In terms of modifications to the Default Assessment Tree for enhanced bivalve fisheries, Principle 1 was removed (see 2.3 for further explanation). The team evaluated that there was no evidence that the parent stock was negatively impacted and so Principle 1 did not require scoring, as per CK2.1.3.1. No further modifications were made to the assessment tree.

3.4 Evaluation Processes and Techniques

3.4.1 Site Visits and consultations

The site visit for this reassessment took place on the 16th and 17th November 2017. The entire team attended the meeting (Matt Doggett, Ulf Löwenberg and Kat Collinson). In addition a trainee fishery assessor, Henry Ernst accompanied the team. Vivien Kudelka of the MSC outreach team also attended both days as an observer and fishery stakeholder.

On-site activities were held in Bremen and Hooksiel, Lower Saxony. A stakeholder meeting for completion of the Risk Based Framework SICA meeting was held on the 16th, which also presented stakeholders with opportunity to voice any concerns or issues about the fishery. As a roundtable meeting consisting on mussel fishers, NGOs and management was taking place earlier that day to discuss the on-going and future management of the fisher, this was deemed the best location to meet with stakeholders wanting to participate in the recertification process. On the 17th November, the team visited the fishery to gain further insight into operations and traceability, as well as to review catch information and compliance in the fishery. As this is a reassessment, the assessment team also made steps to confirm that no changes had occurred since the fishery was first certified. This was confirmed by the client group.

A full list of representatives consulted during the assessment process is given below in Table 8. The team would like to thank all these people for giving up their time to help the assessment.

Table 8. List of attendees at the on-site meetings.

Affiliation	Position	Name	Date/location of consultation	Information obtained
Friends of the Earth Bund LV NI	Stakeholder	Holger, Wesemüller	16th November 2017, Bremen	Stakeholder meeting and RBF workshop
Staatliches Fischereiamt Bremerhaven	Stakeholder	Alfred Homeister Thorsten Brandt	16th November 2017, Bremen	Stakeholder meeting and RBF workshop
MSC	Stakeholder	Vivien Kudelka	16th November 2017, Bremen and 17th November 2017, Hooksiel	Stakeholder meeting and RBF workshop, translation help
Landesfischereiverband Weser-Ems eV	Stakeholder	Dirk Sander	16 th November 2017, Bremen	Stakeholder meeting and RBF workshop

Landwirtschaftskammer Niedersachsen (LWK Nds)	Stakeholder	Hilke Looden	16 th November 2017, Bremen	Stakeholder meeting and RBF workshop
Erzeugergemeinschaft der Deutschen Krabbenfischer GmbH	Stakeholder	Philipp Oberdörffer	16 th November 2017, Bremen	Stakeholder meeting and RBF workshop
David de Leeuw Muschelzucht GmbH	Client group	David de Leeuw	16 th November 2017, Bremen and 17 th November 2017, Hooksiel	Client operations, traceability, general information
Muschelfischer Geschäftsführerin	Client group	Manuela Gubernator	16 th November 2017, Bremen and 17 th November 2017, Hooksiel	Client operations, traceability, general information, catch data
Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz	Stakeholder	Dr Olaf Prawitt	16 th November 2017, Bremen	Stakeholder meeting and RBF workshop
Consultant	Client representative	Jaap Holstein	16 th November 2017, Bremen and 17 th November 2017, Hooksiel	Client operations, traceability, general information.
Nationalpark Niedersächsisches Wattenmeer	Stakeholder	Christian Abel Gregor Scheiffahrt	16 th November 2017, Bremen	Stakeholder meeting and RBF workshop
CU Pesca	Assessment team	Ulf Löwenberg	-	-
CU Pesca	Assessment team	Dr Matthew Doggett	-	-
CU Pesca	Assessment team	Kat Collinson	-	-
CU Pesca	Assessment team (trainee)	Henry Ernst	-	-

At key stages of the assessment process, stakeholders were contacted and provided with an opportunity to comment (for a full list of stakeholders, please see Appendix 6 Stakeholders). Stakeholders were contacted at the following stages:

- Fishery announcement, site visit notification and Assessment Team: 26th September 2017;
- Assessment timeline: 26th September 2017;
- Use of the Risk Based Framework: 26th September 2017;
- Proposed Peer Reviewer: 19th April 2018.

Emails sent directly to notify stakeholders of the assessment included the following MSC documents: “Toolbox for Stakeholder Participation in RBF assessments”, MSC Template for Stakeholder Inputs” and “guide to MSC”.

3.4.2 Stakeholder comments during evaluation

Following the announcement of the fishery on the MSC website, comments were received via email from Dr Rösner of WWF Germany. The stakeholder comments and the team’s responses are to be found in Appendix 4 Stakeholder submissions.

3.4.3 Evaluation Techniques

a) Media announcements

The fishery’s assessment was announced on the MSC website on the 26th September 2017. The MSC press release targeted a wide range of stakeholders within the sustainable seafood industry.

b) Methodology for information gathering

Information for the assessment was gathered during the site visit and through separate consultation and correspondence with individual stakeholders. The PO representatives listed in Table 8 were key in providing most of the information regarding the operation and management of the fishery. Catch data for the fleets under assessment were obtained from the fishery client group and verified through figures from the Staatliches Fischereiamt Bremerhaven, who also provided mussel culture and SMC locations co-ordinates per the fishing licences, and compliance in the fishery.

c) Scoring

Scoring was completed on a Skype call with all members of the team. Each PI was reviewed collectively and a group consensus determined. The scores were decided as follows:

How many scoring issues met?	SG60	SG80	SG100
All	60	80	100
Half	FAIL	70	90
Less than half, most not met	FAIL	65	85
More than half, many or most	FAIL	75	95

Note that where there is only one scoring issue in the SG, the issue can be partially scored – in this case the team used their judgement to determine what proportion of it was met, e.g. at the 100 level, a small part met = 85, about half met = 90, nearly all met = 95.

d) Decision rules for final outcome

The decision rule for MSC certification is as follows:

- No PIs scores below 60;
- The aggregate score for each Principle is 80 or above.

The aggregate score for each Principle is calculated by taking the average score for each component followed by the average of all the component scores (see Table 12).

Table 9. Scoring elements

Component	Scoring elements	Main/not main	Data-deficient or not
1 – Target species/stock (UoA 1 & 2)	Wadden Sea blue mussel	Target	N/A (P1 not scored)
2.1 – Primary Species	None	N/A	N/A
2.2 – Secondary Species	Green shore crab (<i>Carcinus maenas</i>)	Not main	Yes
	Common Starfish (<i>Asterias rubens</i>)	Not main	Yes
	Pacific oyster (<i>Crassostrea gigas</i>)	Not main	Yes
2.3 – ETP species	Eider ducks, oystercatchers, common seals harbour seals and harbour porpoise	N/A	No
2.4 – Habitats	Intertidal (both UoCs)	N/A	No
	Subtidal (UoC 2)	N/A	No
2.5 - Ecosystems	Wadden Sea	N/A	No

e) Use of the Risk Based Framework (RBF)

The RBF was used in this assessment. The team used Table AC2– “Criteria for triggering the use of the RBF” from the MSC CRs v1.3. The conclusions are summarised in Table 10 below.

Table 10. Conclusions for using RBF in this assessment

Performance Indicator	RBF triggered	Reasoning
1.1.1	No	Principle 1 is not being scored due to CK2.1.3.1of the MSC Certification Requirements (v1.3) – see Section 2.3
2.1.1	No	No retained species interacting with the fishery
2.2.1	Yes	No quantitative information available on bycatch species to allow the impact of the fishery to be determined.
2.3.1	No	The impact of the fishery can be analytically determined

		for relevant ETP species.
2.4.1	No	information is available to support analysis of the impact of the fishery on the habitat
2.5.1	No	Information is sufficient to support an analysis of the impact of the fishery on the ecosystem

A wide range of stakeholders were identified and contacted to ensure effective stakeholder participation. This can be seen from the list of stakeholder participants listed in Appendix 6 Stakeholders.

A stakeholder list was compiled between the CAB and the client group. Stakeholders were contacted by email, and were provided with general information on the RBF from the MSC website and also the hyperlink to the RBF methodology specifically being used. The assessment team did not receive any comments specifically regarding the use of the RBF for this assessment.

During the site visit, the use of the RBF was explained, including why it had been triggered for bycatch species. The team used stakeholder input to identify the hazards present in the fishery for those species (table CC2 in MSC CRs v1.3). Stakeholders were provided with hard copies of the SICA and PSA methodology. The team then completed a SICA for the three scoring elements identified by the stakeholder group as most vulnerable to the fishery. As these species received SICA consequence scores of 1 (MSC ≥ 80), a Productivity Susceptibility Analysis (PSA) was not required under version 1.3 of the MSC Certification Requirements (CC2.3.6.5). The results of the SICA meeting are included in Appendix 2 Risk Based Framework (RBF) Outputs.

4 Traceability

4.1 Eligibility Date

The expiry date of this certificate is 27th November 2018. The target eligibility date is for this fishery is therefore the date of re-certification. Traceability and segregation systems are already in place for this fishery, which has been certified since October 2013. No changes to these systems have occurred during the life of the certificate.

4.2 Traceability within the Fishery

Seed mussels are either dredged and relayed onto culture plots and harvested at commercial size (UoA 1) or collected on ropes and grown to a maximum of ~4 cm (usually 1 - 3 cm) and then relayed onto culture plots for commercial harvest (UoA 2). Ropes are hung in spring and sometimes brushed intermediately when the weight of mussels are too heavy for the ropes.

All culture plots are within the National Park, but all SMC longline sites are situated outside the boundary of the National Park. Fishing activities are recorded with the location and quantities in logbooks for the State Fisheries Office in Bremerhaven. Logbooks are completed daily. Information supplied on the logbooks include the tonnage, the date of harvest, the vessel name and the area that the mussels were harvested from (plot location). Entries are in duplicate, one for the fishery and the second for the Ministry. The Black Box system, which has been voluntarily used by the fishery since 1999, tracks all movement of vessels in the fishery. The fishery internally evaluates these annually and as requested in the management plan, yearly documents the extent of the seed mussel fishery. A further mandatory measure is the use of VMS. The Black Box and VMS systems in place in the fishery allow the State Fisheries Office, who receive the data, to ascertain the fishing activity, i.e. whether the vessel is fishing for seed or steaming to a culture plot.

Mussel plots are dredged and mussels are brought on-board where they are placed in one of two holds. Each hold holds 55 tonnes. Once one hold is full, the second is used. Pacific oysters are removed, but the practice varies from ship to ship. Large crabs and starfish are removed by hand and deposited back into the water, smaller individuals go through the washer and directly overboard. No processing of any description takes place on board.

All movement of mussels is documented, whether this is within the mussel seed source (outside Lower Saxony, seed dredge/trawl or what SMC area) or the grow-out areas. A registration document is also completed, a requirement of fishery management (the state office for fisheries) in Niedersachsen. Information on this document includes harvesting vessel, date of harvest, destination of the mussels, whether they are wild or cultured-caught mussels, quality status of the production area and position of the harvest area (fishing ground). In addition, each document has its own registration number. This allows tracing of consumption mussels back to the relevant UoA.

There are several routes to which mussels are sold from the fishery. Mostly, harvested mussels are landed in Hooksiel, Eemshaven or Norddeich and then transported to Yerseke in The Netherlands by road and marketed via the auction there. The logistics vehicles merely transport the product and handle product as a subcontractor. One company sometimes lands the catch directly in Yerseke.

When the mussels arrive in Yerseke for sale at the auction either by road or by fishing vessel, they are sold and change of ownership occurs. A sample of mussels is taken into the auction. Here they are weighed and cleaned of all 'non-mussel' material. The mussels are counted, measured and

sorted by size, of which there are six size classes. This gives an estimate of the size composition; quality and weight of the mussel harvest still on-board the fishing vessel/in transport vehicle. The mussels are sold on a sample basis. Due to logistical reasons, they remain aboard the vessel/on transport vehicle until sold. Once auctioned, the buyers will take ownership and physical custody of the mussels and relay them on their own 'watering' plots for storage in the Oosterschelde until needed for further processing, or taken directly to the processing factory.

There are occasions where product goes through Greetsiel or Bengersiel, Germany. The process is similar to what is described above. Either the mussels are landed there and then transported by road for auction in Yerseke or they are collected directly by the customer's subcontracted transportation and taken directly to their processing facility.

Some mussel farming companies use an agent in Yerseke for selling to a processor/trader and for the paperwork and check at arrival. The agent does not take ownership nor possession of the goods, but controls the product between landing and transport on behalf of the customer. After the change of ownership occurs, new owners may complete processing activities. Occasionally mussels go through traders. In this case mussels are sold to the traders, who take ownership. All traders in Netherlands have their own CoC certificate.

The management system in place in the fishery implements a robust traceability of system. The prime reason for a detailed traceability system is due to the sanitary issues associated with the sale of shellfish for human consumption. The fishery needs to be able to trace back to the area of harvest in the eventuality of a bacteria or toxin outbreak in a consignment of mussels.

Table 11. Traceability Factors within the Fishery

Traceability Factor	Description of risk if applicable
Potential for non-certified gears to be used within the fishery	Not applicable, unless a new gear type is developed in future years.
Potential for vessels from the UoC to fish outside the UoC or in different geographical areas (on the same trips or different trips)	<p>The possibility of vessels from the UoC fishing outside the UoC or in different geographical areas (on the same trip or on different trips) is possible: some of the fishermen have culture plots in MSC-certified fisheries in The Netherlands and Schleswig-Holstein as well. These culture plots are included in the MSC-certificate for those fisheries.</p> <p>Movement documentation (required) of the mussels is maintained for all vessels and fisheries. Information on this document includes harvesting vessel, date of harvest, destination of the mussels, whether they are wild or cultured-caught mussels, quality status of the production area and position of the harvest area (fishing ground). This maintains where mussels have been sourced or left to grow, and can be linked forward to other harvesting documentation for onward traceability.</p>
Potential for vessels outside of the UoC or client group fishing the same stock	The possibility of vessels from outside the UoC fishing the same stock is non-existent.

<p>Risks of mixing between certified and non-certified catch during storage, transport, or handling activities (including transport at sea and on land, points of landing, and sales at auction)</p>	<p>All mussels in UoC will continue to be certified. They are harvested from bottom culture, straight onto the vessels (SMCs are harvested for seed mussel only, never for consumption mussels). On-board, they are placed in open bags, but they are removed from the vessel straight to the transport vehicle, which marks the change of ownership or they are dredged from a vessel's hold straight into the transport vehicle. Transport vehicles will never transport catch from different vessels, i.e. one vessel's catch per transport truck.</p>
<p>Risks of mixing between certified and non-certified catch during transshipment</p>	<p>There is no transshipment in this fishery. Vessels harvest the consumption mussels and take directly to shore for auction. Furthermore, there are only five vessels in this fishery, all of which are part of the fishery certificate, all product handled in certified. All consumption mussels come from a single UoA (UoA 1).</p>
<p>Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)</p>	<p>Not applicable. No processing occurs within this fishery or before subsequent Chain of Custody. The fishery only sells live, whole mussels. These are sold mostly through auction in Yerseke in the Netherlands. Some mussel farming companies use an agent in Yerseke for selling to a processor/trader and for the paperwork and check at arrival. The agent does not take ownership. All Dutch processors have a CoC certificate. This guarantees the continuation of registration of the MSC mussels during storage and packing. After the change of ownership occurs, new owners may complete processing activities.</p> <p>Occasionally mussels go through traders. In this case, the mussels are sold to a trader, then they are in the ownership of the trader. All traders in Netherlands have their own CoC certificate.</p>
<p>Any other risks of substitution between fish from the UoC (certified catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required</p>	<p>Not applicable. Besides, all adjacent mussel fisheries are MSC certified as well. As mentioned above, movement documentation, is provided for all movement of mussels in and out of the fishery. For example, accompanying a seed source, or where mussels have been moved during the growth phase or where mussels have been harvested for onward sale. This means that when mussels are sold to the next customer, there is paperwork available to trace the mussels back to the MSC fishery.</p>

4.3 Eligibility to Enter Further Chains of Custody

The following products have been determined eligible to enter further certified chains of custody as MSC certified and carry the MSC ecolabel: blue mussels (*Mytilus edulis*) caught by vessels owned by the client group (Table 5) in the German part of the Wadden Sea off the Lower Saxony (Niedersachsen) coast after the eligibility date, pending a successful MSC reassessment by the CU Pesca assessment team.

Subsequent Chain of Custody certification is required at first change of ownership. The point of intended change of ownership in this fishery is the point at which the mussels are landed and loaded onto a logistics vehicle, and the customer, having sampled the harvested mussels, accepts the consignment and purchases the mussels.

Separate chain of custody is required at this point as ownership has changed hands prior to the mussels arriving in Eemshaven or Yerseke at the auction.

The fishery currently lands at Greetsiel, Bengersiel, Hooksiel and Norddeich in Germany and Eemshaven and Yerseke in The Netherlands.

4.4 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to Enter Further Chains of Custody

There are no IPI stocks in this fishery.

5 Evaluation Results

5.1 Principle Level Scores

The final principal scores are provided in Table 12.

Table 12. Final Principle Scores

Final Principle Scores		
Principle	UoA 1 score	UoA 2 score
Principle 1 – Target Species	Not scored	
Principle 2 – Ecosystem	89.3	89.7
Principle 3 – Management System	90.5	

5.2 Summary of PI Level Scores

Principle	Component	Wt	Performance Indicator (PI)		Wt	UoA 1 score	UoA 2 score
Two	Retained species	0.2	2.1.1	Outcome	0.33	100	100
			2.1.2	Management strategy	0.33	100	100
			2.1.3	Information/Monitoring	0.33	100	100
	Bycatch species	0.2	2.2.1	Outcome	0.33	100	100
			2.2.2	Management strategy	0.33	80	80
			2.2.3	Information/Monitoring	0.33	80	80
	ETP species	0.2	2.3.1	Outcome	0.33	85	95
			2.3.2	Management strategy	0.33	85	85
			2.3.3	Information strategy	0.33	85	85
	Habitats	0.2	2.4.1	Outcome	0.33	85	80
			2.4.2	Management strategy	0.33	90	95
			2.4.3	Information	0.33	85	80

	Ecosystem	0.2	2.5.1	Outcome	0.33	80	80
			2.5.2	Management	0.33	95	95
			2.5.3	Information	0.33	90	90
Three	Governance and policy	0.5	3.1.1	Legal &/or customary framework	0.25	100	
			3.1.2	Consultation, roles & responsibilities	0.25	80	
			3.1.3	Long-term objectives	0.25	100	
			3.1.4	Incentives for sustainable fishing	0.25	80	
	Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.20	90	
			3.2.2	Decision making processes	0.20	95	
			3.2.3	Compliance & enforcement	0.20	100	
			3.2.4	Research plan	0.20	90	
			3.2.5	Monitoring & management performance evaluation	0.20	80	

5.3 Summary of Conditions

No new conditions were raised during this re-assessment. Table 7 in Section 3.2 lists the conditions that were raised during the fishery's initial certification cycle and their outcomes.

5.4 Recommendations

Recommendations may be made against SIs that score 80 or more and, as such, are non-binding. Nevertheless, progress is reviewed at annual surveillance audits and noted in annual surveillance reports. One non-binding recommendations was made (Table 13).

Table 13. Summary of non-binding recommendations

Number	UoA	PI and SI	Recommendation
1	Both	2.2.3d	<p>Although there bycatch monitoring in place, it is not presently conducted in sufficient detail to assess on-going mortalities for all bycatch species. It is recommended that quantitative information is collected on bycatch species including those not categorised in this assessment as 'main'.</p> <p>In addition, such information is available for other MSC-certified CAG mussel fisheries, so it would help to align this fishery with others in the programme.</p>

5.5 Determination, Formal Conclusion and Agreement

Following consideration of all stakeholders' inputs and comments to the Public Comment Draft Report (PCDR), the fishery assessment team concluded that the fishery should be certified against the MSC standard. This determination remained a recommendation pending the completion of the formal objections process and the final certification decision by the Control Union Pesca official decision making entity.

The final CU Pesca Certification Decision was made on the 3rd December 2018 with the Certification Decision Maker approving the decision to certify the fishery.

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Appendices

Appendix 1 Scoring and Rationales

Appendix 1.1 Principle 1

Not scored see Section 3.3 for more detail.

Appendix 1.2 Principle 2

Evaluation Table for PI 2.1.1 – Retained species outcome

PI 2.1.1		The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guided post	Main retained species are likely to be within biologically based limits (if not, go to scoring issue c below).	Main retained species are highly likely to be within biologically based limits (if not, go to scoring issue c below).	There is a high degree of certainty that retained species are within biologically based limits and fluctuating around their target reference points.
	Met?	Y	Y	Y
	Justification	There are no 'main' retained species i.e. comprising >5% of the total catch. So SG80 is met by default. See Section 2.4.2. When mussels are harvested from culture plots, larger bycatch species such as starfish, crabs and oysters are often returned to the water whilst some may be disposed of. In many instances the mussels are relocated back into the water in the Netherlands after sale on the mussel auction in Yerseke. In all instances no species are 'retained'. All species that are harvested together with mussel spat or grown mussels are managed as bycatch species and assessed under PI s 2.2.1, 2.2.2 and 2.2.3. MSC's requirement at CB3.5.3 states that "SG100 does not include the qualifier 'main' and the team shall consider all retained species in the assessment. If there are no P2 retained species in the fishery, or retention is exceptionally rare and negligible in its impact, then the fishery would meet SG100. SG100 is met. the current practice of suspended mussel culture (SMC – the collection of seed mussels on ropes or nets), the dredging / netting of seed mussel or the harvesting of mussels from culture plots, no other (commercial) species than mussels are retained. This is evident from the catches brought on board the vessels and from the records of percentage mussel content when the mussels are sold at auction in the Netherlands.ther species growing or living on the SMC ropes or nets like algae, tunicates, small crabs and starfish are regarded as fouling-organisms and are discarded upon capture as bycatch back to the environment. When mussel seed is fished there are no retained species; the entire		

		catch is returned to the water quickly as the seed is transported to the culture plots. There is therefore no impact on this component.			
b	Guidepost			Target reference points are defined for retained species.	
	Met?			Y	
	Justification	There are no retained species, met by default.			
c	Guidepost	If main retained species are outside the limits there are measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.	If main retained species are outside the limits there is a partial strategy of demonstrably effective management measures in place such that the fishery does not hinder recovery and rebuilding.		
	Met?	Y	Y		
	Justification	There are no retained species, met by default.			
d	Guidepost	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the retained species to be outside biologically based limits or hindering recovery.			
	Met?	Y			
	Justification	There are no retained species, met by default.			
References	N/A				
OVERALL PERFORMANCE INDICATOR SCORE:				UoA 1	UoA 2
				100	100

CONDITION NUMBER:	N/A
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Evaluation Table for PI 2.1.2 – Retained species management strategy

PI 2.1.2		There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place, if necessary, that are expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main retained species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing retained species.
	Met?	Y	Y	Y
	Justification	<p>No species other than mussels are retained in this fishery (see Section 2.4.2). The management strategy for bycatch species is assessed under PI 2.2.2.</p> <p>Since the practice of mussel culture is understood by the fishery managers, the National Park Authority and the State Fisheries Directorate, any change in practice would be immediately known. Therefore it can be concluded that on-going monitoring ensures that the fishery's practice of not retaining species for commercial purposes is maintained. As long as the current practice continues the fishery will continue to have no impact on this component and SG100 is met.</p> <p>MSC Certification Requirements CB3.3.1 states that the <i>“team should interpret the term “if necessary” used in the management strategy PIs at SG60 and SG80 for the retained species, bycatch species, habitats and ecosystems components to be applicable to those fisheries that have no impact on the relevant component and where no management strategy is required.”</i></p> <p>MSC Guidance to the CR v1.3 GCB3.3.2 also states that to <i>“To meet the requirement at SG100 this may simply comprise a statement of intent about continuing to have no impact and ongoing monitoring to ensure that no impact occurs.”</i></p>		
b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.

	Met?	Y	Y	Y
	Justification	It is well known from on-going monitoring and oversight of the fishery that there are no retained species and therefore SG100 is met by default.		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	Y
	Justification	On-going monitoring and oversight of the fishery operations provides clear evidence that there are no retained species and therefore SG100 is met by default.		
d	Guidepost			There is some evidence that the strategy is achieving its overall objective.
	Met?			Y
	Justification	Since there are no retained species, SG100 is met by default.		
e	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	N/A	N/A	N/A
	Justification	<p>MSC Certification Requirements CB3.6.2 states that if “the retained species is a shark, the team shall score scoring issue (e) to ensure that shark finning is not being undertaken in the fishery.”</p> <p>As there are no retained species and therefore no retained sharks, this element is not relevant to the scoring process.</p>		
References		N/A		

OVERALL PERFORMANCE INDICATOR SCORE:	UoA 1	UoA 2
	100	100
CONDITION NUMBER:	N/A	

Evaluation Table for PI 2.1.3 – Retained species information

PI 2.1.3		Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Qualitative information is available on the amount of main retained species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main retained species taken by the fishery.	Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.
	Met?	Y	Y	Y
	Justification	UoA 1 and UoA 2 – No retained species, major or minor (see Section 2.4.2). Monitoring at the vessels level, and selling the harvested mussels at the auction in Yerseke in the Netherlands, provide a sound basis for the conclusion that no species other than mussels are retained for sale. SG100 is met.		
b	Guidepost	Information is adequate to qualitatively assess outcome status with respect to biologically based limits.	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with a high degree of certainty.
	Met?	Y	Y	Y
	Justification	There are no retained species so the outcome status can be estimated as zero impact with a high degree of certainty (see Section 2.4.2).. Therefore SG100 is met.		
c	Guidepost	Information is adequate to support measures to manage main retained species.	Information is adequate to support a partial strategy to manage main retained species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y	Y

	Justification	During harvesting of seed mussels or fully-grown consumption mussels no other species are retained for commercial purposes (see Section 2.4.2). This situation is fully understood by all fishery managers and stakeholders. Therefore it can be concluded that the strategy of on-going monitoring of fishery procedures ensures a high degree of certainty that that the strategy of not retaining species for commercial purposes is maintained and is achieving its objective. Therefore SG100 is met.			
d	Guided post		Sufficient data continue to be collected to detect any increase in risk level (e.g. due to changes in the outcome indicator score or the operation of the fishery or the effectiveness of the strategy)	Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.	
	Met?		Y	Y	
	Justification	UoA 1 and UoA 2 – No retained species, major or minor. Further to this, the practice of seed harvest and mussel bottom-culture is monitored closely by managers and inspectors of the fishery in Lower Saxony and other stakeholders. On this basis, SG100 is met.			
References	N/A				
OVERALL PERFORMANCE INDICATOR SCORE:				UoA 1	UoA 2
				100	100
CONDITION NUMBER:				N/A	

Evaluation Table for PI 2.2.1 – Bycatch species outcome

PI 2.2.1		The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Main bycatch species are likely to be within biologically based limits (if not, go to scoring issue b below).	Main bycatch species are highly likely to be within biologically based limits (if not, go to scoring issue b below).	There is a high degree of certainty that bycatch species are within biologically based limits.
	Met?	Scored using SICA – Green crab Scored using SICA – Common starfish Scored using SICA – Pacific oyster	Scored using SICA – Green crab Scored using SICA – Common starfish Scored using SICA – Pacific oyster	Scored using SICA
	Justification	<p>As stated above in PI 2.1.1 SI(a), the only stage of the mussel fishery operations during which bycatch of species might occur is during the harvesting of mussels for consumption (an activity present in both UoAs, and therefore information provided in PIs 2.2.1 – 2.2.3 is applicable to both UoAs). At all other stages such as subtidal or intertidal seed harvest, collection of seed mussel from SMC installations or during movement of mussels between bottom-culture plots all biota are returned to the water with the mussels over the culture plots and are not removed from the Wadden Sea ecosystem (see Section 2.4.3).</p> <p>Bycatch species encountered during the harvest of mussels from culture plots consist of slipper limpets, crabs, starfish, barnacles and some Pacific oysters. The quantities of bycatch species encountered during the final harvest are not recorded and were therefore assessed using the RBF. The species selected as most at risk from the fishery’s activity by the stakeholders at the RBF workshop during the site visit were common starfish (<i>Asterias rubens</i>), shore crabs (<i>Carcinus maenas</i>) and Pacific oyster (<i>Crassostrea gigas</i>). This was because these species might sometimes be encountered in significant quantities when harvesting mussels from plots catches. They have been considered here in order to take a precautionary approach, as was also the case under the MSC Schleswig-Holstein blue-shell mussel fishery assessment. Starfish and crabs may be attracted to the culture plots due to the high densities of their preferred food, the blue mussel. During the harvest process, larger organisms are sorted from the mussels on board the fishing vessels via the washing equipment and inspection belt but it is almost impossible to return 100% of the bycatch. That which remains is considered negligible and must be since the presence of these species in mussels at auction has a negative effect on the final price.</p> <p><i>A. rubens</i> is the most prevalent species of starfish in the northern hemisphere including the North Sea and Wadden Sea and is found in high numbers in all coastal waters and estuaries where mussel beds and barnacles are located as it is a major predator of these species (Calderwood 2015; Garcia 2015). Data from the Demersal Fish Survey (DFS) also show that common starfish and shore crabs are among the most common and abundant species in the North and Wadden Seas (Bolle et al. 2012); both species are regarded as resilient and the stocks are regarded as healthy.</p>		

		<p>Pacific oysters are non-native within the Wadden Sea but are increasing in number and have become established over many intertidal areas including existing mussel beds.</p> <p>None of the bycatch species mentioned above are considered to be vulnerable species. Their population sizes are considered to be very large and widespread with high reproductive potentials. However, as no quantitative information is available for the bycatch species, they are considered to be data-deficient (as per Table AC2 of the MSC CRs v1.3) and the MSC's Risk Based Framework analysis must be used to assess the level of impact.</p> <p>Under the RBF, a Scale Intensity Consequence Analysis (SICA) was conducted for the three bycatch species considered most likely to be affected by the fishery. The potential impact of the fishery on the species' populations was considered to be the subcomponent of the species ecology most vulnerable to the fishery. All stakeholders agreed the impacts would result in insignificant changes to population size / growth rates for all species under assessment and would not be detectable against background variation. For the bycatch scoring elements scored in the SICA, this resulted in a score of '1' (see Appendix 2 Risk Based Framework (RBF) Outputs). This score is equivalent to a MSC score of SG100 (MSC Certification Requirements v1.3, Table CC14). A PSA is not required for PI 2.2.1 if a consequence score of 1 or 2 is returned from the SICA.</p>	
b	Guided post	If main bycatch species are outside biologically based limits there are mitigation measures in place that are expected to ensure that the fishery does not hinder recovery and rebuilding.	If main bycatch species are outside biologically based limits there is a partial strategy of demonstrably effective mitigation measures in place such that the fishery does not hinder recovery and rebuilding.
	Met?	Scored using SICA – Green crab Scored using SICA – Common starfish Scored using SICA – Pacific oyster	Scored using SICA – Green crab Scored using SICA – Common starfish Scored using SICA – Pacific oyster
	Justification	As a SICA was carried out and all scoring elements awarded scores of 100, SG80 is met by default (see Appendix 2 Risk Based Framework (RBF) Outputs).	
c	Guided post	If the status is poorly known there are measures or practices in place that are expected to result in the fishery not causing the bycatch species to be outside biologically based limits or hindering recovery.	
	Met?	Scored using SICA – Green crab Scored using SICA – Common starfish	

	Scored using SICA – Pacific oyster		
Justification	A SICA was carried out and all bycatch scoring elements scored 100 (see Appendix 2 Risk Based Framework (RBF) Outputs). Stakeholders do not consider all scoring element to be outside biologically based limits or have recovery hindered. The fishery's practice to discard bycatch back overboard helps to reduce mortality. Furthermore, the fishery operates in such a small area, especially in relation to species distribution, the fishery is not expected have a detrimental effect on any bycatch species encountered in fishing operations.		
References	(Calderwood 2015; Garcia 2015; MarLiN 2017; Bolle et al. 2012)		
		Scoring element	UoA 1
		Green crab	SICA 100
		Common starfish	SICA 100
		Pacific oyster	SICA 100
			UoA 2
			SICA 100
OVERALL PERFORMANCE INDICATOR SCORE:			100
CONDITION NUMBER:		N/A	

Evaluation Table for PI 2.2.2 – Bycatch species management strategy

		Units Of Certification: All UoAs		
PI 2.2.2		There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations		
Scoring Issue		SG 60	SG 80	SG 100
a	Guided post	There are measures in place, if necessary, that are expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a partial strategy in place, if necessary, that is expected to maintain the main bycatch species at levels which are highly likely to be within biologically based limits, or to ensure the fishery does not hinder their recovery and rebuilding.	There is a strategy in place for managing and minimising bycatch.
	Met?	Y – Green crab Y – Common starfish Y – Pacific oyster	Y – Green crab Y – Common starfish Y – Pacific oyster	N – Green crab N – Common starfish N – Pacific oyster
	Justification	<p>When the consumption mussels are harvested some organisms growing on or between the mussels will be caught. These species are likely to be composed of algae, tunicates, barnacles, slipper limpets, crabs, starfish and Pacific oysters (see Section 2.4.3). Of the species that could potentially be considered as ‘main’ bycatch due to the large volumes encountered on occasion (common starfish, green crabs and Pacific oysters) the crabs and oysters are returned to the water when sorted from the main catch on-board the vessels. As stated in PI 2.2.1, sorting cannot be 100% efficient and a small quantity of these species may not be discarded and end up in the final catch. For commercial reasons the fishers aim to keep this as low as possible to avoid a negative impact on the auction price. Returning these organisms to the water is considered as a partial strategy to minimise bycatch (mortality) and as outlined in PI 2.2.1 is expected to ensure their populations are not hindered. SG80 is met.</p> <p>Any other animals contained in the bycatch are separated following auction in the Netherlands during processing and are disposed. It is considered impossible to avoid these very low levels of bycatch, and when considering the population sizes of the species affected a strategy to avoid them is not deemed necessary. SG100 is not met.</p>		

b	Guidepost	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or species involved.
	Met?	Y – Green crab Y – Common starfish Y – Pacific oyster	Y – Green crab Y – Common starfish Y – Pacific oyster	N – Green crab N – Common starfish N – Pacific oyster
	Justification	<p>The main bycatch species are very common and following the SICA (see Appendix 2 Risk Based Framework (RBF) Outputs) meeting are considered likely to be within safe biological limits. This, coupled with the very limited area over which the bottom-culture plots are operated and harvested and the high reproductive potential of the main bycatch species provides an objective basis for confidence that the partial strategy of returning most individuals and discarding some others will be likely to work. Therefore SG80 is met.</p> <p>SG100 is not met as a full strategy is not deemed necessary and therefore is not in place.</p>		
c	Guidepost		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y – Green crab Y – Common starfish Y – Pacific oyster	N – Green crab N – Common starfish N – Pacific oyster
	Justification	<p>The harvesting of fully-grown consumption mussels from the bottom-culture plots has been on-going in the Dutch and German Wadden Sea for many decades (see Section 2.2.2). The fact that the populations of crabs and starfish continue to flourish (Bolle et al. 2012) is clear evidence that the partial strategies are implemented successfully, so SG80 is met.</p> <p>SG100 is not met as a full strategy is not deemed necessary and therefore is not in place.</p>		
d	Guidepost			There is some evidence that the strategy is achieving its overall objective.
	Met?			N – Green crab

					N – Common starfish N – Pacific oyster
	Justification	SG100 is not met as a full strategy is not deemed necessary and therefore is not in place.			
References	(Bolle et al. 2012)				
			Scoring element	UoA 1	UoA 2
			Green crab	80	80
			Common starfish	80	80
			Pacific oyster	80	80
OVERALL PERFORMANCE INDICATOR SCORE:				80	80
CONDITION NUMBER:			N/A		

Evaluation Table for PI 2.2.3 – Bycatch species information

		Units Of Certification: All UoAs		
PI 2.2.3		Information on the nature and the amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch		
Scoring Issue		SG 60	SG 80	SG 100
a	Guided post	Qualitative information is available on the amount of main bycatch species taken by the fishery.	Qualitative information and some quantitative information are available on the amount of main bycatch species taken by the fishery.	Accurate and verifiable information is available on the catch of all bycatch species and the consequences for the status of affected populations.
	Met?	Y – Green crab Y – Common starfish Y – Pacific oyster	Y – Green crab Y – Common starfish Y – Pacific oyster	N – All species
	Justification	<p>The harvest of mussels from the bottom-culture plots is monitored by the mussel growers. They can roughly approximate quantities of the main bycatch species taken by the fishery (in both UoAs, as both have harvest activities) and can supply some quantitative information to this effect. The fishers state that for much of the time bycatch comprises far less than 5% of the mussels harvested for consumption. These assertions were not challenged during the RBF stakeholder meeting.</p> <p>At the stage of final harvesting, mussels and some bycatch are removed from the area fished. This results in a total loss of all bycatch which is not returned. Although the species themselves cannot be accurately quantified, the population-level impact can be somewhat quantified on the basis of the footprint affected (total permitted bottom-culture area) within the wider Wadden Sea i.e. the culture plots account for ~0.4% of the area of the National Park and an even lower fraction of the Wadden Sea, and only a proportion of the culture plots are harvested for adult mussels in any given year (see Section 2.4.3). Therefore a form of quantitative information exists on the amount of main bycatch species taken by the fishery over their range within the Wadden Sea, and SG80 is met.</p> <p>As above, given the lack of verifiable information on all bycatch species and their population statuses, SG100 is not met.</p>		

b	Guidepost	Information is adequate to broadly understand outcome status with respect to biologically based limits	Information is sufficient to estimate outcome status with respect to biologically based limits.	Information is sufficient to quantitatively estimate outcome status with respect to biologically based limits with a high degree of certainty.
	Met?	N/A	N/A	N/A
	Justification	<p>The Guidance to MSC Certification Requirements v1.3, Table GCC8 states that <i>“When the RBF is used to score PI 2.2.1, the bracketed scoring issues within the default tree SGs for this PI need not be scored. Barring this exception, the default tree PISGs shall be used.”</i></p> <p>Therefore this SI need not be scored.</p>		
c	Guidepost	Information is adequate to support measures to manage bycatch.	Information is adequate to support a partial strategy to manage main bycatch species.	Information is adequate to support a strategy to manage retained species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	Y	Y – Green crab Y – Common starfish Y – Pacific oyster	N – All species
		<p>This information available on the main bycatch species, their geographic ranges, known abundances and unlikely impact of the fishery on their populations (see Section 2.4.3) is adequate to justify the partial strategy in place to minimise bycatch mortality (outlined in PI2.2.2 SI(a)) with regard to managing the fishery’s impact on those species. Therefore SG80 is met. SG100 requires a strategy to be in place and therefore cannot be met.</p>		
d	Guidepost		Sufficient data continue to be collected to detect any increase in risk to main bycatch species (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the strategy).	Monitoring of bycatch data is conducted in sufficient detail to assess on-going mortalities to all bycatch species.
	Met?		Y – Green crab Y – Common starfish Y – Pacific oyster	N – All species

	Justification	<p>The fishery bottom-culture (both UoAs) is monitored by the State Fisheries Directorate, National Park Authority, NGOs and the fishery itself. Any change in practice which would increase the risk level for bycatch species e.g. changes operational areas or timing / intensity of activities would be detected as new activities often require authorisation before they can proceed. Furthermore, a monitoring procedure is in place for the seed mussel fishery as of 2017 / 2018 which could alert the fishery to any further species considered to be at risk from mortality and may provide information of relevance to the harvested consumption mussels regarding any likely changes in bycatch species composition. The monitoring programme however does not presently extend to the bycatch associated with the harvested consumption mussels. A recommendation has been raised here to allow protocols to encompass this information in future. See Section 5.4 for more details.</p> <p>Therefore the team concludes that sufficient data continue to be collected to detect any increase in risk level to main bycatch species and SG80 is met. SG100 is not met as monitoring of bycatch from harvested consumption mussels is not conducted in sufficient detail to assess on-going mortalities to all bycatch species. This has been raised as a recommendation in this re-assessment (see Table 13).</p>		
References	(Calderwood 2015; Garcia 2015; MarLiN 2017; Bolle et al. 2012)			
		Scoring element	UoA 1	UoA 2
		Green crab	80	80
		Common starfish	80	80
		Pacific oyster	80	80
OVERALL PERFORMANCE INDICATOR SCORE:			80	80
CONDITION NUMBER:		N/A		
RECOMMENDATION NUMBER:		1		

Evaluation Table for PI 2.3.1 – ETP species outcome – UoA 1: Seed collection via dredging / nets and bottom culture

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	Met?	Y – Harbour porpoise	Y – Harbour porpoise	Y – Harbour porpoise
	Justification	<p>With reference to limits set on ETP species, the only ETP species for which specific national / international limits exist in terms of total mortality permitted before a management response is required, is the harbour porpoise (see Section 2.4.4.2). There are no specific limits as to the numbers of the of the other ETP species that may be directly affected (i.e. mortality) by the fishery. Therefore, as per the MSC Certification Requirements v1.3 CB3.11.3.1, since there are “no requirements for protection and rebuilding, provided through national legislation or binding international agreements” in terms of set limits with respect to the remaining ETP species, scoring issue (a) shall only be scored for the harbour porpoise. Direct and indirect effects of the fisheries on all ETP species are scored in sections SI(b) and SI(c) respectively.</p> <p>Harbour Porpoise</p> <p>ICES states the percentage fishing mortality over the Greater North Sea Ecoregion assessment area (areas VIId, IV and IIIa) is less than the threshold level of 1.7% stipulated by ASCOBANS as the maximum acceptable total mortality (from all human activities) above which a management response would be required to limit the mortality to which the population is subjected (ASCOBANS 2000). ICES acknowledges that some uncertainty surrounds its estimate due to unknown bias and a lack of reporting from some nations. However, the upper estimate of bycatch mortality from ICES was 0.88% and, even accounting for some potential bias, the assessment team considers it highly unlikely that this estimate would increase by 100% and exceed the 1.7% limit (ICES 2015).</p> <p>ICES cites set nets (gill nets and trammel nets) as the biggest risk to regional porpoise populations. Due to the gear types, low vessel speeds and absence of any evidence to suggest the fishery operations have ever resulted in direct mortality of harbour porpoises, the assessment team consider there is a high degree of certainty that the mussel fishery is meeting international requirements for the protection of harbour porpoise in the North Sea and SG100 is met.</p>		

b	Guided post	Known direct effects are unlikely to create unacceptable impacts to ETP species.	Direct effects are highly unlikely to create unacceptable impacts to ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.
	Met?	Y	Y – All ETP species	N – All ETP species
	Justification	<p>Direct effects of the fishery on ETP species are considered highly unlikely to create unacceptable impacts to ETP species as a consequence of the fishing methods and low operational vessel speeds.</p> <p>ETP species that are present in the Lower Saxony Wadden Sea include, seals, harbour porpoise and marine bird species (see Section 2.4.4). There are no direct interactions reported between mussel dredgers and seals, harbour porpoises and birds however. The risk that they will be caught or struck during fishing operations can be considered negligible due to the small net openings and low fishing speed. Therefore direct effects of the fishery on each ETP species are scored thus:</p> <ul style="list-style-type: none"> • Grey seals – SG80 • Common seals SG80 • Harbour porpoise – SG80 • Oystercatchers – SG80 • Eider ducks – SG80 <p>Given an absence of verifiable data to this effect, the team did not consider that available evidence was sufficient to justify that there is a high degree of certainty that the fishery is not posing a direct risk to ETP species and SG100 is not met.</p>		
c	Guided post		Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?		Y – Oystercatchers and eider ducks	Y – Grey and common seals, harbour porpoise N – Oystercatchers and eider ducks
	Justification	<p>The assessment team consider the indirect effects of the fishery to be:</p> <ul style="list-style-type: none"> • The potential impact on the food supply of ETP birds such as oystercatchers and eider ducks; and • Disturbance from the fishing vessels to marine mammals and birds. <p>The indirect impact on food supply for birds is limited through restrictions on the fishery operations over intertidal mussel beds as described in section 2.4.4.3. From data on fishing activities in recent years it is also clear that seed mussel fishing activity on intertidal beds has been very low</p>		

with no seed collection from intertidal beds since 2009. Most mussel seed is harvested following spat fall in subtidal areas. The team therefore considers it unlikely that the fishery has created unacceptable impacts to intertidal mussel stocks for birds.

In parts of the Lower Saxony Wadden Sea, intertidal mussel beds have been either replaced or heavily encroached upon by reefs of the invasive Pacific oyster (*Crassostrea gigas*). Mussels persist within these reefs and remain available as a food source for oystercatchers. It has also been concluded that the oystercatchers have developed techniques to open smaller oysters and can feed on them at sustainable rates (Markert 2013; Troost 2010); the oyster beds thus form an important new food source for this species. Eider ducks on the other hand cannot feed on oysters and the structure of the oyster beds prevents them from feeding effectively on the mussels therein contained.

Oystercatchers feed mainly on shellfish and blue mussels and cockles are their most important food items. Thus during low tide the majority of oystercatchers can be observed over blue mussel beds or sand flats with cockles; to a lesser degree some are found in areas with the small bivalves *Mya* and *Scrobicularia*. The population of oystercatcher in the Wadden Sea increased up to the 1990s but has since shown a decrease in the Dutch, and Schleswig Holstein Wadden Sea areas. It is assumed that the decrease was induced by low shellfish stocks in the early 1990's and the reduction in the area of intertidal mussel beds. Throughout the Wadden Sea both the migratory and breeding populations of oystercatchers are in decline although the reasons for this are not apparent (Koffijberg 2016; Blew 2016). Concerning the impact of the fishery on oystercatcher food sources the team has considered that nowadays large parts of the intertidal cannot be fished because of the presence of Pacific oysters and the associated oyster reefs and that the fishery will be closed when the total area of intertidal mussel beds falls below 1000 hectares or the biomass below 10,000 t. Given the increase recorded in both these parameters with respect to blue mussel quantities in recent years (see PI 2.4.1 SI(a)), the lack of (or minimal) seed fishing that occurs over intertidal beds and oystercatchers' ability to feed on Pacific oysters, the assessment team considers that the fishery is unlikely to be having an unacceptable indirect impact on food resources for oystercatchers.

Concerning the effects of mussel fishing on the food supply of eider ducks, an important factor in the evaluation of impacts is that eider ducks are diving birds and therefore also feed on subtidal mussel beds including the bottom-culture plots. Thus when seed mussels are fished and relocated to culture plots, they can still be a food source for these birds. Given that the naturally-occurring, subtidal seed mussel beds are often ephemeral with a high likelihood of disappearing during autumn / winter, by moving them to the culture plots it can be argued that the fishery is most likely extending their availability as a food source for the ducks. It is commonly known that eider ducks do feed on the culture plots. Bult (2004) concluded that mussel culture in the Netherlands resulted on average in a 15% increase of the mussel stock in the Dutch Wadden Sea. Van Stralen (2008) evaluated the impact of mussel culture on food availability for eider ducks in the Dutch Wadden Sea, and concluded that the overall food supply was not reduced since the removals were compensated by the extra growth and reduced mortality of mussels on the culture plots.

The harvest of consumption mussels from naturally-occurring subtidal mussel beds will remove the mussels from the system. However this activity is restricted by the rules that these mussels must be at least 5 cm and only from subtidal beds. The wild fishery for consumption mussels is quite a rare event and is unlikely to have a significant impact on the average total mussel stock present in the ecosystem. The last time consumption mussels were fished from the subtidal was in 2005 when a total of 160 tonnes was harvested (consumption mussels taken from the wild fishery is

	<p>outside the scope of this certification).</p> <p>Disturbance of birds and marine mammals is not considered to be a major issue in this fishery. Fishing operations are carried out during short periods in specified fishing areas tightly regulated by the fishing licence and monitored by VMS. Birds feeding on wild mussel beds might undergo some temporary disturbance but it is highly unlikely that this would have negative effects on their populations. Oystercatchers are not disturbed since fishing is carried out in the subtidal where they do not occur and only in the intertidal during high tide when they are also not present.</p> <p>On the above information the assessment team considered that indirect effects of the fishery on the ETP bird species listed are unlikely and are scored thus:</p> <ul style="list-style-type: none"> • Oystercatchers – SG80 • Eider ducks – SG80 <p>SG100 is not met for the bird species as there is not a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species as no site-specific testing to produce verifiable evidence has been carried out with respect to impact on food supplies. The influence of food supply on the decline of breeding birds throughout the Wadden Sea is unclear from the present Trilateral Management Action Plan (TMAP) monitoring of the birds in the Wadden Sea. Food shortage is recognized as a difficult impact to prove and the impact of fishery activities throughout the Wadden Sea is not fully understood (Koffijberg 2016).</p> <p>Based on the above information the assessment team considered that there is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on the ETP marine mammal species and they are scored thus:</p> <ul style="list-style-type: none"> • Grey and common seals – SG100 • Harbour porpoise – SG100 								
References	(ICES 2015; ASCOBANS 2000; Markert 2013; Troost 2010; Koffijberg 2016; Blew 2016; Bult 2004; Stralen 2008)								
	<table border="1"> <tr> <td>Grey seal</td> <td>90</td> </tr> <tr> <td>Common seal</td> <td>90</td> </tr> <tr> <td>Harbour porpoise</td> <td>95</td> </tr> <tr> <td>Oystercatcher</td> <td>80</td> </tr> </table>	Grey seal	90	Common seal	90	Harbour porpoise	95	Oystercatcher	80
Grey seal	90								
Common seal	90								
Harbour porpoise	95								
Oystercatcher	80								

	Eider ducks	80
OVERALL PERFORMANCE INDICATOR SCORE:	85	
CONDITION NUMBER:	N/A	

Evaluation Table for PI 2.3.1 – ETP species outcome – UoA 2: Seed collection via ropes and nets and bottom culture

PI 2.3.1		The fishery meets national and international requirements for the protection of ETP species The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Known effects of the fishery are likely to be within limits of national and international requirements for protection of ETP species.	The effects of the fishery are known and are highly likely to be within limits of national and international requirements for protection of ETP species.	There is a high degree of certainty that the effects of the fishery are within limits of national and international requirements for protection of ETP species.
	Met?	Y	Y	Y – Harbour porpoise
	Justification	<p>With reference to limits set on ETP species, the only ETP species for which specific national / international limits exist in terms of total mortality permitted before a management response is required, is the harbour porpoise (see Section 2.4.4.2). There are no specific limits as to the numbers of the of the other ETP species that may be directly affected (i.e. mortality) by the fishery. Therefore, as per the MSC Certification Requirements v1.3 CB3.11.3.1, since there are “no requirements for protection and rebuilding, provided through national legislation or binding international agreements” in terms of set limits with respect to the remaining ETP species, scoring issue (a) shall only be scored for the harbour porpoise. Direct and indirect effects of the fisheries on all ETP species are scored in sections SI(b) and SI(c) respectively.</p> <p>ICES states the percentage fishing mortality over the Greater North Sea Ecoregion assessment area (areas VIId, IV and IIIa) is less than the threshold level of 1.7% stipulated by ASCOBANS as the maximum acceptable total mortality (from all human activities) above which a management response would be required to limit the mortality to which the population is subjected (ASCOBANS 2000). ICES acknowledges that some uncertainty surrounds its estimate due to unknown bias and a lack of reporting from some nations. However, the upper estimate of bycatch mortality from ICES was 0.88% and, even accounting for some potential bias, the assessment team considers it highly unlikely that this estimate would increase by 100% and exceed the 1.7% limit (ICES 2015).</p> <p>ICES cites set nets (gill nets and trammel nets) as the biggest risk to regional porpoise populations. Due to the gear types, low vessel speeds and absence of any evidence to suggest the fishery operations have ever resulted in direct mortality of harbour porpoises, the assessment team consider there is a high degree of certainty that the mussel fishery is meeting international requirements for the protection of harbour porpoise in the North Sea and SG100 is met.</p>		

b	Guided post	Known direct effects are unlikely to create unacceptable impacts to ETP species.	Direct effects are highly unlikely to create unacceptable impacts to ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species.
	Met?	Y	Y	Y – All ETP species
	Justification	<p>There is a high degree of confidence that there are no significant detrimental direct effects of the fishery on ETP species as a consequence of the fishing methods and low operational vessel speeds. ETP species that are present in the Lower Saxony Wadden Sea include, seals, harbour porpoise and marine bird species (see Section 2.4.4). There are no direct interactions reported between mussel dredgers or seed mussel SMC installations and seals, harbour porpoises and birds however. The risk that they will be caught or struck during fishing operations can be considered negligible due to the small net openings and low fishing speed.</p> <p>Mortality of mammals or birds through entanglement in the SMC ropes or nets can be considered very unlikely as the ropes used in both types of installation are rather thick (~15-20mm). As a consequence the nets can be avoided easily and risk of entanglement is negligible. Negative impacts of SMC installations on protected species such as seals and birds were not observed in a study carried out in the Dutch Wadden Sea (Wiersinga 2009). Since the SMC methods used in the Dutch and Lower Saxony Wadden Sea areas are the same and the permits for SMC areas ensure they are located away from important habitats including seal and bird colonies and are outside the National Park, the assessment team has a high degree of confidence that there are no significant detrimental direct effects of SMC on ETP species.</p> <p>Overall the assessment team felt that available evidence was sufficient to justify a high degree of confidence that the fishery is not posing a significant detrimental direct effect risk to ETP species, which are scored thus:</p> <ul style="list-style-type: none"> • Grey and common seals – SG100 • Harbour porpoise – SG100 • Oystercatchers – SG100 • Eider ducks – SG100 		
c	Guided post		Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?		Y – Oystercatchers and eider ducks	Y – Grey and common seals, harbour porpoise N – Oystercatchers and eider ducks

Justification	<p>The assessment team consider the indirect effects of the fishery to be:</p> <ul style="list-style-type: none"> • The potential indirect impact on the food supply of ETP birds such as oystercatchers and eider ducks; and <p>Disturbance from the fishing vessels to marine mammals and birds.</p> <p>Seed collection on SMC installations and the subsequent bottom-culture on allocated, permitted mussel plots do not reduce the amount of food available for ETP bird species (see Section 2.4.4.3). SMC installations offer additional substrate for mussel settlement and growth and is likely to increase the quantity of mussels in the Lower Saxony Wadden Sea and therefore the food available for birds. Furthermore, when seed mussels are laid on the culture plots they continue to experience favourable growing conditions therefore increase rather than decrease the total mussel biomass available. Eider ducks are known to feed on mussels on culture plots. Bult (2004) concluded that mussel culture in the Netherlands resulted on average in a 15% increase of the mussel stock in the Dutch Wadden Sea. Van Stralen (2008) evaluated the impact of mussel culture on food availability for eider ducks in the Dutch Wadden Sea. It was concluded that the overall food supply was not reduced since the removals were compensated by the extra growth and reduced mortality of mussels on the culture plots. Therefore, so long as mussels are present on the culture plots the eiders are likely to benefit. When the mussels are harvested for human consumption the culture process recommences and further mussels are made available. Some culture plots also exist in intertidal areas and these will provide further feeding opportunities for oystercatchers. The assessment team considers it is unlikely that the fishery will negatively affect the food supply for ETP birds and therefore unacceptable impacts are also unlikely.</p> <p>Disturbance of birds and marine mammals is not considered to be a major issue in this fishery. Fishing operations are carried out during short periods in specified fishing areas tightly regulated by the fishing licence and monitored by VMS. Birds feeding on wild mussel beds might undergo some temporary disturbance but it is highly unlikely that this would have negative effects on their populations. Oystercatchers are not disturbed since fishing is carried out in the subtidal where they do not occur and only in the intertidal during high tide when they are also not present.</p> <p>On the above information the assessment team considered that indirect effects of the fishery on the ETP bird species listed are unlikely and are scored thus:</p> <ul style="list-style-type: none"> • Oystercatchers – SG80 • Eider ducks – SG80 <p>SG100 is not met for the bird species as there is not a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species as no testing to produce verifiable evidence has been carried out with respect to the potential impact of mussel harvest on food supplies. The influence of food supply on the decline of breeding birds throughout the Wadden Sea is unclear from the present Trilateral Management Action Plan (TMAP) monitoring of the birds in the Wadden Sea. Food shortage is recognised as a difficult impact to prove and the impact of fishery activities throughout the Wadden Sea is not fully understood (Koffijberg 2016).</p> <p>Based on the above information the assessment team considered that there is a high degree of confidence that there are no significant detrimental</p>
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	indirect effects of the fishery on the ETP marine mammal species and they are scored thus: <ul style="list-style-type: none"> • Grey and common seals – SG100 • Harbour porpoise – SG100 											
References	(ICES 2015; ASCOBANS 2000; Koffijberg 2016; Blew 2016; Bult 2004; Stralen 2008; Wiersinga 2009)											
		<table border="1"> <tr> <td>Grey seal</td> <td>100</td> </tr> <tr> <td>Common seal</td> <td>100</td> </tr> <tr> <td>Harbour porpoise</td> <td>100</td> </tr> <tr> <td>Oystercatcher</td> <td>90</td> </tr> <tr> <td>Eider duck</td> <td>90</td> </tr> </table>	Grey seal	100	Common seal	100	Harbour porpoise	100	Oystercatcher	90	Eider duck	90
Grey seal	100											
Common seal	100											
Harbour porpoise	100											
Oystercatcher	90											
Eider duck	90											
OVERALL PERFORMANCE INDICATOR SCORE:	95											
CONDITION NUMBER:	N/A											

Evaluation Table for PI 2.3.2 – ETP species management strategy - UoA 1: Seed collection via dredging / nets and bottom culture

PI 2.3.2		The fishery has in place precautionary management strategies designed to: <ul style="list-style-type: none"> • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species. 		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place that minimise 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 fishery'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 fishery'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?	Y	Y – All ETP species	N – All ETP species
	Justification	<p>Eider ducks and oystercatcher are protected under the National Park law and through implementation of the EC Habitats and Bird Directives (see Section 2.4.4.3). The impact on these species is managed through the management of the fishery in the Fisheries Regulation and the Management Plan for the fishery. The latter makes provisions for protecting a defined proportion of the intertidal mussel beds (although in practice very few / none are fished for seed mussel in any given year) and thereby protects the food resources for these species from fishery impacts. Together these laws, Directives, regulations and management plans form a strategy for the protection of ETP species. They do not however form a comprehensive strategy specifically to manage the fishery's impact on ETP species and designed to exceed national and international requirements.</p> <p>For eider ducks the assessment team considers that the regulation of the fishery, permit requirements and approval process and the fact that the subtidal mussels are relocated to culture plots where the birds can continue to feed on them makes it highly likely that the strategy will minimise mortality and achieve national and international requirements for this species. This is considered to be highly likely because if subtidal seed mussels are not harvested they are recognised as being ephemeral and often disappear over the autumn and winter due to tidal movements and storms. As argued in PI 2.3.1 by laying the subtidal seed mussels on the culture plots the fishery is likely enhancing the food available to the ducks in the Lower Saxony Wadden Sea. SG80 is met.</p> <p>For oystercatchers, the team concludes that the strategy in place (described above) to manage the potential impact of the fishery on intertidal mussel beds is highly likely to achieve national and international requirements for the protection of the species particularly because the fishery only very rarely harvests seed mussels from a small proportion of the intertidal (see UoA1, PI 2.4.1, SI(a)). Furthermore to these management measures</p>		

		<p>oystercatchers can also feed on the large areas with oyster reefs (including feeding on the oysters) that cannot be fished by the fishermen and on mussels within intertidal culture plots. SG80 is met.</p> <p>For grey and common seals and harbour porpoises, the team concluded that the strategy in place (described above) to regulate the fishery and its activity levels will minimise mortality and will be highly likely to achieve national and international requirements. SG80 is therefore met for each of these species.</p> <p>MSC v1.3 Guidance GCB3.3 states that a comprehensive strategy “<i>is a complete, tested strategy consisting of linked monitoring, analyses and management measures and responses</i>”. The strategy in place is not set out in such detail so SG100 is not met.</p>		
b	Guided 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 strategy will work, based on information directly about the fishery and/or the species involved.	The 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?	Y	Y – All ETP species	N – All ETP species
	Justification	<p>For eider ducks the relocation of subtidal mussels to culture plots (where they have increased chances of survival and persistence compared with the often ephemeral wild beds) continues to provide a food sources and provides an objective basis for confidence that the strategy will work. Assessments of the known subtidal mussel beds to date in the Lower Saxony has not found evidence of stable beds in the fishery areas. Furthermore, Bult (2004) estimated that mussel culture in the Dutch Wadden Sea resulted in an average increase of the mussel stock of 15 %; it would be reasonable to assume an increase of similar magnitude might result in the Lower Saxony. It is therefore unlikely that the harvest of subtidal seed mussels and their subsequent culture will decrease the mussel stock available for the eider duck population.</p> <p>Oystercatchers only feed in the intertidal at low tide and mussel beds are a main food resource for this species. The impact of the fishery on this food resource is limited through a number of measures described under UoA1, PI 2.4.2, SI(a). Although Pacific oysters have been recorded as becoming established over many mussel beds in the last 10-15 years, oystercatchers have been shown to be able to exploit young oysters as a food resource (Markert 2013; Troost 2010) as well as the mussels between them.</p> <p>Although both common eiders and oystercatchers are recorded as decreasing throughout much of the Wadden Sea including in the Lower Saxony, the reasons for this are unclear and although the current impact of fishery activities is not well known it would seem unlikely that food resources are a significant factor given the present calculated quantities of mussels which are at a ten-year high (see PI2.4.1 SI(a)). Therefore the assessment team considers that there is an objective basis for confidence that the strategy to manage the fishery’s impact on ETP marine bird species will work and the scores are:</p> <ul style="list-style-type: none"> • Eider ducks – SG80 • Oystercatchers – SG80 		

		<p>Grey and common seal populations in the North Sea and Wadden Sea are reported as increasing and there is no evidence that harbour porpoise populations in the northeast Atlantic are in decline (see sections 2.4.4.1 and 2.4.4.2). Given the strategy to limit the size and activity of the fishery, the assessment team considers that there is an objective basis for confidence that the strategy to manage the fishery's impacts on ETP marine mammal species will work and the scores are:</p> <ul style="list-style-type: none"> • Grey and common seals – SG80 • Harbour porpoise – SG80 <p>No quantitative analysis of the fishery's impact on food resources or disturbance of of ETP species is conducted and therefore SG100 is not met for any ETP species.</p>		
c	Guided post		There is evidence that the strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	Y – All ETP species
	Justification	<p>The fishery is closely monitored by the State Fisheries Directorate, National Park Authority, is limited in its extent and can only operate under the conditions of the various permits it receives. Annual mussel stock surveys provide evidence of the spatial cover and biomass of mussels on the intertidal beds throughout the Lower Saxony. As such there is clear, documented evidence that the fishery complies with its Management Plan and permit conditions and that the strategy is being implemented successfully. Therefore SG100 is met for all ETP species.</p>		
d	Guided post			There is evidence that the strategy is achieving its objective.
	Met?			Y – Grey and common seals, harbour porpoise N – Eider ducks and oystercatchers
	Justification	<p>There is basis for confidence that the strategy is achieving its objectives. However, as not all the interactions between mussel culture and bird populations are understood and have not been studied in the Lower Saxony, SG100 is not met for eider ducks and oystercatchers.</p> <p>SG100 is met for grey and common seals and harbour porpoise given the present knowledge that their populations are increasing or remaining stable in the North and Wadden Seas (see sections 2.4.4.1 and 2.4.4.2).</p>		
References	(Markert 2013; Troost 2010; Bult 2004)			

	Grey seal	90
	Common seal	90
	Harbour porpoise	90
	Oystercatcher	85
	Eider duck	85
OVERALL PERFORMANCE INDICATOR SCORE:	85	
CONDITION NUMBER:	N/A	

Evaluation Table for PI 2.3.2 – ETP species management strategy - UoA 2: Seed collection via ropes and nets and bottom culture

PI 2.3.2		The fishery has in place precautionary management strategies designed to: <ul style="list-style-type: none"> • Meet national and international requirements; • Ensure the fishery does not pose a risk of serious harm to ETP species; • Ensure the fishery does not hinder recovery of ETP species; and • Minimise mortality of ETP species. 		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There are measures in place that minimise 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 fishery'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 fishery'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?	Y	Y – All ETP species	N – All ETP species
	Justification	<p>The SMC installations are immobile and constructed from stiff rope or net material making it almost impossible for marine mammals or birds to become entangled. The use of this seed collection method can be considered a measure which helps to manage the fishery's impact on ETP species and minimises mortality.</p> <p>Further to this the Fishery Management Plan states in Section 2.5.4 that the fishery operations (including mussel stocking) are carried out in accordance with the protection requirements of the Natura 2000 area i.e. that of the National Park. As described in PI 2.3.1 SI(b), since the SMC operations must all be assessed before being licensed by the Fisheries Directorate (and be located outside the National Park boundary), this process itself forms a strategy to manage the fishery's impact on ETP species and is highly likely to achieve national and international requirements for their protection.</p> <p>Further to the above processes, once the seed mussels are collected from the SMC installations, both eider ducks and oystercatchers can feed on them when they are laid in intertidal and/or subtidal culture plots.</p> <p>The team concluded that the strategy in place (described above) to regulate the fishery and its activity levels will minimise mortality and will be highly likely to achieve national and international requirements. Therefore SG80 is met for all species.</p> <p>MSC v1.3 Guidance GCB3.3 states that a comprehensive strategy <i>"is a complete, tested strategy consisting of linked monitoring, analyses and</i></p>		

		<i>management measures and responses</i> ". The strategy in place is not set out in such detail so SG100 is not met..		
b	Guidepost	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 strategy will work, based on information directly about the fishery and/or the species involved.	The 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?	Y	Y – All ETP species	N – All ETP species
	Justification	<p>No entanglement of any species within the SMC ropes or nets has been reported so they are considered unlikely to cause mortality in this sense. Although marine mammal populations are reported as being stable or increasing within the Greater North Sea Ecoregion (see sections 2.4.4.1 and 2.4.4.2), those of marine birds in the Wadden Sea are presently reported to be in decline (Koffijberg 2016; Blew 2016). The reasons for the decline of the bird species, which includes eider ducks and oystercatchers, is unknown and fishery impacts have not been investigated in detail. However, Bult (2004) estimated that mussel culture in the Dutch Wadden Sea resulted in an average increase of the mussel stock of 15 %; it would be reasonable to assume an increase of similar magnitude might result in the Lower Saxony. It is therefore unlikely that the practice of mussel culture will decrease the food stock available for the eider duck and oystercatcher populations particularly as the present calculated quantities of mussels in the Lower Saxony are at a ten-year high (see PI2.4.1 SI(a)). Although Pacific oysters have been recorded as becoming established over many intertidal mussel beds in the last 10-15 years, oystercatchers have been shown to be able to exploit young oysters as a food resource (Markert 2013; Troost 2010) as well as the mussels between them.</p> <p>The assessment team considers that for both species an objective basis for confidence that the strategy to manage the fishery's impact on ETP species will work. SG80 is met for all species.</p> <p>No direct quantitative analysis of the fishery's impact on ETP species is conducted and therefore SG100 is not met for any species.</p>		
c	Guidepost		There is evidence that the strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y	Y – All ETP species

	Justification	The fishery is closely monitored by the State Fisheries Directorate, National Park Authority and can only operate under the conditions of the various permits it receives (see Section 2.5.4). Annual mussel stock surveys provide evidence of the spatial cover and biomass of mussels on the intertidal beds throughout the Lower Saxony. As such there is clear, documented evidence that the fishery complies with its Management Plan and permit conditions and that the strategy is being implemented successfully. Therefore SG100 is met for all ETP species.			
d	Guided post			There is evidence that the strategy is achieving its objective.	
	Met?			Y – Grey and common seals, harbour porpoise N – Eider ducks and oystercatchers	
	Justification	<p>There is basis for confidence that the strategy is achieving its objectives. However, as not all the interactions between mussel culture and bird populations are understood and have not been studied in the Lower Saxony, SG100 is not met for eider ducks and oystercatchers.</p> <p>SG100 is met for grey and common seals and harbour porpoise given the present knowledge that their populations are increasing or remaining stable in the North and Wadden Seas (see sections 2.4.4.1 and 2.4.4.2).</p>			
References	(Markert 2013; Troost 2010; Koffijberg 2016; Blew 2016; Bult 2004)				
				Grey seal	90
				Common seal	90
				Harbour porpoise	90
				Oystercatcher	85
				Eider duck	85
OVERALL PERFORMANCE INDICATOR SCORE:				85	
CONDITION NUMBER:				N/A	

Evaluation Table for PI 2.3.3 – ETP species information - UoA 1: Seed collection via dredging / nets and bottom culture

PI 2.3.3		Relevant information is collected to support the management of fishery impacts on ETP species, including: <ul style="list-style-type: none"> • 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	Guidepost	Information is sufficient to qualitatively estimate the fishery-related mortality of ETP species.	Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.	Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.
	Met?	Y – All ETP species	Y – All ETP species	Y – Grey and common seals, harbour porpoise N – Eider ducks and oystercatchers
	Justification	<p>There are monitoring programmes in place for ETP bird and mammal species within both the Wadden Sea and wider Greater North Sea Ecoregion (see Section 2.4.4.1, Section 2.4.4.2 and Section 2.4.4.3). These combined with discussions with fishers and stakeholders who expressed no concerns during wider discussions at the site visit stakeholder meeting provide sufficient data to conclude that there are no direct impacts from the fishery on ETP species.</p> <p>Concerning the potential indirect interactions between the fishery and shellfish-eating birds, annual data are available on the bird populations, mussel stock size and the quantities of mussels harvested and relocated by the fishery. Given that (i) no stable subtidal mussel beds have been identified in the area of fishery operations based on recent survey data (ii) intertidal seed mussels are rarely fished (if at all) from those beds available and (iii) the area and biomass of mussels is presently at a ten-year high, the assessment team considers that sufficient information exists to allow a quantitative estimation of fishing-related mortality on ETP bird species. The populations of ETP bird species are monitored and the impact of the fishery on these populations is considered insignificant. However the present understanding of all indirect interactions is not sufficient to estimate the outcome status of ETP bird species with a high degree of certainty and SG100 is not met. For eider ducks and oystercatchers, SG80 is</p>		

		<p>met.</p> <p>SG100 is met for grey and common seals and harbour porpoises as their populations have been demonstrated to be increasing or stable and there are few possible pathways for interactions with the fishery and no reported direct effects. There is therefore a high degree of certainty that their outcome status with respect to the fishery can be quantitatively estimated.</p>		
b	Guided ost	Information is adequate to broadly understand the impact of the fishery on ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.	Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Y – All ETP species	Y – All ETP species	N – All ETP species
	Justific ation	<p>The present high numbers of mussels in the Lower Saxony Wadden Sea (see above) and lack of any direct mortality caused by the fishery is sufficient to determine that the fishery is not a direct threat to ETP birds and is highly unlikely to be an indirect threat. Many of the proposed management measures in the recommendations for the Breeding Birds Action Plan (Koffijberg 2016) are based around habitat restoration at breeding and feeding sites, habitat management with respect to agriculture and industry, habitat creation, predator management, removal of barriers, tourist management and flood management with research on fishery interactions also recommended. The high number of other potential factors in the decline of breeding birds and the unlikely negative impact of mussel culture on overall food availability for eider ducks and oystercatchers mean the assessment team considers sufficient information exists to determine whether the fishery is likely to be a threat to the protection and recovery of these ETP species. SG80 is met for eider ducks and oystercatchers.</p> <p>Information on the fishery interactions (or lack of) with marine mammal ETP species is sufficient to determine that fishery is unlikely to cause a threat to their protection and recovery (see Section 2.4.4.1 and Section 2.4.4.2). Therefore SG80 is met for grey and common seals and harbour porpoises.</p> <p>Although it is commonly accepted that the fishery is highly unlikely to have a significant impact on any ETP species, there is not verifiable information on all interactions between the fishery and ETP species, so SG100 is not met.</p>		

c	Guided post	Information is adequate to support measures to manage the impacts on ETP species.	Information is sufficient to measure trends and support a full 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?	Y	Y – All ETP species	N – All ETP species	
	Justification	<p>As described above, information exists regarding ETP populations, mussel biomass and extent and on the lack of direct mortality from the fishery. Areas where the fishery operates are assessed by the Fisheries Directorate and the National Park Authority for ETP species and habitat types prior to licences being granted to ensure the Natura 2000 site features are not significantly impacted. Therefore the information available is sufficient to support this strategy and SG80 is met for all ETP marine bird and marine mammal species.</p> <p>MSC v1.3 Guidance GCB3.3 states that a comprehensive strategy “<i>is a complete, tested strategy consisting of linked monitoring, analyses and management measures and responses</i>”. Since the strategy is not considered a comprehensive strategy and the information available does not allow for a complete evaluation of all impacts (direct and indirect) with a high degree of certainty, SG100 is not met.</p>			
References		(Koffijberg 2016)			
				Grey seal	85
				Common seal	85
				Harbour porpoise	85
				Oystercatcher	80
				Eider duck	80
OVERALL PERFORMANCE INDICATOR SCORE:				85	

CONDITION NUMBER:	N/A
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Evaluation Table for PI 2.3.3 – ETP species information - UoA 2: Seed collection via ropes and nets and bottom culture

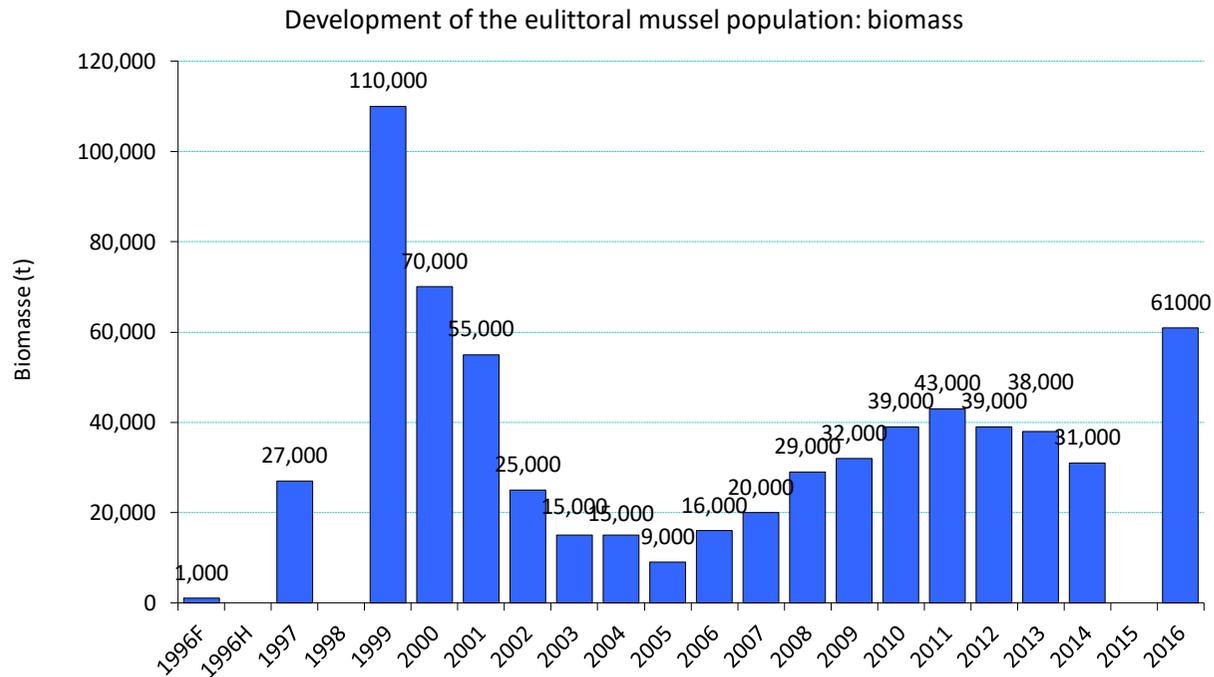
PI 2.3.3		Relevant information is collected to support the management of fishery impacts on ETP species, including: <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Information is sufficient to qualitatively estimate the fishery related mortality of ETP species.	Sufficient information is available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species.	Information is sufficient to quantitatively estimate outcome status of ETP species with a high degree of certainty.
	Met?	Y	Y – Eider ducks and oystercatchers	Y – Grey and common seals, harbour porpoise N – Eider ducks and oystercatchers
	Justification	<p>There are monitoring programmes in place for ETP bird and mammal species within both the Wadden Sea and wider Greater North Sea Ecoregion (see Section 2.4.4.1, Section 2.4.4.2 and Section 2.4.4.3). These combined with discussions with fishers and stakeholders who expressed no concerns during wider discussions at the site visit stakeholder meeting provide sufficient data to conclude that there are no direct impacts from the fishery on ETP species.</p> <p>Concerning the potential indirect interactions between the fishery and shellfish-eating birds, annual data are available on the bird populations, mussel stock size and the quantities of mussels grown on the SMC installations and culture plots and on annual harvest quantities following on-growing. SMC installation are also located away from key bird feeding and breeding areas and are outside the National Park boundary. Given that the area and biomass of mussels is presently at a ten-year high and the conclusion that mussel culture in other Wadden Sea areas can raise the mussel quantities by ~15% (Bult 2004), the assessment team considers that sufficient information exists to allow a quantitative estimation of fishing-related mortality on ETP birds species. SG80 is met for oystercatchers and eider ducks.</p> <p>The populations of ETP bird species are monitored and the impact of the fishery on these populations is considered insignificant (see Section 2.4.4.3). However the present understanding of all indirect interactions is not sufficient to estimate their outcome status with a high degree of</p>		

		<p>certainty. SG100 is not met.</p> <p>SG100 is met for grey and common seals (see Section 2.4.4.1) and harbour porpoises (see Section 2.4.4.2) as their populations have been demonstrated to be increasing or stable and there are few possible pathways for interactions with the fishery and no reported direct effects. There is therefore a high degree of certainty that their outcome status with respect to the fishery can be quantitatively estimated.</p>		
b	Guided post	Information is adequate to broadly understand the impact of the fishery on ETP species.	Information is sufficient to determine whether the fishery may be a threat to protection and recovery of the ETP species.	Accurate and verifiable information is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	Y	Y – All ETP species	N – All ETP species
	Justification	<p>The present high numbers of mussels in the Lower Saxony Wadden Sea (see above) and lack of any direct mortality caused by the fishery is sufficient to determine that the fishery is not a direct threat to ETP birds or mammals and is highly unlikely to be an indirect threat. Many of the proposed management measures in the recommendations for the Breeding Birds Action Plan (Koffijberg 2016) are based around habitat restoration at breeding and feeding sites, habitat management with respect to agriculture and industry, habitat creation, predator management, removal of barriers, tourist management and flood management with research on fishery interactions also recommended. The high number of other potential factors in the decline of breeding birds and the highly unlikely negative impact of mussel culture on overall food availability for eider ducks and oystercatchers mean the assessment team considers sufficient information exists to determine whether the fishery is likely to be a threat to the protection and recovery of these ETP species. SG80 is met for eider ducks and oystercatchers.</p> <p>Information on the fishery interactions (or lack of) with marine mammal ETP species is sufficient to determine that fishery is unlikely to cause a threat to their protection and recovery. Therefore SG80 is met for grey and common seals and harbour porpoises.</p> <p>Although it is commonly accepted that the fishery is highly unlikely to have a significant impact on ETP species, there is no verifiable information on all interactions between the fishery and ETP species, so SG100 is not met.</p>		
c	Guided post	Information is adequate to support measures to manage the impacts on ETP species.	Information is sufficient to measure trends and support a full strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.

	Met?	Y	Y – All ETP species	
	Justification	<p>As described above, information exists regarding ETP populations, mussel biomass and extent and on the lack of direct mortality from the fishery. Areas where the fishery operates are assessed by the Fisheries Directorate and the National Park Authority for ETP species and habitat types prior to licences being granted to ensure the Natura 2000 site features are not significantly impacted; all SMC installations are located outside the National Park boundary and away from important ETP species feeding, breeding or resting areas. Therefore the information available is sufficient to support this strategy and SG80 is met for all ETP marine bird and marine mammal species.</p> <p>MSC v1.3 Guidance GCB3.3 states that a comprehensive strategy “<i>is a complete, tested strategy consisting of linked monitoring, analyses and management measures and responses</i>”. Since the strategy is not considered a comprehensive strategy and the information available does not allow for a complete evaluation of all impacts (direct and indirect) with a high degree of certainty, SG100 is not met.</p>		
References	(Koffijberg 2016; Bult 2004)			
			Grey seal	85
			Common seal	85
			Harbour porpoise	85
			Oystercatcher	80
			Eider duck	80
OVERALL PERFORMANCE INDICATOR SCORE:			85	
CONDITION NUMBER:			N/A	

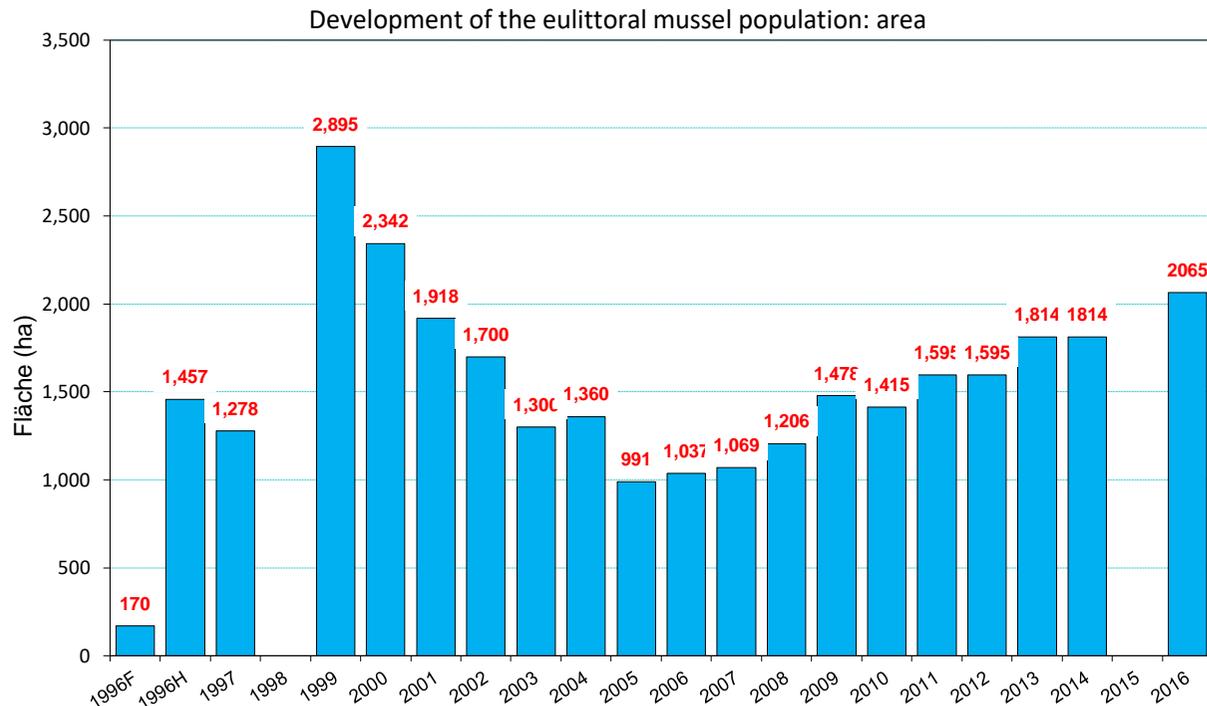
Evaluation Table for PI 2.4.1 – Habitats outcome - UoA 1: Seed collection via dredging / nets and bottom-culture

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
	Met?	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection N – Sublittoral seed collection N – Bottom culture
	Justification	<p>The seed mussel fishery takes place in both intertidal and sublittoral areas under permits issued by the State Fisheries Directorate, Bremerhaven.</p> <p><u>Intertidal seed harvest</u> (Section 2.4.5.1)</p> <p>The mussel stock in the intertidal is monitored annually; the total biomass and the area of mussel beds are calculated every year and must remain above the 1994 threshold levels of 10,000 t and 1,000 ha. Presently (following the 2016 surveys) the levels are estimated to be ~6x this for biomass (a ten-year high) and ~2x this figure for area. Since 1997 the mussel stocks have fallen below these levels only once in 2005. Therefore, no evidence exists to suggest that serious or irreversible harm is occurring.</p> <p>In the intertidal, there are 102 ‘mussel locations’ that may be comprised of more than one mussel bed. The 102 identified mussel locations comprise those sites where, according to past experience, accumulations of mussels have a good chance to form stable mussel beds. A mussel location may comprise more than one mussel bed. Of the 102 intertidal mussel locations recorded, 29 are off limits to the fishery. Of these locations, 12 are protected by the National Park Authority, 12 are protected by the fishery Management Plan and a further five are voluntarily avoided by the fishery for the purposes of monitoring. Of the remaining 73 intertidal locations potentially open to seed mussel fishing, only one or two are likely to be fished in any given year with none having been fished since 2009 (and evidenced through available VMS data); this results in a very infrequent and small spatial overlap of the fishery with any intertidal mussel beds irrespective of stability. Furthermore, the mussel fishery regulation only allows fishing of mussels of up to 4 cm shell length (with 25% in weight of bigger mussels permitted). Thus, older mussel beds are excluded from fishing and have the potential to stabilise. Since the arrival of Pacific oysters (<i>Crassostrea gigas</i>) in the Wadden Sea any fishing of such stable intertidal mussel beds is further prevented owing to the potential to damage the fishing equipment and the lower percentage of mussels harvested.</p>		



Quelle: Dr. Millat, Nationalparkverwaltung 2017

Figure 1: Variations in the intertidal mussel biomass (t) estimates in the Lower Saxony Wadden Sea since 1996.



Quelle: Dr. Millat, Nationalparkverwaltung 2017

Figure 2: Variations in the intertidal mussel spatial cover (ha.) estimates in the Lower Saxony Wadden Sea since 1996.

On the basis of the mussel habitat assessments providing maps with evidence of mussel bed occurrence and distribution, the evidence of historical and present stock levels and the VMS evidence that either very few or no intertidal stable mussel beds are fished for mussel seed, the assessment team consider that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm and SG100 is met.

Sublittoral seed harvest (Section 2.4.5.1)

In the sublittoral the main concern is regarding the potential impact of the seed fishery on stable sublittoral mussel beds. Following the initial fishery MSC assessment, the action plan required the development to map the sublittoral mussel beds and ascertain their stability status. The research

undertaken used information provided by both shrimp fishermen and mussel farmers and does not cover the whole of the Lower Saxony Wadden Sea, rather only those areas where fishers operate (Stralen 2015; Stralen 2016). The research has nonetheless identified that no stable sublittoral mussel beds are likely to exist in the fishery areas and that the beds that are identified are unlikely to be stable; all known sublittoral beds have been mapped with their stability categorised on a scale of 1-5. This information allows the fishery to manage its operations in the knowledge that it is highly unlikely to cause serious or irreversible harm to stable mussel beds. The Fishery Management Plan acknowledges that as no stable mussel beds could be found, no measures are presently required to prevent serious damage. Further assessment of the sublittoral habitats, including mussel beds, is planned at the beginning of the present 2017-2021 Management Plan by the NLWKN (Niedersächsische Landesbetrieb for Water Management, Coastal and Nature Conservation) Coastal Research Centre in cooperation with the National Park Administration. The fishery acknowledges that should stable mussel beds be found, then they would be unlikely to conflict with the fishery due to the likelihood of gear damage and measures would be put in place to ensure its operations did not cause them serious or irreversible harm.

Those sublittoral beds that are fished for seed mussel are recognised by the fishery and the regulatory authorities as ephemeral and would quickly disappear as a result of strong currents and/or winter storms if they were not harvested. This is a recognised phenomenon following mussel spatfall. It is these harvested seed mussels that are then used to lay on the licensed bottom-culture plots.

On the basis of the independent assessments made to date and in relation to stable sublittoral mussel beds, the assessment team considers that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm and SG80 is met. SG100 is not met as all sublittoral mussel beds potentially remain open to seed mussel harvesting yet all/most of the sublittoral areas have not been mapped (an on-going activity) and the stability status of any unknown beds remains unknown.

Bottom-culture (Section 2.4.5.3).

Bottom-culture of mussels is undertaken only in permitted intertidal and sublittoral areas over a very limited portion of the Lower Saxony Wadden Sea. The total area permitted for mussel bottom-culture is capped at 1,300 ha. which accounts for <0.4% of the total National Park area (~345,800 ha.). The allocation of culture areas is described below in PI2.4.2, SI(a) and is considered carefully by the Fisheries Directorate and the National Park Authority to ensure that no vulnerable habitats are likely to be impacted by the proposed operations

Studies on mussel culture plots in the Menai Strait, UK have shown the impact on natural community diversity was confined directly to the footprint of the mussel lays and there was no evidence of any effects propagating beyond the lays (Beadman 2004). Given the low diversity of natural communities over which mussel bottom-culture plots are permitted, removal of the mussels would likely result in the restoration of natural habitats within a timescale of approximately one year.

Based on the tight controls surrounding the location and permitting of mussel culture plots and their relatively small footprint within the National Park, the assessment team considers this activity is highly unlikely to reduce habitat structure and function to a point where there would be serious

	or irreversible harm and SG80 is met. SG100 is not met as there have been no site-specific studies to provide evidence of this.	
References	Beadman 2004; Stralen 2015, 2016	
	Intertidal seed collection	100
	Sublittoral seed collection	80
	Bottom culture	80
OVERALL PERFORMANCE INDICATOR SCORE:	85	
CONDITION NUMBER:	N/A	

Evaluation Table for PI 2.4.1 – Habitats outcome - UoA 2: Seed collection via ropes and nets and bottom culture

PI 2.4.1		The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.	There is evidence that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
	Met?	Y – Suspended mussel culture, Y – Bottom-culture	Y – Suspended mussel culture, Y – Bottom-culture	N – Suspended mussel culture, N – Bottom-culture
	Justification	<p>The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. Literature reports indicate a variety of potential effects on the benthic environment from mussel culture with many of the main potential impacts described by Kaiser et al (1998).</p> <p>Suspended Mussel Culture (Section 2.4.5.2)</p> <p>The rain of faeces and pseudo-faeces from suspended mussel culture (SMC) crops could lead to organic enrichment of the sediments below mussel farms where there is little water flow. This can create organic enrichment of the benthos leading to anaerobic and acidic conditions which result in elevated levels of sulphides and ammonium (Tenore 1985). These conditions can cause declines in the abundance of large, deep-burrowing species of molluscs, echinoderms, crustaceans and polychaetes and a shift in food webs away from predominantly suspension-feeding organisms and ore in favour of deposit-feeding faunas. The severity of benthic impacts, however, is not consistent as studies have revealed effects varying from severe impacts on all examined parameters to low impacts on only few of the parameters (Hatcher 1994) whilst other studies did not detect any significant effects (Crawford 2003).</p> <p>In the Netherlands the fast expansion of SMC prompted a range of impact studies under the framework of the PRODUS project (Project Sustainable Shellfish Fishery). Kamermans (2008) described the ecosystem impacts of SMC and investigated the effects of the deposition of organic material on the sediment and fauna beneath spat collectors (Kamermans 2010). Since the activity in the Lower Saxony is carried out with the same rope and net systems used in the Netherlands and the Lower Saxony Wadden Sea and the Dutch Wadden Sea are both part of the same larger Wadden Sea ecosystem, the scientific information from the Dutch research efforts could be considered relevant for this activity in the Lower Saxony Wadden Sea.</p> <p>To support this assertion, a review was completed on the total ‘free’ sulphide (S₂⁻) in surficial (0-2 cm) sediments on the seabeds under the rope-</p>		

	<p>growing sites on installation areas with similar morphological and hydrodynamic characteristics to the UoA (Holstein 2015). The review specifically compared suspended mussel culture (SMC) installations in the Netherlands with those in the Lower Saxony ‘Southern Wanger-Reede’. The review determined that, the research in the western Wadden Sea and Oosterschelde showed that effects due to deposition of pseudo-faeces in the vicinity of SMC on the seafloor and benthic species cannot be detected. The seafloor underneath different types of SMC in the Wadden Sea and Oosterschelde was sampled, both directly after installation of the SMC and during the peak in biomass on the SMC. The SMC were located in channels with relatively strong currents. Within 1 km of the SMCs there were no detectable changes in the seafloor (Kamermans 2010). During a different field study underneath a mussel rope-culture in Mattenhaven (Oosterschelde), no changes between the seafloor underneath the rope-culture and the reference area were detected (Seip 2014). The studies determined that as SMC are located in areas with relatively strong currents, this resulted in no accumulation of organic material (Kamermans 2014). The comparison made between the SMC ‘Southern Wanger-Reede’ in Lower-Saxony with the Dutch SMC-locations found the strength of the currents and depths at the locations to be similar, indicating that significant impacts would be highly unlikely.</p> <p>It is possible that the sediment fractions beneath SMC installations could change over time as shells and other hard materials fall from the SMC ropes and nets. Given that the total area over which SMC installations are active within the Lower Saxony (located in the Jade near the industrial port of Wilhelmshaven) is a tiny fraction of a percent of the total Wadden Sea area, the assessment team does not anticipate that any major impacts would arise as a result. Winter storms and tidal currents could also be expected to disperse any residual shall fractions over time.</p> <p>SMC is a permitted activity and prior to any licensing an assessment is carried out to ensure no vulnerable habitats such as seagrass beds are within or near to the proposed SMC area. Furthermore, the spat collection sites in the Lower Saxony are based in semi-sheltered open water. The client has stated that the sediment type under the SMC sites is normally sandy mud. It is expected that sedimentation of fine sediment (pseudo-faeces) will have a relatively low impact on this sediment type. The main effect is likely to be the addition of organic matter to the habitats. This effect however is localised, seasonal in occurrence and the relative impact on the whole Wadden Sea is extremely small at just a fraction of 1%. When the activity ceases the situation is expected to return to baseline levels within one year (a time-scale agreed with stakeholders during the original assessment).</p> <p>Based on the above studies and management procedures in place, the assessment team considers that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm and SG80 is met. SG100 is not met because site-specific studies on the benthic impacts beneath and around SMC sites in the Lower Saxony have not been completed.</p> <p>Bottom-culture (Section 2.4.5.3)</p> <p>The impacts of the on-growing bottom-culture phase are identical to those described above under UoA 1.</p> <p>Based on the tight controls surrounding the location and permitting of mussel culture plots and their relatively small footprint within the National Park, the assessment team considers this activity is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm and SG80 is met. SG100 is not met as there have been no site-specific studies to provide evidence of this.</p>	
References	(Kaiser 1998; Kamermans 2010; Kamermans 2008; Holstein 2015; Seip 2014; Kamermans 2014; Tenore 1985; Hatcher 1994; Crawford 2003)	
	Suspended mussel culture	80

	Bottom culture	80
OVERALL PERFORMANCE INDICATOR SCORE:	80	
CONDITION NUMBER:	N/A	

Evaluation Table for PI 2.4.2 – Habitats management strategy - UoA 1: Seed collection via dredging/nets and on-growing

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	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 the fishery on habitat types.
	Met?	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection N – Sublittoral seed collection Y – Bottom culture
	Justification	<p>The fishery has a Management Plan in place, which states one of its main objectives is to achieve the effective combination of economic requirements and ecological goals. The plan states that the mussel fishery is carried out in accordance with the habitat protection objectives of the National Park. Therefore, at the very least a partial strategy exists (see Section 2.5.4).</p> <p>The Management Plan has several measures in place to protect habitats either specifically or in part, including:</p> <ul style="list-style-type: none"> • Promoting the sustainable use of resources; • Requiring black boxes on all vessels in addition to the VMS systems; • States minimum mussel stock levels must cover a minimum of 1,000 hectares and have an estimated biomass of 10,000 tonnes; • Denotes closed areas. <p>In the instance that the mussel fishery wishes to fish seed from an intertidal or sublittoral location, the fishery must apply for a permit. Permits are issued by the State Fisheries Directorate, Bremerhaven. The application will be reviewed by the Fisheries Directorate, which will also consult the National Park Authority.</p> <p>In relation to the application, the National Park Authority will assess the following:</p> <ul style="list-style-type: none"> • Whether the seed areas are in the intertidal or sublittoral; • If seagrass is present; 		

- Quality and size of the seed beds;
- Whether the seed can be fished or not;
- Is it in a protected area?
- Are any man-made structures in the area (cables etc.)?
- Any overlap with other activities.

The Fisheries Directorate will consider the location of the application and the size of the mussels, since seed mussels larger than 4 cm should not be fished. In recent years there have also been several years where no mussel locations (in the intertidal) have been fished at all.

During review of any licence applications by the Fisheries Directorate it will also be determined whether vulnerable habitats such as seagrass are present in the area applied for. No permits are issued if fishing will occur in or near to seagrass beds.

Intertidal seed harvest (Sections 2.4.5 and 2.4.5.1)

The fishery regulations and the Management Plan contain several measures that regulate the impact of the seed mussel fishery on intertidal mussel beds. Out of 102 mussel locations (Standorte) in the intertidal, 29 are closed for seed mussel fisheries. Of the remaining locations, only a limited number are fished in any given year, if at all, with only one fished in the past 10 years in 2009. Licences are issued for a specific period and a specific area marked by co-ordinates; vessel activity within the areas is monitored via VMS and black box systems and recorded in vessel logbooks.

The previous MSC assessment included a condition to map the development of stable mussel beds in the intertidal. As part of the Trilateral Wadden Sea Monitoring (TMAP), the state government conducts a comprehensive aerial survey once a year to determine the location and area of the mussel deposits in the entire eulittoral of the Wadden Sea of Lower Saxony. To determine the total biomass, on-site examinations at a total of 29 mussel locations are required (Millat & Adolph 2017). At these locations, the National Park Administration annually determines stocking and coverage in spring / summer and extracts samples from which live weight and shell lengths are determined. The State Fisheries Directorate conducts surveys on the location and extent of these areas, stocking densities, size distribution of the bivalve molluscs and quantity estimates prior to the release of stocking resources. The Fisheries Office is assisted by the mussel fisheries. The upper limit on the bottom-culture plots of 1,300 ha. also limits any increase in activity of the seed fishery as all seed mussels fished within the Lower Saxony must be relocated to culture plots within the Lower Saxony area.

The aerial and field surveys are undertaken each spring as part of the mussel stock assessment (and by proxy the mussel bed habitat assessment) and act as the foundation for the Management Plans (Bewirtschaftungsplan). These allow the spatial extent of intertidal beds to be calculated and

the locations of any stable beds to be recorded and regularly updated. If the intertidal beds are stable they would be highly likely to be situated on hard substrate and/or among oyster beds. The fishery cannot operate over hard substrate as their gear would be damaged and/or the seed mussel catches would contain a high percentage of oysters. These areas are therefore not fished, thereby avoiding any conflict with the fishery.

Based on the fact that the present quantity of mussels recorded in the intertidal is estimated at ~6x the minimum reference value of 10,000 t and is the highest recorded value in the past ten years the strategy can also be expected to achieve the Ecosystem Outcome 80 level of performance. Given the knowledge of stable intertidal mussel beds and the specific consideration of these issues in the present Management Plan, the assessment team considers that SG80 is met.

The collaborative process between the Fisheries Directorate and the National Park Authority regarding the various permit applications, coupled with the requirements to ensure a minimum quantity of mussel remain as well as restricting activities over or near to vulnerable habitats constitutes a specific strategy to manage the impacts of the fishery on the habitats present so SG100 is also met.

Sublittoral seed harvest (Section 2.4.5.1)

In the sublittoral, the management plan rules that seed mussels that will be moved to culture plots should be no larger than 4 cm also applies. However, in the sublittoral a fishery for consumption mussels is allowed when the mussels have passed the minimum size of 5 cm. This means that in the sublittoral in principle nearly all mussels located by the mussel sector can be fished; only beds with mussels between 4 and 5 cm are exempted. As in the intertidal in all cases a licence is needed and licences are issued for a specific period and a specific area marked by co-ordinates.

As with the intertidal, the condition raised at the initial certification, also required the mapping of stable mussel beds in the sublittoral. The aerial surveys are unable to determine if stable beds exist in the sublittoral. A stability map for sublittoral mussel beds in the Lower Saxony Wadden Sea was completed in 2015 and updated in 2016 (Stralen 2015; Stralen 2016). To date, no stable mussel beds have been identified in the sublittoral. The stability study suggested that the probability of stable sublittoral mussel locations in the coastal waters of Lower Saxony is low due to the high hydrological dynamics. The Fishery Management Plan states that further information on the presence of sublittoral mussel locations shall be provided by the habitat mapping of the sublittoral, which will be carried out during the term of the present management plan by the National Park

		<p>Administration and the Coastal Research Centre of the NLWKN. Based on the evidence from the stability map, a partial strategy is not necessary, as no stable mussel beds exist in the sublittoral area of the fishery. No specific management measures are deemed necessary and the existing condition is considered to be met, and SG80 is awarded by default here⁷.</p> <p>If stable beds were located then measures would be put in place i.e. for the same reasons as stated above, the fishers would not want to fish the sites due to the probability of gear damage and so would avoid the habitats.</p> <p><u>Bottom-culture (Section 2.4.5.3)</u></p> <p>If a fisherman wants to start a new bottom-culture plot, in either intertidal or sublittoral locations, he must accordingly give up an equivalent area from his existing plots as the total area permitted to be fished is fixed within the National Park to 1,300 ha. To start a new plot a permit must be applied for which there is a procedure to follow:</p> <ul style="list-style-type: none"> • Other mussel and shrimp fishermen are consulted; • The National Park Authority and the Fisheries Directorate assess the benthic habitats to be affected and survey them if necessary; • The application is printed in the “Niedersächsisches Ministerialblatt” (another legal requirement); • The Fishery Directorate has procedures for producing the maps of new and old plots, changes in areas etc. <p>On this basis, a strategy is in place to manage the impact of the bottom culture element of the fishery on the habitats present. SG100 is met.</p>		
b	Guided post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.
	Met?	Y – Intertidal seed collection Y – Sublittoral seed collection	Y – Intertidal seed collection Y – Sublittoral seed collection	Y – Intertidal seed collection N – Sublittoral seed collection

⁷ Unless MSC guidance, if the fishery does not need to have measures or partial strategy because there is no or negligible impact on specific components, it would meet at least the SG80 level.

		Y – Bottom culture	Y – Bottom culture	N – Bottom culture
	Justification	<p><u>Intertidal seed harvest (Sections 2.4.5 and 2.4.5.1)</u> Stable intertidal mussel beds are known, mapped and are not fished by the fishery. Monitoring of vessel activity via VMS and additionally Black Box demonstrates that the fishery adheres to the permit conditions under which it operates. Both of these points provide objective basis for confidence that the strategy is working. Further to this, annual surveys of intertidal mussel beds demonstrate a ten-year high in terms of total mussel biomass present giving high confidence that the fishery is not negatively impacting these habitats. SG100 is therefore met.</p> <p><u>Sublittoral seed harvest (Section 2.4.5.1)</u> Research into the occurrence of stable sublittoral mussel beds has found no evidence of their existence (Stralen 2015; Stralen 2016) and, by way of association, there are therefore no detrimental impacts on these habitats. A partial strategy was deemed not necessary in SI(a) above. Monitoring of vessel activity via VMS demonstrates that the fishery adheres to the permit conditions under which it operates. SG80 is met. As SI(a) only scored SG80, SG100 cannot be met here.</p> <p><u>Bottom-culture (Section 2.4.5.3)</u> Prior to permits being issued for intertidal or sublittoral seed mussel harvesting or changes to bottom-culture plots, site-specific assessments are undertaken by the National Park Authority and the Fisheries Directorate to ensure no adverse impact to vulnerable habitats will occur. Regarding bottom-culture plots, these are tightly controlled by permits and not permitted to occur over or near to vulnerable habitats such as seagrass beds. On the basis of the points above, the assessment team consider there is an objective basis for confidence that the management strategy for the bottom culture will work based on knowledge about the fishery and the habitats involved. Therefore SG80 is met. SG100 is not met as there are no site-specific studies to test for habitat impacts following licensing of new bottom-culture plots.</p>		
c	Guided post		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection N – Sublittoral seed collection Y – Bottom culture
	Justification	The fishery vessels are monitored constantly via VMS and all operations are controlled by permits that are only issued if the assessments of site-specific impacts conclude there will be no significant negative habitat impacts. All activities are therefore logged and provided to the authorities. Further to this, annual surveys of intertidal mussel beds demonstrate a ten-year high in terms of total mussel biomass present giving clear		

		<p>evidence that the strategy is being implemented successfully. SG100 is therefore met.</p> <p>In the case of the sublittoral, a partial strategy was not deemed necessary due to the absence of stable mussel beds. This was evidenced in the stability maps completed in 2015 and 2016 by van Stralen. On the basis of the above, SG80 is met. In the absence of a full strategy, SG100 cannot be met.</p> <p>With regard to bottom-culture, there is evidence that the strategy is being implemented successfully in terms of the licensing and habitat assessment procedures and the logging of vessel activity via VMS. Therefore SG100 is met.</p>	
d	Guided post		There is some evidence that the strategy is achieving its objective.
	Met?		Y – Intertidal seed collection N – Sublittoral seed collection Y – Bottom culture
	Justification	<p>As stated above, mussel biomass and spatial cover in the intertidal is at a ten-year high thereby providing some evidence that the fishery is not negatively affecting mussel beds in the intertidal. Bottom culture areas must give up an area and close it before they may open another and thereby maintaining a limited spatial footprint over the Wadden Sea benthic habitats and minimising any likelihood of serious or irreversible harm. The management strategy can therefore be said to be achieving its objective of not having a serious or irreversible impact on these habitats and the scoring issue is met and SG100 awarded for both intertidal seed collection and bottom culture.</p> <p>Assessments of stable sublittoral mussel beds (see SI(a)) have to date, only provided evidence of their absence. In previous SIs in this PI, SG100 was not awarded and therefore cannot be awarded here. SG100 is not met.</p>	
References	van Stralen 2015, 2016		
		Intertidal seed collection	100
		Sublittoral seed collection	80
		Bottom culture	95

OVERALL PERFORMANCE INDICATOR SCORE:	90
CONDITION NUMBER:	N/A

Evaluation Table for PI 2.4.2 – Habitats management strategy - UoA 2: Seed collection via ropes and nets and bottom culture

PI 2.4.2		There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	Guided 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 the fishery on habitat types.
	Met?	Y – Suspended mussel culture, Y – Bottom-culture	Y – Suspended mussel culture, Y – Bottom-culture	Y – Suspended mussel culture, Y – Bottom-culture
	Justification	<p>The fishery has a Management Plan in place which states one its main objectives is to achieve the effective combination of economic requirements and ecological goals. The Management Plan states that the mussel fishery is carried out in accordance with the habitat protection objectives of the National Park.</p> <p><u>Bottom culture (Section 2.4.5.3)</u> Specific details of the management procedures undertaken surrounding mussel-bottom culture sites and their management are outlined in PI 2.4.2 for UoA 1 above. Therefore a strategy exists to manage the impacts of the fishery on habitats and SG100 is met.</p> <p><u>Suspended mussel culture (Section 2.4.5.2)</u> Licences for Suspended Mussel Culture (SMC) or for the bottom-culture of mussels at a particular site are granted following an evaluation of the impacts of the activity. Permits are issued by the State Fisheries Directorate, Bremerhaven. Permission will not be given for SMC installations or bottom-culture in vulnerable areas and all SMC areas are located outside the National Park. The area of SMC spat collection sites is very limited and tightly controlled and reviews of likely habitat impacts support the assertion that there will be no significant impact. Therefore as a strategy is in place for managing any habitat impacts of the fishery from SMC, SG100 is met.</p>		
b	Guided post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	There is some objective basis for confidence that the partial strategy will work, based on information directly about the fishery and/or habitats involved.	Testing supports high confidence that the strategy will work, based on information directly about the fishery and/or habitats involved.

	Met?	Y – Suspended mussel culture, Y – Bottom-culture	Y – Suspended mussel culture, Y – Bottom-culture	N – Bottom culture N – Suspended mussel culture
	Justification	<p>Annual surveys of intertidal mussel beds demonstrate a ten-year high in terms of total mussel biomass present giving high confidence that the fishery is not negatively impacting these habitats. Stable intertidal mussel beds are known, mapped and are not fished by the fishery.</p> <p><u>Bottom-culture (Section 2.4.5.3)</u> Prior to permits being issued for intertidal or sublittoral seed mussel harvesting or changes to bottom-culture plots, site-specific assessments are undertaken by the National Park Authority and the Fisheries Directorate to ensure no adverse impact to vulnerable habitats will occur. Regarding bottom-culture plots, these are tightly controlled by permits and not permitted to occur over or near to vulnerable habitats such as seagrass beds. On the basis of the points above, the assessment team consider there is an objective basis for confidence that the management strategy for the bottom culture will work based on knowledge about the fishery and the habitats involved. Therefore SG80 is met. SG100 is not met as there are no site-specific studies to test for habitat impacts following licensing of new bottom-culture plots.</p> <p><u>Suspended mussel culture (Section 2.4.5.2)</u> Permits for SMC are granted following an evaluation of the impacts of the activity. Permits are issued by the State Fisheries Directorate, Bremerhaven. Monitoring of vessel activity via VMS demonstrates that the fishery adheres to the permit conditions under which it operates. The location of SMC sites is exactly known since the coordinates of the sites are described in the licence. Inspectors control the site location and the allocated number of lines on a regular basis. From scientific literature it is generally accepted that the impacts of mussel farms are determined by water speed, water depth, farm size and stocking densities. These parameters are known and a literature review of potential impacts on the habitats beneath SMCs suggests that significant impacts are unlikely (Holstein 2015). There is also a good understanding of the distribution of habitats (mussel beds, sea grass) in the Wadden Sea. Mussel spat collection sites are not present in vulnerable areas and are located outside the National Park.</p> <p>There is thus some objective basis for confidence that the strategy will work, based on some information directly about the fishery and/or habitats involved. SG80 is met. SG100 is not met as specific field-studies on the impacts of SMC at sites in the Lower Saxony have not been undertaken.</p>		
c	Guided post		There is some evidence that the partial strategy is being implemented successfully.	There is clear evidence that the strategy is being implemented successfully.
	Met?		Y – Suspended mussel culture, Y – Bottom-culture	Y – Suspended mussel culture, Y – Bottom-culture

	Justification	<p>The fishery vessels are monitored constantly via VMS and additionally Black Box and all operations are controlled by permits which are only issued if the assessments of site-specific impacts conclude there will be no significant negative habitat impacts. All activities are therefore logged and provide evidence that the strategy is implemented successfully.</p> <p>SMC sites are allocated within specific co-ordinates outside the National Park boundary. The locations of these sites are easy to determine to demonstrate the strategy is being implemented. SMC are also located away from vulnerable habitats and it is therefore evident that the strategy is aiming to prevent negative impacts. Annual surveys of intertidal mussel beds also maps the culture plots and provides clear evidence that this element of the management strategy is being implemented successfully.</p> <p>On the basis of the above, SG100 is met for suspended mussel culture.</p> <p>With regard to bottom-culture, there is evidence that the strategy is being implemented successfully in terms of the licensing and habitat assessment procedures and the logging of vessel activity via VMS. Therefore SG100 is met.</p>	
d	Guided post		There is some evidence that the strategy is achieving its objective.
	Met?		Y – Suspended mussel culture, Y – Bottom-culture
	Justification	<p><u>All activities</u></p> <p>As stated above, mussel biomass and spatial cover in the intertidal is at a ten-year high thereby providing some evidence that the fishery is not negatively affecting mussel beds in the intertidal. Bottom culture areas must give up an area and close it before they may open another and thereby maintaining a limited spatial footprint over the Wadden Sea benthic habitats and minimising any likelihood of serious or irreversible harm. The management strategy can therefore be said to be achieving its objective of not having a serious or irreversible impact on these habitats and the scoring issue is met and SG100 awarded for bottom culture.</p> <p>A review of likely impacts of SMC on the habitats beneath in similar areas of the Dutch Wadden Sea concluded that given the similar physical and hydro-dynamic characteristics of the sites, significant negative habitat impacts were unlikely. As there is some evidence that the strategy is achieving its objective, SG100 is met for bottom-culture and suspended mussel culture.</p>	
References	(Holstein 2015)		

	Suspended culture	95
	Bottom culture	95
OVERALL PERFORMANCE INDICATOR SCORE:	95	
CONDITION NUMBER:	N/A	

Evaluation Table for PI 2.4.3 – Habitats information - UoA 1: Seed collection via dredging / nets and bottom culture

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	N – Intertidal seed collection N – Sublittoral seed collection N – Bottom culture
	Justification	<p><u>Intertidal seed harvest (Section 2.4.5.1)</u> All seed collection activities are licensed; therefore, the locations and the spatial extent of the collection sites are exactly known, as are the habitats within which the activities occur to approve the licence. There is yearly monitoring of the mussel stock and distribution of mussel beds in the intertidal by the National Park Authority (Millat 2012). The locations and distribution of main habitat types, such as seagrass beds, are also known at a scale relevant to the fishery as a result of the on-going monitoring. To that end, the nature, distribution and vulnerability of the main habitats in the fishery are known at a level of detail relevant to the scale and intensity of the fishery and SG80 is met. SG100 is not met as the occurrence of vulnerable habitats types such as seagrass and/or mussel beds over their full range is not fully known.</p> <p><u>Sublittoral seed harvest (Section 2.4.5.1)</u> As with the intertidal, all seed collection activities in the sublittoral area of the fishery are licensed. Some monitoring is conducted by the fishery in its operational areas. The previous assessment required an action plan to map stable sublittoral mussel beds to improve information on their occurrence and distribution. Surveys were undertaken and did not detect the presence any stable sublittoral mussel beds in the areas in which the fishery operates. This information now exists at a level of detail relevant to the scale and intensity of the fishery and SG80 is met. For sublittoral areas information is less certain as aerial surveys cannot always detect sublittoral mussel beds or seagrass beds so SG100 cannot be awarded.</p> <p><u>Bottom-culture (Section 2.4.5.3)</u> No bottom-culture activities are allowed over sensitive habitats. The information to determine the risks posed by the on-growing phase to habitat</p>		

		<p>types is identical with that evaluated under UoA 2. Like the elements above, the bottom-culture activities are licensed. Therefore, the locations and the spatial extent the culture plots are exactly known as are the habitats within which the activities occur. On this basis, information exists at a level of detail relevant to the scale and intensity of the fishery and SG80 is met.</p> <p>As all habitat types have not been evaluated throughout their geographical range, SG100 is not met.</p>		
b	Guided 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.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the timing and location of use of the fishing gear.	The physical impacts of the gear on the habitat types have been quantified fully.
	Met?	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	N – Intertidal seed collection N – Sublittoral seed collection N – Bottom culture
	Justification	<p><u>Intertidal seed harvest</u></p> <p>Further and more recent information is available from research carried out in the Wadden Sea (especially in the Netherlands) on the impact of seed collection (and bottom-culture on habitat types) (Ens 2004; Brink 2009; Fey 2008; Fey 2007; Craeymeersch 2013; Drent 2013) and therefore the nature of the impacts can be identified. The spatial extent of the interaction within the fishery, the timing and location of use of the fishing gear is also known through the use of the ‘black box’ VMS system, which are installed on all vessels operating in the fishery. SG80 is met. Physical impacts of the gear have not been fully quantified so SG100 cannot be met.</p> <p><u>Sublittoral seed harvest</u></p> <p>As above intertidal seed harvest above. This also applies to sublittoral seed harvest. SG80 is met. As above, the physical impacts of the gear have not been fully quantified so SG100 cannot be met.</p> <p><u>Bottom-culture</u></p> <p>Regarding bottom culture, the habitat impacts arising from it have been studied in many countries where it occurs. Extensive work has been published in scientific articles and books. Information on the impact of mussel farming is reviewed to make this information more accessible for policy makers, the industry and the general public (Kaiser 1998). From this general information the main impacts arising from the on-growing on culture plots can be inferred. In addition, the research information cited in intertidal and sublittoral rationale above in this scoring issue, also applies. SG80 is met.</p>		

		<p>Observations of the gear operations confirm that the catches are ‘clean’ and cause little disturbance to the substrates underlying any mussels subject to relaying/harvesting. Furthermore, the management/licence controls mean that the timing of any fishing activities and the spatial area over which they occur are tightly controlled and reliably documented. Based on the above information, SG80 is met.</p> <p>As the physical impacts of suspended mussel culture and relaying/harvesting dredges and nets have not been quantified for this specific situation in Lower Saxony, SG100 is not met.</p>		
c	Guided post		Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Changes in habitat distributions over time are measured.
	Met?		Y – Intertidal seed collection Y – Sublittoral seed collection Y – Bottom culture	Y – Intertidal seed collection N – Sublittoral seed collection N – Bottom culture
	Justification	<p><u>Intertidal seed harvest</u></p> <p>In the Lower Saxony fishery, there is information on the distribution of the mussel stock in the intertidal which forms the major part of the total mussel stock. The locations where the sector fishes for seed mussels and the exact quantities harvested are exactly known for the intertidal and are continually monitored. Sufficient data continues to be collected and enables the detection of any increase in risk (e.g. an increase in spatial extent or intensity of the fishery). Therefore, SG80 is met.</p> <p>Changes in habitat distributions over time are measured in the intertidal via the aerial surveys completed by the National Park Authority, therefore SG100 is met.</p> <p><u>Sublittoral seed harvest</u></p> <p>As with the intertidal, locations and exact quantities in the sublittoral are known and monitored by the fishery and the relevant authorities. Sufficient data is therefore collected to detect any increase in risk to habitat. As mentioned above, VMS is installed and operated on all vessels in the fishery and SG80 is met. Changes in habitat distributions over time have not been measured in the sublittoral, as only one sublittoral habitat map was only created in 2015/16, so SG100 cannot be met as there is nothing to provide a comparison and measure changes over time.</p>		

	<p><u>Bottom-culture</u> Exact plot locations are recorded via GPS co-ordinates by the fishery and indeed the Fisheries Directorate and amended as necessary. VMS again applies to the vessels carrying out bottom-culture activities and the exact amount of mussels harvested known. As bottom culture occurs in both the intertidal and sublittoral, and the sublittoral area cannot be awarded SG100 on the basis that change cannot be detected, SG100 can also not be received here. SG80 is awarded.</p>	
References	(Ens 2004; Kaiser 1998; Brink 2009; Fey 2008; Fey 2007; Craeymeersch 2013; Drent 2013; Millat 2012)	
	Intertidal seed collection	85
	Sublittoral seed collection	80
	Bottom culture	80
OVERALL PERFORMANCE INDICATOR SCORE:	85	
CONDITION NUMBER:	N/A	

Evaluation Table for PI 2.4.3 – Habitats information - UoA 2: Seed collection via ropes and nets and bottom culture

PI 2.4.3		Information is adequate to determine the risk posed to habitat types by the fishery and the effectiveness of the strategy to manage impacts on habitat types		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	There is basic understanding of the types and distribution of main habitats in the area of the fishery.	The nature, distribution and vulnerability of all main habitat types in the fishery are known at a level of detail relevant to the scale and intensity of the fishery.	The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.
	Met?	Y – Suspended mussel culture, Y – Bottom-culture	Y – Suspended mussel culture, Y – Bottom-culture	N – Suspended mussel culture, N – Bottom-culture
	Justification	<p>Habitat maps of the Lower Saxony Wadden Sea area exist and are regularly updated. Therefore the nature, distribution and vulnerability of all main habitat types in the fishery (like sea grass beds and mussel beds) are known.</p> <p><u>Bottom-culture (Section 2.4.5.3)</u> No bottom-culture activities are allowed over sensitive habitats. The information to determine the risks posed by the on-growing phase to habitat types is identical with that evaluated under UoA 1. Like the elements above, the bottom-culture activities are licensed. Therefore, the locations and the spatial extent the culture plots are exactly known as are the habitats within which the activities occur. On this basis, information exists at a level of detail relevant to the scale and intensity of the fishery and SG80 is met.</p> <p><u>Suspended mussel culture (Section 2.4.5.2)</u> All mussel farming activities including spat collection on nets or ropes are licensed. Therefore the locations and the spatial extent of the spat collection sites and the culture plots are exactly known as are the habitats within which the activities occur. On this basis, information exists at a level of detail relevant to the scale and intensity of the fishery. Therefore SG80 is met.</p> <p>As all habitat types have not been evaluated throughout their geographical range, SG100 is not met.</p>		
b	Guidepost	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.	Sufficient data are available to allow the nature of the impacts of the fishery on habitat types to be identified and there is reliable information on the spatial extent of interaction, and the	The physical impacts of the gear on the habitat types have been quantified fully.

			timing and location of use of the fishing gear.	
	Met?	Y – Suspended mussel culture, Y – Bottom-culture	Y – Suspended mussel culture, Y – Bottom-culture	N – Suspended mussel culture, N – Bottom-culture
	Justification	<p><u>Suspended mussel culture</u> The studies undertaken in the Netherlands on SMC impacts on benthic habitats and the review in relation to those in the Lower Saxony Wadden Sea described in SI(a) are sufficient to identify the nature of the impacts arising from SMC. The spatial extent and seasonal use of the SMC lines and nets is recorded annually. Therefore SG80 is met. As the physical impacts of suspended mussel culture have not been quantified for this specific situation in Lower Saxony, SG100 is not met.</p> <p><u>Bottom-culture</u> Regarding bottom culture, the habitat impacts arising from it have been studied in many countries where it occurs. Extensive work has been published in scientific articles and books. Information on the impact of mussel farming is reviewed to make this information more accessible for policy makers, the industry and the general public (Kaiser 1998). From this general information the main impacts arising from the on-growing on culture plots can be inferred. Further and more recent information is available from research carried out in the Wadden Sea (especially in the Netherlands) on the impact of mussel fishing on habitat types (Ens 2004; Fey 2008; Fey 2007; Drent 2013) and therefore the nature of the impacts can be identified.</p> <p>Observations of the gear operations confirm that the catches are ‘clean’ and cause little disturbance to the substrates underlying any mussels subject to relaying / harvesting. Furthermore, the management / licence controls mean that the timing of any fishing activities and the spatial area over which they occur are tightly controlled and reliably documented. Based on the above information, SG80 is met. As the physical impacts of the relaying / harvesting dredges and nets have not been quantified for this specific situation in Lower Saxony, SG100 is not met.</p>		
c	Guidepost		Sufficient data continue to be collected to detect any increase in risk to habitat (e.g. due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Changes in habitat distributions over time are measured.

	Met?	Y – Suspended mussel culture, Y – Bottom-culture	N – Suspended mussel culture, N – Bottom-culture		
	Justification	<p><u>Bottom-culture</u> Exact plot locations are recorded via GPS co-ordinates by the fishery and indeed the Fisheries Directorate and amended as necessary. VMS again applies to the vessels carrying out bottom-culture activities and the exact amount of mussels harvested known. As bottom culture occurs in both the intertidal and sublittoral, and the sublittoral area cannot be awarded SG100 on the basis that change cannot be detected, SG100 cannot be awarded overall for this scoring issue. SG80 is awarded.</p> <p><u>Suspended mussel culture</u> At the previous assessment, no monitoring had been completed regarding impacts of SMC on benthic habitats to meet SG80. Since then, a literature review has been completed on the total ‘free’ sulphide (S₂-) in surficial (0-2 cm) sediments on the seabeds under the rope-growing sites on installation areas with similar morphological and hydrodynamic characteristics to the UoA (Holstein 2015). The review specifically compared suspended mussel culture (SMC) installations in the Netherlands with those in the Lower Saxony ‘Southern Wanger-Reede’ (see further details above) and considered the risks to sites in the Lower Saxony from these activities. As the use of SMC and bottom-culture activities are licensed activities and vessels operate using VMS, sufficient data continue to be collected to determine any increase in risk (e.g. an increase in spatial extent of the fishery) and SG80 is met.</p> <p>SG100 is not met. Changes in habitat distributions over time are measured in the intertidal but not the subtidal.</p>			
	References	(Ens 2004; Kaiser 1998; Fey 2008; Fey 2007; Holstein 2015; Drent 2013)			
			<table border="1"> <tr> <td>Suspended culture</td> <td>80</td> </tr> </table>	Suspended culture	80
Suspended culture	80				
			<table border="1"> <tr> <td>Bottom culture</td> <td>80</td> </tr> </table>	Bottom culture	80
Bottom culture	80				
OVERALL PERFORMANCE INDICATOR SCORE:			80		
CONDITION NUMBER:			N/A		

Evaluation Table for PI 2.5.1 – Ecosystem outcome - UoA 1: Seed collection via dredging / nets and bottom culture

PI 2.5.1		The fishery 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	Guidepost	The fishery 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 fishery 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 fishery 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?	Y	Y	N
	Justification	<p><u>All activities (Section 2.4.6)</u></p> <p>The mussel seed fishery results in the movement of mussel seed to the licensed bottom-culture plots within the Lower Saxony Wadden Sea ecosystem. Given that the seed mussels (particularly those in the subtidal) are very likely to be ephemeral and remain in the wild for more than a few months, their subsequent transfer to the culture plots means they remain in the ecosystem and continue to deliver the functions of food provision for higher trophic levels, water filtration and nutrient cycling for a longer duration. Bult et al (2004) found that mussel culture in the Dutch Wadden Sea lead to an overall increase in mussel biomass; a result of the relocation process improving growth and survival potential. The assessment team considers that given the proximity of the Dutch and German Wadden Sea areas and the similar methods employed for mussel culture, a similar increase in overall mussel biomass availability could be expected in the Lower Saxony Wadden Sea; therefore the functional processes facilitated by mussels in the ecosystem is likely to be stimulated rather than hindered by mussel culture.</p> <p>The fishery does not have a significant impact on top predators like fish species or marine mammals. Any potential impact on bird species are addressed under ETP species (PI 2.3) and Habitats (PI 2.4). It is concluded here that although an indirect impact on bird populations cannot be excluded completely the assessment team consider it is highly unlikely and therefore also highly unlikely that any such impact could disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. A study of the abundance and distribution of key bird species in areas around mussel culture plots in the UK detected either neutral or positive impacts on bird species, with no negative impacts identified (Caldow 2003).</p> <p>Although not specifically studied in the Lower Saxony, a study of macrozoobenthos diversity in and around mussel culture plots in the Dutch Wadden Sea found only short-term effects of fishery activities in terms of total density and community composition with the effects varying with</p>		

season (Craeymeersch 2013). Overall the study concluded that any impact from fishing activities was minor compared with natural, seasonal factors affecting species mortality and recruitment. Similar results were found in and around mussel beds in the Menai Strait, UK (Beadman 2004) giving confidence to the assertion that the community composition of benthic habitats in the Wadden Sea ecosystem is highly unlikely to be disrupted to a point where there would be a serious or irreversible harm.

A further potential impact from mussel culture on ecosystem processes is the potential for mussel concentrations above the ecosystem's natural carrying-capacity to lead to competition with other organisms that compete for similar food resources such as phytoplankton, suspended particulate matter and dissolved organic matter. Previous studies have demonstrated that mussels can deplete the chlorophyll *a* in the water column in the Menai Strait, UK (Tweddle 2005; Saurel 2007) and in the Oosterschelde estuary, Netherlands (Prins 1996). A mesocosm study of the same processes in the Wadden Sea found that whilst mussels could alter the composition of plankton communities, these could recover within just eight days (Jacobs 2016). Considering the bottom-culture plots cover just 0.4% of the National Park area, any significant impact on phytoplankton communities is considered very unlikely by the assessment team.

Re-suspension of sediments during seed harvesting and mussel relocation has the potential to increase overall turbidity with knock-on effects on primary production processes and nutrient cycling. However, these activities take place over very short timescales, within restricted areas and for less than 100 days a year. Furthermore, the equipment used to harvest and move mussels is designed for efficiency with the aim of harvesting clean mussels with minimal sediment insofar as possible. In the UK, a study on long-term trends in turbidity in the Menai Strait (Kratzer 2003) caused by organic and inorganic suspended sediments found there had been no significant long-term increase in suspended sediments and proposed that the main factor influencing long-term variations was wind-forcing of sediments into the water column over shallow areas; most of the suspended solids were inorganic clay particles. Continuous monitoring of turbidity in the Menai Strait carried out between 2003 and 2005 (Bowers 2006) also concluded that short-term increases in turbidity were due to tidal mixing and wind-forcing with increased turbidity occurring over spring tides and during high winds; no links were made with mussel fishery operations. A 2009 study (Ysebaert 2009) concluded that whilst bottom-cultured mussels did significantly increase sedimentary conditions compared with surrounding areas, the overall biodiversity of the microbenthic communities increased as a result of increased settlement of opportunistic species; the study suggested that an increase in re-suspended sediments is likely to occur during dredging operations owing to the increased sedimentation within the beds. However, the study by Prins et al (1996) of the filtration and re-suspension of particulate matter and phytoplankton by intertidal mussel beds in the Oosterschelde, concluded that despite wind-forcing of sediments into the water column, the mussel beds provided a net uptake of particulate matter. Given the shallow nature of the Lower Saxony Wadden Sea and the small spatial footprint of the mussel fishery, it would seem reasonable to conclude that the re-suspension of sediments through wind-driven and tidal forces would have a greater influence over ecosystem processes than the mussel fishery. Any effect from the mussel fishery is highly likely to be short-lived and not cause any serious or irreversible harm.

Mussel culture has the potential to alter ecological assemblages by influencing the distribution of species and their subsequent reproductive

		<p>success. In New Zealand, starfish were found to occur in higher densities and have significantly enhanced fertilization rates over mussel farms compared with unfarmed areas (Inglis 2003) which could occasionally lead to population outbreaks. However, this is unlikely to cause serious and irreversible harm to the ecosystem as if the mussel culture were to cease, this influence would be immediately removed and starfish reproductive success would be likely to revert back to natural levels.</p> <p>The relocation of seed mussels between subtidal and / or intertidal areas of the Wadden Sea is assessed as highly unlikely to influence the spread of non-native species. Observations of seed mussels harvested from subtidal or intertidal beds show that they often contain very few additional species owing to the recent settlement of the seed mussels from the water column in high numbers – the ‘cleanliness’ of these catches is recognised by the regulating authorities. Once on the culture plots, the mussels are moved over very limited spatial areas and whilst some non-native species might grow amongst them, these are likely to have either originated in the Wadden Sea before settling out or to have arrived by some other means before colonising mussel beds. With the exception of the Pacific oysters, any non-native species are removed from the ecosystem with the mussels during final harvest. An assessment of the risks from mussel cultivation in the Wadden Sea of enhancing the spread of non-native marine species was undertaken and determined that natural tidal currents and harbours were likely to play the greatest roles in the spread of those species already established within the ecosystem (Gittenberger 2015). Most non-native species known from within the Wadden Sea are widely distributed throughout its range and only ~45% of those are found within shellfish areas, and most of those were found only on oyster reefs which are not fished. The review found no indication that <i>“the transport of mussels within the Wadden Sea will significantly raise the risk that non-native species will increase their distributional range within the Wadden Sea and have a significant impact on the ecosystem”</i> (Gittenberger 2015).</p> <p>On the basis of the studies and evidence above, the assessment team concluded that it is highly unlikely that the fishery would disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm and SG80 is met. However it cannot be concluded that all possible interactions have been studied or that there is full, fishery-specific evidence that the fishery 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 so SG100 is not met.</p>
References	(Craeymeersch 2013; Jacobs 2016; Beadman 2004; Bult 2004; Caldow 2003; Tweddle 2005; Saurel 2007; Prins 1996; Kratzer 2003; Bowers 2006; Ysebaert 2009; Gittenberger 2015; Inglis 2003)	
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER:		N/A

Evaluation Table for PI 2.5.1 – Ecosystem outcome - UoA 2: Seed collection via ropes and nets and bottom culture

PI 2.5.1		The fishery 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	Guidepost	The fishery 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 fishery 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 fishery 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?	Y	Y	N
	Justification	<p>All activities (Section 2.4.6)</p> <p>Most of the elements surrounding mussel re-location, trophic interactions, re-suspension of sediments, impacts on benthic and planktonic communities outlined in PI 2.5.1 above for UoA 1 also apply here.</p> <p>The additional potential ecosystem impacts for UoA 2 are those originating from the use of SMC installations for the collection of mussel seed prior to laying on the culture plots. Studies conducted on the environmental impacts of SMC in various countries have shown that SMC can have ecological effects on both the seabed and the water column (Keeley 2009; Inglis 2003). The potential effects on seabed habitats are discussed under PI 2.4.1 whilst those on the water column are addressed below.</p> <p>The large densities of mussels found in SMC farms can extract a significant proportion of phytoplankton, acting as biological filters and influencing the types and quantity of food available in the water column. This in turn has the potential to affect the wider ecosystem by reducing the available resources at the base of the food web. Similar potential impacts from mussel culture plots are described above in UoA1 PI 2.5.1.</p> <p>Mussel seed farms can also concentrate and re-distribute nutrients (Keeley 2009; Christensen 2003). Farmed mussels and other associated fauna are sources for the release of dissolved nitrogen (e.g. ammonium) directly into the water column as metabolic waste products. Water column nitrogen concentrations can also be increased due to enhanced benthic re-mineralisation rates beneath the farm i.e. the microbial breakdown of mussel bio-deposits on the sediment surface and flux of ammonium into the water column. Despite some knowledge gaps, Keeley et al (2009) note that no significant water column-related issues have been reported from SMC installations, suggesting that any impacts would be minor. All</p>		

	<p>SMC installations are permitted following an impact assessment by the Fisheries Directorate and are located outside the boundaries of the National Park and away from any habitats. Mixing of the water column by currents and wind is likely to rapidly dilute any effects of filtration, thereby reducing any overall ecosystem impact. Compared with the Wadden Sea, the total area over which SMC installations are active within the Lower Saxony mussel fishery is a tiny fraction of a per cent and the assessment team does not anticipate that any ecosystem-wide impacts would be detectable and / or attributable to the installations as a result. In their mesocosm study, Prins et al (1996) found that plankton communities recover within eight days following removal of mussels, suggesting a rapid recovery and re-balancing of ecosystem processes.</p> <p>The various reports available on potential water-column impacts and those discussed in UoA1 PI 2.5.1 conclude that ecosystem impacts will vary depending on factors including the spatial extent of SMC operations, mussel size and density, water depth, currents, missing processes and season. Large effects are observed only in situations with a high concentration of mussels in water bodies with a limited water exchange. In Tasmania, environmental impacts of suspended shellfish culture were considered so minimal that extensive monitoring was not considered necessary (Crawford 2003).</p> <p>A further potential ecosystem impact from SMC could arise from the ropes and nets providing a settlement substrate for non-native, invasive species. Rocha et al (2009) found that mussel farms can provide a habitat for several invasive tunicate species. It should be noted that the study by Rocha et al (2009) examined shellfisheries which used SMC installations for the entire culture cycle. In the fishery under assessment here, SMC installations are used only for spat collection whereby the seed mussels are harvested and ropes / nets are removed after the spat collection season. Therefore the temporal opportunity for non-native species to become established is limited. Further to this, Gittenberger (2015) noted that the most important factors influencing the distribution of non-natives within the Wadden Sea ecosystem are currents (aiding larval dispersal) and permanent harbours / jetties (providing stepping stones for colonisation).</p> <p>There is no overall genetic impact on the ecosystem as all the mussels originate from the Wadden Sea ecosystem.</p> <p>The team considers that the current scale of mussel spat collection on ropes and nets in Lower Saxony is minor, especially when compared to the total Wadden Sea ecosystem area. It is highly unlikely that the current practice of using SMC installations in the Lower Saxony disrupts the key elements underlying ecosystem structure and function, to a point where there would be serious or irreversible harm to the environment. SG80 is met. However it cannot be concluded that all possible interactions have been studied or that there is full, fishery-specific evidence that the fishery 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 so SG100 is not met.</p>		
References	(Crawford 2003; Prins 1996; Gittenberger 2015; Keeley 2009; Rocha 2009; Inglis 2003; Christensen 2003)		
<table border="1" style="width: 100%;"> <tr> <td>OVERALL PERFORMANCE INDICATOR SCORE:</td> <td style="text-align: center;">80</td> </tr> </table>		OVERALL PERFORMANCE INDICATOR SCORE:	80
OVERALL PERFORMANCE INDICATOR SCORE:	80		

CONDITION NUMBER:	N/A
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Evaluation Table for PI 2.5.2 – Ecosystem management strategy - UoA 1: Seed collection via dredging / nets and bottom culture

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidpost	There are measures in place, if necessary.	There is a partial strategy in place, if necessary.	There is a strategy that consists of a plan, in place.
	Met?	Y	Y	Y
	Justification	<p><u>All activities</u></p> <p>The fishery has a Management Plan in place which states one its main objectives is to achieve the effective combination of economic requirements and ecological goals. The Plan states that the mussel fishery is carried out in accordance with the environmental protection and Natura 2000 conservation objectives of the National Park (see Section 2.4.5.4 and Section 2.5.4).</p> <p>The numerous assessments and approvals required for both the mussel seed fishery and their on-growing on culture plots within the Lower Saxony Wadden Sea are outlined in PI 2.4.2 SI(a) and ensure the fishery has a minimal impact on the ecosystem. The fishery is restricted to a limited number of companies and vessels that are only allowed to fish under permit and only in designated areas following environmental assessments undertaken by both the State Fisheries Directorate and the National Park Authority. Further to this there are certain areas closed permanently to fishing. Mussel culture is limited to plots that comprise only ~0.4% of the area of the National Park and an even lower fraction of the Wadden Sea ecosystem (Section 2.2.2 and Section 2.4.6).</p> <p>On an ecosystem scale there is a strategy that consists of a plan, in the form of the Wadden Sea Plan (2010). This includes fisheries as one of the activities, and mussel beds as one of the habitats, and sets outcome objectives for each habitat ('a natural size, distribution and development of natural mussel beds'). To implement the plan, there are various measures in place, such as the Trilateral Monitoring and Assessment Programme (TMAP) to evaluate whether these goals are being achieved, of which regular monitoring of mussel beds, the mussel fishery and its management forms a part (Section 2.4.5).</p> <p>These measures and licensing and approval processes (as outlined within the Fishery Management Plan) together with the conservation objectives for the Natura 2000 areas within the Lower Saxony Wadden Sea and the Wadden Sea Plan itself, form a strategy to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function. Therefore SG100 is met.</p>		

b	Guided post	The measures take into account potential impacts of the fishery on key elements of the ecosystem.	The partial strategy takes into account available information and is expected to restrain impacts of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	The strategy, which consists of a plan, contains measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
	Met?	Y	Y	N
	Justification	<p><u>All activities</u></p> <p>As described previously, a strategy is in place (and outlined in the Fishery Management Plan (Section 2.4.5.4 and 2.5.4)) for limiting the fishery's main impacts on the ecosystem and its various components. Protection measures are in place including annual surveys to provide up-to-date information and ensure that minimum mussel quantities (biomass and spatial cover) remain in the intertidal areas each year, and assessments of potential habitat impacts before new activities are permitted. The total area of mussel culture plots in Lower Saxony is limited to 1,300 hectares and the area of mussel beds in the intertidal has increased in recent years. Permits limit the number of sites that can be fished for seed mussel or used for bottom-culture (Standorte) and are only issued after assessments of their potential impacts on key habitats and species have indicated that no such effects are likely; this will restrain the total impact of the fishery. These elements of SG100 are met. However, the assessment team does not consider that all the fishery-specific functional relationships between the fishery and ecosystem elements are well-understood (e.g. local impacts on plankton composition or trophic interactions with higher predators) irrespective of their likely magnitude or significance. Therefore these elements of SG100 are not met.</p> <p>SG80 is met as the strategy in place can be expected to achieve the Ecosystem Outcome 80 level of performance.</p>		
c	Guided post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.

	Met?	Y	Y	Y
	Justification	<p><u>All activities</u></p> <p>The practice of seed fishing and bottom-culture of mussels has been in operation in the Lower Saxony for several decades. There are no indications that the fishery poses a risk of serious or irreversible harm to ecosystem structure and function and the quantity of wild mussels in the intertidal areas is presently at a ten-year high, some 6x above the minimum biomass values permitted before fishing in intertidal areas would need to cease under the present Management Plan. This information directly from the fishery suggest little significant impact is occurring. Furthermore, studies from mussel fisheries in dynamic environments in other countries also suggest that detectable impacts at the ecosystem-level are unlikely to occur and provide plausible argument for the same conclusion in the Lower Saxony fishery (Beadman 2004; Caldow 2003; Saurel 2007; Ysebaert 2009; Gittenberger 2015; Keeley 2009). Therefore it can be concluded that the measures in place to limit the impacts of the fishery are effective and likely to work; SG100 is met.</p>		
d	Guided post		There is some evidence that the measures comprising the partial strategy are being implemented successfully.	There is evidence that the measures are being implemented successfully.
	Met?		Y	Y
	Justification	<p><u>All activities</u></p> <p>The exact locations of areas fished for seed mussels and of those used as mussel culture plots are specified within each permit. Records of permits issued and any associated assessments of likely environmental impact are retained by the State Fisheries Directorate office. Vessel operations are monitored using VMS which provides evidence that fishing is undertaken within the permit conditions and that its area of operation remains limited. All mussel movements are subject to very tight controls. Movement records are maintained of all mussel movements between seed areas and plots, when relaying between plots and when taken to auction. This ensures the origin of all mussels is known and maintains traceability should any concern arise regarding ecosystem impacts. The annual mussel stock surveys provide evidence that the minimum requirement for remaining mussel stock within the Lower Saxony is met. Therefore it is quite certain that the fishery for seed mussels and the harvesting of mussels will only take place on allocated fishing areas and culture plots, and evidence is available to demonstrate that the measures are being implemented successfully. SG100 is met.</p>		
References		(Beadman 2004; Caldow 2003; Saurel 2007; Ysebaert 2009; Gittenberger 2015; Keeley 2009)		
OVERALL PERFORMANCE INDICATOR SCORE:				95

CONDITION NUMBER:	N/A
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Evaluation Table for PI 2.5.2 – Ecosystem management strategy - UoA 2: Seed collection via ropes and nets and bottom culture

PI 2.5.2		There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidpost	There are measures in place, if necessary.	There is a partial strategy in place, if necessary.	There is a strategy that consists of a plan, in place.
	Met?	Y	Y	Y
	Justification	<p>All activities</p> <p>The fishery has a Management Plan in place which states one its main objectives is to achieve the effective combination of economic requirements and ecological goals. The Plan states that the mussel fishery is carried out in accordance with the environmental protection and Natura 2000 conservation objectives of the National Park (see Section 2.4.5.4 and Section 2.5.4).</p> <p>The numerous assessments and approvals required for both the operation of suspended mussel culture (SMC) installations for seed collection and the subsequent on-growing on culture plots within the Lower Saxony Wadden Sea are outlined in PI 2.4.2 SI(a) and ensure the fishery has a minimal impact on the ecosystem. The fishery is restricted to a limited number of companies and vessels that are only allowed to fish under permit and only in designated areas following environmental assessments undertaken by both the State Fisheries Directorate and the National Park Authority. Further to this there are certain areas closed permanently to fishing. Mussel culture is limited to plots that comprise only ~0.4% of the area of the National Park and an even lower fraction of the Wadden Sea ecosystem. In the rare event that any wild mussels are harvested for consumption, they are subject to strict size limits.</p> <p>On an ecosystem scale there is a strategy that consists of a plan, in the form of the Wadden Sea Plan (2010). This includes fisheries as one of the activities, and mussel beds as one of the habitats, and sets outcome objectives for each habitat ('a natural size, distribution and development of natural mussel beds'). To implement the plan, there are various measures in place, such as the Trilateral Monitoring and Assessment Programme (TMAP) to evaluate whether these goals are being achieved, of which regular monitoring of mussel beds, the mussel fishery and its management forms a part (Section 2.4.5).</p> <p>These measures and licensing and approval processes (as outlined within the Fishery Management Plan) together with the conservation objectives for the Natura 2000 areas within the Lower Saxony Wadden Sea and the Wadden Sea Plan itself, form a strategy to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function. Therefore SG100 is met.</p>		
b	Guidpost	The measures take into account potential impacts of the fishery on key elements of the	The partial strategy takes into account available information and is expected to restrain impacts	The strategy, which consists of a plan, contains measures to address all main impacts of the

		ecosystem.	of the fishery on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	fishery on the ecosystem, and at least some of these measures are in place. The plan and measures are based on well-understood functional relationships between the fishery and the Components and elements of the ecosystem. This plan provides for development of a full strategy that restrains impacts on the ecosystem to ensure the fishery does not cause serious or irreversible harm.
	Met?	Y	Y	N
	Justification	<p>All activities</p> <p>As described previously, a strategy is in place (and outlined in the Fishery Management Plan) for limiting the fishery's main impacts on the ecosystem and its various components. Protection measures are in place including annual surveys to provide up-to-date information and ensure that minimum mussel quantities (biomass and spatial cover) remain in the intertidal areas each year, and assessments of potential habitat impacts before new activities are permitted. The total area of mussel culture plots in Lower Saxony is limited to 1,300 hectares and the area of mussel beds in the intertidal has increased in recent years. Permits limit the number of sites and total areas that can be used for SMC installations or used for bottom-culture (Standorte) and are only issued after assessments of their potential impacts on key habitats and species have indicated that no such effects are likely; this will restrain the total impact of the fishery. These elements of SG100 are met. However, the assessment team does not consider that all the fishery-specific functional relationships between the fishery and ecosystem elements are well-understood (e.g. local impacts on plankton composition or trophic interactions with higher predators) irrespective of their likely magnitude or significance. Therefore these elements of SG100 are not met.</p> <p>SG80 is met as the strategy in place can be expected to achieve the Ecosystem Outcome 80 level of performance.</p>		
c	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The partial strategy is considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	The measures are considered likely to work based on prior experience, plausible argument or information directly from the fishery/ecosystems involved.
	Met?	Y	Y	Y

	Justification	<p>All activities</p> <p>The practice of bottom-culture of mussels has been in operation in the Lower Saxony for several decades. SMC is a relatively new practice having only been introduced in the last 15 or so years. There are no indications that the fishery poses a risk of serious or irreversible harm to ecosystem structure and function and the quantity of wild mussels in the intertidal areas is presently at a ten-year high, some 6x above the minimum biomass values permitted before fishing in intertidal areas would need to cease under the present Management Plan. This information directly from the fishery suggest little significant impact is occurring. Furthermore, studies from mussel fisheries in dynamic environments in other countries also suggest that detectable impacts at the ecosystem-level are unlikely to occur and provide plausible argument for the same conclusion in the Lower Saxony fishery (Beadman 2004; Caldwell 2003; Saurel 2007; Ysebaert 2009; Gittenberger 2015; Keeley 2009). Despite SMC being a relatively new method of seed collection in the Lower Saxony, suspended culture systems have been studied in some detail elsewhere and supporting a general conclusion that unless they are situated in sheltered systems with little water movement (unlike the Lower Saxony fishery), ecosystem-scale impacts are unlikely to occur (Chamberlain 2001; Hatcher 1994; Crawford 2003; Wiersinga 2009; Ysebaert 2009; Keeley 2009; Christensen 2003). Therefore it can be concluded that the measures in place to limit the impacts of the fishery are effective and likely to work; SG100 is met.</p>	
d	Guided post		<p>There is some evidence that the measures comprising the partial strategy are being implemented successfully.</p>
	Met?	Y	Y
	Justification	<p>All activities</p> <p>The exact locations (co-ordinates) of SMC areas and of those used as mussel culture plots are specified within each permit. Records of permits issued and any associated assessments of likely environmental impact are retained by the State Fisheries Directorate office. Vessel operations are monitored using VMS which provides evidence that fishing is undertaken within the permit conditions and that its area of operation remains limited.</p> <p>All mussel movements are subject to very tight controls. Movement records are maintained of all mussel movements between seed areas and plots, when relaying between plots and when taken to auction. This ensures the origin of all mussels is known and maintains traceability should any concern arise regarding ecosystem impacts.</p> <p>The annual mussel stock surveys provide evidence that the minimum requirement for remaining mussel stock within the Lower Saxony is met. It is quite certain that the use of SMC and the relocation of mussels and subsequent harvesting from culture plots will only take place in allocated areas</p>	

		and therefore evidence is available to demonstrate that the measures are being implemented successfully. SG100 is met.
References		(Chamberlain 2001; Hatcher 1994; Crawford 2003; Beadman 2004; Wiersinga 2009; Caldow 2003; Ysebaert 2009; Gittenberger 2015; Keeley 2009; Christensen 2003)
OVERALL PERFORMANCE INDICATOR SCORE:		95
CONDITION NUMBER:		N/A

Evaluation Table for PI 2.5.3 – Ecosystem information - UoA 1: Seed collection via dredging / nets and bottom culture

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Guided post	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	<p><u>All activities (Section 2.4.6)</u></p> <p>Substantial research has been carried out on the Wadden Sea ecosystem by research institutes in Germany, Netherlands and Denmark. This existing information is adequate to identify and broadly understand the key elements of the ecosystem such as benthos, trophic structure and function, community composition, biodiversity and productivity (Wolff 2010; Marencic 2010). In the Netherlands there is currently a project called the Wadden Sea Long-Term Ecosystem Research (WaLTER) which provides advice on fundamental monitoring of the Wadden Sea area and provides the access point to Wadden Sea data (https://www.walterwaddenmonitor.org/en/). The Wadden Sea Secretariat based in Wilhemshafen regularly publishes reports on the status of the Wadden Sea ecosystem (http://www.waddensea-secretariat.org/). The existing information on the Wadden Sea ecosystem is therefore adequate to broadly understand the key elements of the ecosystem and SG80 is met.</p>		
b	Guided post	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.
	Met?	Y	Y	N
	Justification	<p><u>All activities</u></p> <p>The impacts that mussel culture may have on the environment have been studied in many places in the world where mussel culture takes place and published in scientific journals and books. From the research on the impacts of mussel seed fishing and culture (Ens 2004; Kaiser 1998; Brink 2009; Fey 2008; Craeymeersch 2013; Jacobs 2016; Crawford 2003; Beadman 2004; Caldow 2003; Prins 1996; Ysebaert 2009) sufficient information is</p>		

		<p>available on the impacts of the fishery on these components to allow some of the main consequences for the ecosystem to be inferred. Effects of the dredging for seed mussels have been studied in detail in the Netherlands (Ens 2004; Fey 2008; Fey 2007) whilst the persistence of mussel beds in subtidal environments in the Lower Saxony has also been recently investigated (Stralen 2015; Stralen 2016). On the basis of the information available, SG80 is met.</p> <p>SG100 is not met as not all of the main potential interactions between the fishery and the ecosystem elements have been investigated e.g. local impacts on plankton composition or trophic interactions with higher predators.</p>	
c	Guidepost		<p>The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known</p> <p>The impacts of the fishery on target, Bycatch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are understood</p>
	Met?	Y	Y
	Justification	<p><u>All activities</u> There are no retained species.</p> <p>The Wadden Sea and its ecosystem components are very well studied. The role of mussels in the ecosystem is described by Dankers and Zuidema (1995) whilst bycatch species like crabs, starfish and Pacific oysters have also been studied (Beadman 2004; Morris 2007; MarLiN 2017; Herbert 2016; Markert 2013; Inglis 2003; Klein Breteler 1976; Dolmer 1998). Extensive work has also been done on ETP species like seals, harbour porpoises and birds (Markert 2013; Koffijberg 2016; Blew 2016; Hammond 2006; Hammond 2017; CWSS 2003). Through this scientific work the main functions of the components of the ecosystem are well known. The main impacts of the fishery on target, bycatch and ETP species and habitats are identified (see PIs 2.1 to 2.4) and the main functions of these components in the ecosystem are understood. SG100 is met.</p>	
d	Guidepost		<p>Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.</p> <p>Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for the ecosystem to be inferred.</p>
	Met?	Y	Y

	Justification	<p><u>All activities</u> Multiple studies have been carried out to understand the impacts of mussel fishing on ecosystem components and elements within the Wadden Sea ecosystem, many in Dutch waters but also some in the adjacent Lower Saxony (Brink 2009; Kamermans 2010; Fey 2008; Fey 2007; Craeymeersch 2013; Jacobs 2016; Drent 2013; Millat 2012; Bult 2004; Ysebaert 2009; Gittenberger 2015; Dankers 1995). The fishery in Lower Saxony is similar to the corresponding Netherlands mussel fishery and both are within the Wadden Sea ecosystem. Therefore the scientific research and monitoring from Dutch fisheries are relevant for that in the Lower Saxony.</p> <p>The available scientific information is sufficient to infer the main consequences of the Lower Saxony mussel fishery for the Wadden Sea ecosystem elements and components. SG100 is met.</p>		
e	Guided post		Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Information is sufficient to support the development of strategies to manage ecosystem impacts.
	Met?		Y	N
	Justification	<p><u>All activities</u> All mussel farming permits are issued by the Lower Saxony authorities. Therefore the location of the fishery, vessel activity and the timing and quantities of mussels that are harvested are known. This means that the scale and intensity of the activity is known and any increase in risk level to the ecosystem would be detected. The limitations on the size of mussel culture plots limit the impact on the ecosystem to an estimated acceptable level. Any increase in the activity is subject to a licence and evaluation. It is concluded therefore that from the existing data collection and monitoring any increase in risk levels will be detected and SG80 is met.</p> <p>Information on the impacts on the ecosystem is available but for the subtidal fishery it cannot be concluded that this information is currently of sufficient detail to develop strategies to manage ecosystem impacts of activities with respect to subtidal mussel beds with a high confidence of achieving their objectives. SG100 is not met</p>		
References		(Ens 2004; Kaiser 1998; Wolff 2010; Brink 2009; Kamermans 2010; Fey 2008; Fey 2007; Craeymeersch 2013; Jacobs 2016; Drent 2013; Millat 2012; Stralen 2015; Stralen 2016; Crawford 2003; Beadman 2004; Morris 2007; MarLiN 2017; Herbert 2016; Markert 2013; Koffijberg 2016; Blew 2016; Bult 2004; Caldow 2003; Prins 1996; Ysebaert 2009; Gittenberger 2015; Inglis 2003; Marencic 2010; Dankers 1995; Klein Breteler 1976; Dolmer 1998; CWSS 2003; Hammond 2017)		

OVERALL PERFORMANCE INDICATOR SCORE:	90
CONDITION NUMBER:	N/A

Evaluation Table for PI 2.5.3 – Ecosystem information - UoA 2: Seed collection via ropes and nets and bottom culture

		UoA 2: Seed collection via ropes and nets and bottom culture		
PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Information is adequate to identify the key elements of the ecosystem (e.g., trophic structure and function, community composition, productivity pattern and biodiversity).	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	Y	Y	
	Justification	<p><u>All activities (Section 2.4.6)</u></p> <p>Substantial research has been carried out on the Wadden Sea ecosystem by research institutes in Germany, Netherlands and Denmark. This existing information is adequate to identify and broadly understand the key elements of the ecosystem such as benthos, trophic structure and function, community composition, biodiversity and productivity (Wolff 2010; Marencic 2010). In the Netherlands there is currently a project called the Wadden Sea Long-Term Ecosystem Research (WaLTER) which provides advice on fundamental monitoring of the Wadden Sea area and provides the access point to Wadden Sea data (https://www.walterwaddenmonitor.org/en/). The Wadden Sea Secretariat based in Wilhemshafen regularly publishes reports on the status of the Wadden Sea ecosystem (http://www.waddensea-secretariat.org/). The existing information on the Wadden Sea ecosystem is therefore adequate to broadly understand the key elements of the ecosystem and SG80 is met.</p>		
b	Guidepost	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, and have not been investigated in detail.	Main impacts of the fishery on these key ecosystem elements can be inferred from existing information and some have been investigated in detail.	Main interactions between the fishery and these ecosystem elements can be inferred from existing information, and have been investigated.
	Met?	Y	Y	N

	Justification	<p><u>All activities</u></p> <p>The impacts that mussel culture may have on the environment have been studied in many places in the world where mussel culture takes place and published in scientific journals and books. From the research on the impacts of SMC and subsequent bottom-culture (Ens 2004; Kaiser 1998; Kamermans 2010; Holstein 2015; Seip 2014; Craeymeersch 2013; Jacobs 2016; Chamberlain 2001; Hatcher 1994; Crawford 2003; Beadman 2004; Wiersinga 2009; Caldow 2003; Prins 1996; Ysebaert 2009; Keeley 2009; Rocha 2009; Christensen 2003) sufficient information is available on the impacts of the fishery on these components to allow some of the main consequences for the ecosystem to be inferred. On the basis of the information available, SG80 is met.</p> <p>SG100 is not met as not all of the main potential interactions between the fishery and the ecosystem elements have been investigated e.g. local impacts on plankton composition or trophic interactions with higher predators.</p>	
c	Guidepost	The main functions of the Components (i.e. target, Bycatch, Retained and ETP species and Habitats) in the ecosystem are known	The impacts of the fishery on target, Bycatch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are understood
	Met?	Y	Y
	Justification	<p><u>All activities</u></p> <p>There are no retained species. The Wadden Sea and its ecosystem components are very well studied. The role of mussels in the ecosystem is described by Dankers and Zuidema (1995) whilst bycatch species like crabs, starfish and Pacific oysters have also been studied (Beadman 2004; Morris 2007; MarLiN 2017; Herbert 2016; Markert 2013; Inglis 2003; Klein Breteler 1976; Dolmer 1998). Extensive work has also been done on ETP species like seals, harbour porpoises and birds (Markert 2013; Koffijberg 2016; Blew 2016; Hammond 2006; Hammond 2017; CWSS 2003). Through this scientific work the main functions of the components of the ecosystem are well known. The main impacts of the fishery on target, bycatch and ETP species and habitats are identified (see PIs 2.1 to 2.4) and the main functions of these components in the ecosystem are understood. SG100 is met.</p>	
d	Guidepost	Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the	Sufficient information is available on the impacts of the fishery on the Components and elements to allow the main consequences for

			ecosystem to be inferred.	the ecosystem to be inferred.
	Met?		Y	Y
	Justification	<p><u>All activities</u></p> <p>Multiple studies have been carried out to understand the impacts of mussel fishing on ecosystem components and elements within the Wadden Sea ecosystem, many in Dutch waters but also some in the adjacent Lower Saxony (Brink 2009; Kamermans 2010; Fey 2008; Fey 2007; Craeymeersch 2013; Jacobs 2016; Drent 2013; Millat 2012; Bult 2004; Ysebaert 2009; Gittenberger 2015; Dankers 1995). The fishery in Lower Saxony is similar to the corresponding Netherlands mussel fishery and both are within the Wadden Sea ecosystem. Therefore the scientific research and monitoring from Dutch fisheries are relevant for that in the Lower Saxony.</p> <p>The collection of mussel spat on ropes and nets has seen a fast expansion in recent years. The impacts of this new activity have been studied through the framework of the PRODUS project (Project Sustainable Shellfish Fishery). The main ecosystem consequences of SMC on ropes and nets have been described (Kamermans 2010; Kamermans 2008; Crawford 2003; Keeley 2009) including the effects of the deposition of organic material on the sediment and fauna under the spat collectors (Kamermans 2010; Holstein 2015; Seip 2014). Since the activity in the Lower Saxony uses the same SMC systems as those in the Netherlands the assessment team considers the scientific information from the Dutch research efforts to be relevant for this activity in Germany.</p> <p>The available scientific information described above is sufficient to infer the main consequences of the Lower Saxony mussel fishery for the Wadden Sea ecosystem elements and components. SG100 is met.</p>		
e	Guidpost		Sufficient data continue to be collected to detect any increase in risk level (e.g., due to changes in the outcome indicator scores or the operation of the fishery or the effectiveness of the measures).	Information is sufficient to support the development of strategies to manage ecosystem impacts.
	Met?		Y	N

	Justification	<p><u>All activities</u></p> <p>All mussel farming permits are issued by the Lower Saxony authorities. Therefore the location of the fishery, vessel activity and the timing and quantities of mussels that are harvested are known. This means that the scale and intensity of the activity is known and any increase in risk level to the ecosystem would be detected. The limitations on the size of mussel culture plots limit the impact on the ecosystem to an estimated acceptable level. SMC installations are at the moment only deployed outside the National Park and within defined areas. Any increase in the activities is subject to a licence and evaluation such as a full environmental impact assessment. It is concluded therefore that from the existing data collection and monitoring any increase in risk levels will be detected and SG80 is met.</p> <p>Information on the impacts on the ecosystem is available but as few fishery-specific studies have been completed it cannot be concluded that this information is currently of sufficient detail to develop strategies to manage ecosystem impacts with a high confidence of achieving their objectives. SG100 is not met.</p>
References	<p>(Ens 2004; Kaiser 1998; Wolff 2010; Brink 2009; Kamermans 2010; Fey 2008; Fey 2007; Holstein 2015; Seip 2014; Craeymeersch 2013; Jacobs 2016; Drent 2013; Millat 2012; Stralen 2015; Stralen 2016; Chamberlain 2001; Hatcher 1994; Crawford 2003; Beadman 2004; Morris 2007; MarLiN 2017; Herbert 2016; Markert 2013; Koffijberg 2016; Blew 2016; Bult 2004; Wiersinga 2009; Caldow 2003; Prins 1996; Ysebaert 2009; Gittenberger 2015; Rocha 2009; Inglis 2003; Marencic 2010; Dankers 1995; Klein Breteler 1976; Dolmer 1998; Hammond 2006; CWSS 2003; Hammond 2017)</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER:		N/A

Appendix 1.3 Principle 3

Evaluation Table for PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> • Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2; and • 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	Guidepost	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 <u>organised and effective cooperation</u> with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and <u>binding procedures governing cooperation with other parties</u> which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	<p>Generally fisheries in the EU are managed through the CFP. The CFP “<i>shall 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</i>” and it “<i>shall apply the precautionary approach to fisheries management, and shall aim to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield</i>” (Article 2).</p> <p>Germany has ratified the United Nations Convention on the Law of the Sea of 10 December 1982 (UN 1982) which set out the principle that all States have a duty to adopt appropriate measures to ensure sustainable management of marine resources and to cooperate with each other to this end. The management system follows the principles set out in the FAO Code of Conduct for Responsible Fisheries (FAO 1995a), which includes the application of a precautionary approach. It also complies with the requirements in the UN Fish Stocks Agreement (FAO 1995b) regarding reference points and application of the precautionary approach as well as the Agreement to promote compliance with international conservation and management measures by fishing vessels on the high seas (FAO, 1993). And finally Germany has signed the UN Convention on Biological Diversity (UN, 1992).</p> <p>Environmental issues are addressed by several EU Directives such as the Habitats Directive (EC, 1992), the Birds Directive (EC, 2009), the Water</p>		

		<p>Framework Directive (EC, 2000), the Shellfish Directive (EC, 2006) and the marine Strategy framework Directive (EC, 2008).</p> <p>This fishery takes place within German territorial waters, which is why the following legislation has to be applied within the fishery: the Sea Fisheries Law (Germany, 1984); the Sea Fisheries Regulation (Germany, 1989); the Federal Waterway Act (Germany, 1968) and the Federal Nature Conservation Law (Germany, 2009); as well as Lower Saxony legislation such as the State Regulation on the Exercise of Fisheries in Coastal Waters (Germany, 2008), the State Nature Conservation Law (Germany, 2010) and the State Law on the Conservation of the Wadden Sea (Germany, 1999) have to be applied (Section 2.5.2).</p> <p>The roles and responsibilities of individuals and organisations involved in the Blue Mussel Fishery in the Lower Saxony National Park are well-defined. The key management organisations in Lower Saxony are the Ministry of Food, Agriculture, and Consumer Protection and the Ministry of Environment and Climate Protection.</p> <p>The international and national legal systems are consistent with MSC Principles 1 and 2. Therefore SG 100 is met.</p>		
b	Guidepost	<p>The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.</p>	<p>The management system incorporates or is subject by 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 fishery.</p>	<p>The management system incorporates or subject by 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.</p>
	Met?	Y	Y	Y
	Justification	<p>There are well-established and transparent mechanisms in place for resolving legal disputes. Representatives of the fishery, the Environmental and the Nature Park Administration, fishers and NGOs have the possibility to express their concerns, to exchange ideas and to discuss potential problems such as management decisions. In this context, the fishery has organised a roundtable meeting several times a year, in particular to discuss controversial issues concerning the new management plan, which has been in preparation for several years. In a case where a consensus cannot be reached, there is always the possibility to file a lawsuit based on State, Federal or European Law. So far, all conflicts have been resolved amicably.</p> <p>The mechanisms are transparent, tested and proven to be effective. SG100 is met.</p>		

d	Guided 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?	Y	Y	Y
	Justification	<p>The German fisheries legislation implements European laws. The CFP states that <i>“In view of the precarious economic state of the fishing industry and the dependence of certain coastal communities on fishing, it is necessary to ensure the relative stability of fishing activities by allocating fishing opportunities among Member States, based on a predictable share of the stocks for each Member State”</i>.</p> <p>In practice, the only fishery in the area that could be impacted by the mussel fishery is the shrimp fishery. If new culture plots are established the other mussel and shrimp fishers are consulted in order to avoid conflicts. If any fisher feels his rights and interests have not been considered in an appropriate way, they can appeal against the decision and take formal legal action.</p> <p>Despite some non-commercial activities of fishing and mussel collection, no one else depends on the fishery for food or livelihood. Hence SG100 is met.</p>		
	References	EC, 1992; EC, 2000; EC, 2006; EC, 2008; EC, 2009; EC, 2013; FAO, 1995a; FAO, 1995b; Germany, 1968; Germany, 1984; Germany, 1989; Germany, 2005; Germany, 2009; Lower Saxony, 1978; Lower Saxony, 1994; Lower Saxony, 2001; Lower Saxony, 2006a; Lower Saxony, 2009; Lower Saxony, 2010; UN, 1982; UN, 1992;		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER:				N/A

Evaluation Table for 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	Guidepost	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?	Y	Y	N
	Justification	<p>The management system for the fishery mainly involves the fishery and fisheries, environmental and national park administrations. Coordination between these actors is well-established and proven to be effective. Scientific advice is sought if necessary.</p> <p>The roles of all parties in all areas of responsibility are defined in the valid legislation, particularly in the State Fisheries Law, the State Coastal Fisheries Regulation, the National Park Law, the Federal and State Nature Conservation Laws and the Blue Mussel Management Plan. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction. SG80 is met.</p> <p>Although a round table was introduced by fisheries representatives that gets together several times a year and offers the possibility to discuss all issues, nature conservation NGOs continue to state they're not satisfactorily involved in the management process. Functions, roles and responsibilities are therefore not well understood for all areas of responsibility and interaction, SG100 is not met.</p>		
b	Guidepost	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?	Y	Y	N

	Justification	<p>A consultation process exists, which engages fisheries and environmental administrations, fishers and NGOs. Relevant information is regularly collected personally and for vessel operations, through the Black Box system. Licences for the seed fishery and culture plots are allocated for several years, and based on a sometimes much elaborated consultation process. This counts especially for the licensing of culture plots.</p> <p>While there was a wider consultation process during the first five-year phase which involved all stakeholders, NGOs and the National Park administration have not fully agreed with the decision of the fishery administration to extend the Management Plan 2009-13 for another five years without extensive consultation. The round table was set up by the fishery in order to solve this problem but has not yet been successful. Despite this disagreement, SG80 can be said to be met as there are regular consultative processes, which seeks and takes into account information, including local knowledge from a range of stakeholders.</p> <p>There isn't however a formal process to document which information is considered and explains how it is used or not used, so SG100 is not met.</p>		
c	Guidpost		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?		Y	N
	Justification	<p>All affected parties are either formally consulted or get an opportunity to express their concerns in case of licensing of culture lots and collectors as well as, with some restrictions, licensing of seed mussel fisheries. Other interested parties such as nature conservation/environmental NGOs are not formally consulted, but have a chance to express their concerns to the Fisheries Office, via the advisory council of the National Park or through other institutions and channels.</p> <p>From the late 1990s when the discussions on a Blue Mussel Management Plan began, the conservation/environmental NGOs were involved in the process, although there was no legal basis for this at that time. The NGOs have regular meetings with the Ministry of Environment, cosignatory of the management Plan, and therefore have the possibility to comment on the Plan at any time. Whenever the Management Plan was renewed the NGOs were invited to forward their comments. In August 2009, the Federal Nature Conservation Act has been renewed and provide now for the involvement of conservation/environmental NGOs. They have to be informed of the content of a plan and they are entitled to issue statements. The Lower Saxon law has been adopted only in February 2010 and has incorporated the new regulations. SG80 is met.</p> <p>Possibly affected parties are actively contacted, at least in case of licensing of culture lots and collectors. For other interested parties, involvement is limited and no proof of encouragement and facilitation of engagement could be found. SG100 is not met.</p>		

References	EC, 2001; Germany, 1990; Germany, 2009; Lower Saxony, 1978; Lower Saxony, 1994; Lower Saxony, 2001; Lower Saxony, 2009.
OVERALL PERFORMANCE INDICATOR SCORE:	80
CONDITION NUMBER:	N/A

Evaluation Table for 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 Principles and Criteria, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Long-term objectives to guide decision-making, consistent with the MSC Principles and Criteria and the precautionary approach, are implicit within management policy	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within and required by management policy.
	Met?	Y	Y	Y
	Justification	<p>The EU CFP clearly provides for long-term objectives. Article 2 states that the CFP “shall apply the precautionary approach to fisheries management, and shall aim to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels which can produce the maximum sustainable yield”, and that applies also to German Federal and Lower Saxony State legislation. This is reflected in the Management Plan, whose objectives are to guarantee:</p> <ul style="list-style-type: none"> • The livelihood of the fishery; • The sustainable use of the mussel stocks and; • An undisturbed development of intertidal mussel beds. <p>Several measures have been introduced to support these objectives:</p> <ul style="list-style-type: none"> • 26% of the park area as closed for the fishery (in reality only about 2% of the area are used for seed fishery and culture plots); • Licences for seed mussel fishery and for culture plots are allocated for several years; • The number of fishing licences is limited to four; • The fishery voluntarily renounced the importation of seed mussels; • Voluntary additional monitoring by further black box systems on board. <p>These objectives and measures are consistent with MSC Principles and Criteria and oriented towards sustainability, SG100 is met.</p>		
References		EC, 2013; Germany, 1984; Lower Saxony, 1978; Lower Saxony, 2009.		

OVERALL PERFORMANCE INDICATOR SCORE:	100
CONDITION NUMBER:	N/A

Evaluation Table for PI 3.1.4 Incentives for Sustainable Fishing

PI 3.1.4		The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Guided post	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and seeks to ensure that perverse incentives do not arise.	The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and explicitly considers incentives in a regular review of management policy or procedures to ensure they do not contribute to unsustainable fishing practices.
	Met?	Y	Y	N
	Justification	The management system limits the exploitation of the mussel resource to four Lower Saxony companies with four fishing licences and provides each of them with a fixed multi-annual quota. This may act as an incentive for sustainable fisheries as the companies are not compelled to compete for the resource but have a guaranteed part of the profit. As a result, fishers accept the system as a whole, including the measures designed for conserving habitats and ecosystem. In addition to the European-wide tax exemption for marine diesel, no further subsidies are granted. SG80 is met. An explicit consideration of incentives in any regular review of the management system has not been reported. SG100 is not met.		
References		Lower Saxony, 2009.		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER:				N/A

Evaluation Table for PI 3.2.1 Fishery-specific objectives

PI 3.2.1		The fishery 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	Guidepost	Objectives, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery's 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's 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's management system.
	Met?	Y	Y	P
	Justification	<p>The relevant Federal, as well as State legislation, (which includes the Blue Mussel Fishery Management Plan) aim clearly at a sustainable exploitation of the mussel stock and at a minimisation of the environmental impact. Standards set by the EU Habitat (EC, 1992), Birds (EC, 2009b), and Shellfish (EC, 2006) Directives are respected.</p> <p>The Lower Saxony Fisheries Law (§ 17) (Section 2.5.4) provides for a limitation of mussel fisheries licences in the interest of care/preservation, thereby expressing long-term objectives and related general mechanisms. Similarly, the Lower Saxony Coastal Fisheries Regulation in § 8 provides for restrictions for the protection of wild mussel stocks. The objective of the Blue Mussel Fishery Management Plan is <i>"the effective and conflict-solving combination of economic requirements and ecological objectives. On the one hand, a sustainable utilisation of mussel stocks has to be facilitated in order to ensure the livelihood of the mussel fishing companies and, on the other hand, the development of intertidal mussel beds including their specific biocenosis has to be ensured"</i>.</p> <p>The Wadden Sea Plan 2010 <i>"provides a framework for the integrated management of the Wadden Sea Area as an ecological entity, as well as its landscape and cultural heritage, within the cultural entities"</i>.</p> <p>The measures taken, such as the limitation of the number of fishing licences, the allocation of licences for several years, the restriction of the fishery to 26% of the National Park area, the increase of precautionary limits (minimum area covered by mussel beds and minimum mussel biomass), reduction of the size of culture plots to a maximum area of 1,300 ha since 1998, the voluntary ban of seed imports from outside the Wadden Sea are consistent with achieving the outcomes expressed by Principles 1 and 2. SG80 is met on this basis.</p> <p>Not all of the objectives are quantified and measurable, hence SG100 is met only partly.</p>		

References	CWSS, 2010a; EC, 1992; EC, 2006; EC, 2009a; Germany, 1984; Lower Saxony, 1978; Lower Saxony, 2006a; Lower Saxony, 2009;
OVERALL PERFORMANCE INDICATOR SCORE:	90
CONDITION NUMBER:	N/A

Evaluation Table for 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 under assessment.		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	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?	Y	Y	
	Justification	The Lower Saxony Fisheries Law and Coastal Fisheries Regulation, the Law on the National Park “Lower Saxony Wadden Sea”, as well as the Blue Mussel Fishery Management Plan, define decision-making processes that are oriented towards the achievement of the fishery-specific objectives (Section 2.5.4). These include closed areas, limitation to four fishing companies, minimum sizes, multi-annual licences, strict culture plot management (e.g. maximum size of plots) and others. SG80 is met.		
b	Guidepost	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?	Y	Y	Y
	Justification	The decision-making process can react in a timely and transparent manner through information gathered under the mussel monitoring programme, through the Black Box system, through regular consultations or otherwise and take account of the wider implications and decisions. The relevant legislation and the Blue Mussel Fishery Management Plan include a number of measures (minimum area covered by mussel beds and minimum mussel biomass, maximum size for seed mussels) that require an immediate reaction. It has to be mentioned, that the fishery already applies the stricter measures outlined in the new Management Plan drafted in 2014 and revised several times because comments from nature conservation NGOs and mussel fishery had to be considered. This new Management Plan is not yet in effect. Generally, the Management Plan is		

		<p>reviewed all five years and either rewritten, revised or extended without modifications.</p> <p>An annual monitoring by aerial photography is undertaken by the administration in order to determine position of and area covered by mussel beds in the intertidal of the Lower Saxony Wadden Sea, the Black Box data collected by the fishery are used by the administration to annually establish a map of all fishing activities in the intertidal and sublittoral zones, regular consultations involving fishery and administration but also conservationists aim at reducing the fishing pressure on sensitive areas. A number of studies has been commissioned by the PO in order to improve the knowledge on intertidal and sublittoral mussel beds (see Table 7).</p> <p>The decision-making process comprises several levels. (I) At the end of each 5-year-term the management plan is subject to an assessment carried out by the two responsible Ministries (Environment, Energy, Construction and Climate Protection, Food, Agriculture and Consumer Protection). The result of this assessment is communicated to all stakeholders. (II) The annual aerial monitoring and the analysis of the data takes place under the leadership of the National Park Administration. The results are communicated via the competent Ministries to the competent Fisheries Office that can stop the fishery immediately if the limits fixed in the management plan are undercut. (III) Each time a fishermen wants to fish seed mussels or to relay seed mussels on culture plots this has to be approved by the National Park Administration.</p> <p>An annual meeting between fisheries administration an mussel fishery is held at the beginning of a year and offers the possibility to discuss all issues. But there are many other possibilities for discussion</p> <p>There is enough information available, including on potential subtidal mussel beds, to assume that the decision-making process responds to all issues. SG100 is met.</p>	
c	Guided post		Decision-making processes use the precautionary approach and are based on best available information.
	Met?		Y
	Justification	The decision-process is based on the best information available, supplied primarily by research, by regular aerial mussel monitoring, by inspections on sea and in the port and by the Black Box system that is in place since 2016. Several criteria such as closed areas and closed seasons, minimum biomass, minimum area covered by mussel beds, maximum length etc. clearly demonstrate that the precautionary approach is used. SG80 is met.	

d	Guidepost	Some information on fishery performance and management action is generally available on request to stakeholders.	Information on fishery 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 fishery 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?	Y	Y	N
	Justification	<p>Decisions taken with regard to licences for the seed mussel fishery or seed mussel collectors (ropes) or the allocation of culture plots is made available to the PO and the concerned fishers and the public. Individually fished and sold quantities are not public due to the German legislation with regard to data confidentiality.</p> <p>Other information such as monitoring results, or management decisions of general relevance (beyond the individual level) such as the closure of new areas are accessible for a wider range of interested and affected parties, some of the information is also published in annual reports of the competent Fisheries Office (SFA) or Ministry (NMELV). Information is exchanged between fishery, administration and NGOs during consultations. SG80 is met. There is, however, no formal reporting to all stakeholders describing how the management system responded to findings and relevant recommendations (Section 2.5.3). SG100 is not met.</p>		
e	Guidepost	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?	Y	Y	Y
	Justification	<p>For years no significant infringements of laws and regulations have been reported (personal comment Lower Saxony Coast Guard), no indication of disrespect or defiance of the law could be found (see Appendix 4 Stakeholder submissions– letter from the Fisheries Office).</p> <p>There is no doubt that the management system would react in a timely fashion to any binding judicial decision as a consequence of violation of</p>		

		<p>rules. As a matter of course, the system disposes itself to mechanisms to enforce judicial decisions. The management system and fishery act proactively to avoid disputes. As mentioned before, there are many opportunities to exchange ideas or to discuss pending problems through formal or informal contacts between fishery, fisheries and environmental administrations and nature conservation organisations.</p> <p>An example for this is the round table organised by the fishery. Its objective was to create a platform for discussions with the nature conservation NGOs on controversial views with regard to the new Management Plan (not yet in force). This proactive move has so far dissuaded the nature conservation NGOs from taking legal action against management and the fishery SG100 is met.</p>
References	EC, 2001; Germany, 1990; Lower Saxony, 1978; Lower Saxony, 2001; Lower Saxony, 2006a; Lower Saxony, 2009; Lower Saxony, 2016.	
OVERALL PERFORMANCE INDICATOR SCORE:		95
CONDITION NUMBER:		N/A

Evaluation Table for PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Monitoring, control and surveillance mechanisms exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery under assessment 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 under assessment and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	Y	Y	Y
	Justification	<p>In addition to the well-established usual control mechanisms like logbooks, VMS-system, patrol vessels and port controls, the Lower Saxony mussel fishery is equipped with a Black Box system. The data are transferred to BLE (VMS) and the competent State Ministry (Black Box). This allows the administration to establish a high-resolution picture of the vessels' activities that is used for the enforcement of management measures (Section 2.5.4).</p> <p>Considering the small number of vessels (five fishing and two for farming activities) and their restricted range of activities in near-shore waters, the comparatively high density of surveillance has proved to be effective, as for the last ten years no violations reported (see Appendix 4 Stakeholder submissions– letter from the Fisheries Office). SG100 is met.</p>		
b	Guidepost	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?	Y	Y	Y
	Justification	<p>Sanctions to deal with non-compliance exist in the State Fisheries Law (§ 61/62) and the Coastal Fisheries Regulation (§ 12) and according to the statements of the Fisheries Office, such sanctions would be consistently applied if needed. Sanctions information is provided within the terms licence for seed mussel fishing or mussel culturing areas in the eventuality of failure to comply with all conditions SG80 is therefore met.</p>		

		<p>Minor offences may be penalised with a fine of up to 5,000 EUR and/or the confiscation of the equipment used. In case of major offences, there is the possibility of initiating criminal proceedings. This can lead to the withdrawal of the licence and the expulsion from the PO.</p> <p>No major violations have been reported in recent years, possibly due to the acceptance of the management system by the fishery. The team deem the absence of infringements as a demonstration of their effectiveness. SG100 is met.</p>		
c	Guidepost	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?	Y	Y	Y
	Justification	There is a high degree of confidence that fishers comply with the management system due to the absence of infringements or violations. The Fisheries Office confirmed that no procedures were initiated against a member of the PO since ten years (see Appendix 4 Stakeholder submissions– letter from the Fisheries Office). The fishery closely cooperates with the competent administrations and provides all information needed for the effective management. SG100 is met.		
d	Guidepost		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	There is no evidence of systematic non-compliance, no violations have been reported for several years. SG80 is met.		
References	Information from fishermen and representatives of MSC-Authority; Lower Saxony, 1978; Lower Saxony, 2006a.			
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER:				N/A

Evaluation Table for PI 3.2.4 – Research Plan

PI 3.2.4		The fishery has a research plan that addresses the information needs of management		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Research is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2.	A research plan provides the management system with a strategic approach to research and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.	A comprehensive research plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and reliable and timely information sufficient to achieve the objectives consistent with MSC's Principles 1 and 2.
	Met?	Y	Y	Y
	Justification	<p>Before 2014 no research plan existed. As a matter of course, research has also been conducted before the plan came into force but it was less oriented towards the objectives of the Management Plan. In this context, it has to be mentioned that the National Park Administration has been monitoring the mussel stocks in the National Park since 1996. That means that position and surface of the intertidal mussel beds are determined each year and the results are published. This is the basis for the authorisation of the seed mussel fishery.</p> <p>In 2014 a research plan was introduced and presented to the stakeholders (see Table 7). The plan provides the management system with reliable and timely information and is regularly updated. Since then a number of studies have been commissioned by the fishery in order to close the existing information gaps. This applies in particular to:</p> <ul style="list-style-type: none"> • The stability of sub-tidal mussel beds; • The impact of seed mussel collectors on the benthos; • A risk analysis of mussel transports within the Wadden Sea. <p>Also the results from research in neighbouring Wadden Sea areas, namely in the Netherlands, in Schleswig-Holstein, in Germany and in Denmark, are used for the management but this is not part of the research plan. The research covers all three principles, producing reliable and updated information, sufficient to objectives consistent with MSC Principles 1 and 2. SG100 is met.</p>		

b	Guidedepost	Research results are available to interested parties.	Research results are disseminated to all interested parties in a timely fashion.	Research plan and results are disseminated to all interested parties in a timely fashion and are widely and publicly available.
	Met?	Y	Y	N
	Justification	<p>Research results are usually made available to all interested parties, namely the Ministry of Food, Agriculture and Consumer Protection, the Ministry of Environment, Energy, Construction and Climate Protection and their subordinate administrative entities and institutions, the fishing companies and their associations and a number of stakeholders. Information can also be requested by interested external parties according to the Lower Saxon Environmental Information Act. Parts of the information can also be found on the websites of the Ministries, the National Park “Lower Saxony Wadden Sea”, the Mussel Fishers Association and the CWSS. Important findings become part of the publications of the CWSS or other presentations and reports. The Management Plan states in paragraph 6 that “the public will be informed about the development of the blue mussel stocks in the National Park in a suitable way. SG80 is met.</p> <p>The research plan has a limited distribution and research results are not widely and publicly available. SG100 is not met.</p>		
References		Gittenberger, A. 2015; H&S Consultancy B.V., 2015; Lower Saxony, 2006b; Lower Saxony, 2009; Manzenrieder und Partner, 2014; Millat & Adolph, 2017; Niedersächsische Muschelfischer GbR Research Plan (updated 2017); van Stralen, 2015; van Stralen, 2016, Websites of Ministries, National Park, Wadden Sea Quality Status Report 2017 , Mussel Fishers Association and CWSS		
OVERALL PERFORMANCE INDICATOR SCORE:				90
CONDITION NUMBER:				N/A

Evaluation Table for PI 3.2.5 Monitoring and management performance evaluation

PI 3.2.5		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	Guidepost	The fishery has in place mechanisms to evaluate some parts of the management system.	The fishery has in place mechanisms to evaluate key parts of the management system	The fishery has in place mechanisms to evaluate all parts of the management system.
	Met?	Y	Y	N
	Justification	According to §9 of the National Park Law the Management Plan Blue Mussel Fishery in the National Park “Lower Saxony Wadden Sea“ has a term of five years and “ <i>will be automatically renewed for another period of five years unless there are compelling reasons to change the content</i> ” (Management Plan paragraph 7). Basis for the extension is the evaluation of the Management Plan predominantly against the key criteria such as size and biomass of intertidal mussel beds, the impact of seed mussel collectors and culture plots on the benthic ecosystem and the compliance of the fishery with all relevant legal provisions. Ad hoc reviews can take place at any time if the need arises (Section 2.5.4). SG80 is met as key parts of the management system can be evaluated. There are however, no mechanisms in place to evaluate all parts of the management system. SG100 is not met.		
b	Guidepost	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?	Y	Y	N
	Justification	<p>The evaluation process taking place every five years implies a review of the Management Plan. Additionally internal discussions between representatives of the fishery, the National Park and the Fishery Administration or statements/comments of the Nature Conservation Organisations concerning a need to modify the system, such as the negative development of the mussel beds, can lead to the revision of the Management Plan.</p> <p>The present Management Plan is under revision since 2014, when Environmental and Fisheries Administration have decided to strengthen the precautionary approach in the seed mussel fishery. Several drafts of a new Management Plan have been presented, the last dating from November 2016, but due to comments of representatives of the fishery and of the NGOs, this process has not yet been finalised. From January</p>		

		<p>2017, a number of Round Tables were organised by the Lower Saxony Mussel Fishers Association, the last one beginning of this year, but so far it was not possible to reach an agreement.</p> <p>In 2017, the fishery commissioned the first external review, conducted by an independent fisheries expert. The representatives of the fishers have agreed to develop a regular schedule for external revisions in the future. SG80 is met.</p> <p>The management is subject to regular internal reviews but so far only one external review has been conducted, a regular external review will be implemented in future. SG100 is not met.</p>
References	COFAD GmbH, 2017; Lower Saxony, 2001; Lower Saxony, 2009; Lower Saxony, 2016.	
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER:		N/A

Appendix 2 Risk Based Framework (RBF) Outputs

Appendix 2.1 Scale Intensity Consequence Analysis (SICA) – Bycatch species outcome

During the RBF process with stakeholders, three species were identified as relevant scoring elements to assess with the SICA, green crab (*Carcinus maenas*), common starfish (*Asteria rubens*) and Pacific oyster (*Crassostrea gigas*). The results of which are presented in Table 14 - Table 16 below.

Table 14. Scoring Template for PI 2.2.1 Bycatch Species (Reference: CR Table CC5) – Green crab

PRINCIPLE TWO: Bycatch species outcome	Risk-causing activities from fishery under assessment	Spatial scale of fishing activity	Temporal scale of fishing activity	Intensity of fishing activity	Relevant subcomponents	Consequence Score	MSC score
Species: Green crab (<i>Carcinus maenas</i>)	Fishing Gear loss Bait collection Other identified risk-causing activities	1	3	1	Population size	1	100
					Reproductive capacity		
					Age/size/sex structure		
					Geographic range		
Rationale for selecting worst plausible case scenario	The biggest risk identified by stakeholder for this species is removal from the ecosystem by the fishery. Although crabs are discarded over the side of the boat during the harvesting of consumption mussels, their survival rate is unknown and therefore direct mortality due to fishing operations is the biggest risk. They are naturally present in the fishery, residing on SMCs or culture plots, so are naturally captured upon the harvesting mussels for further sale.						

Rationale for spatial scale of fishing activity	<p>Green crab has a very wide distribution range. The distribution of this species is very large (Norway to Mauritania (Roman and Palumb, 2004). The stock structure within this distribution is thought to be known, with a clear genetic breaks between the Atlantic and Mediterranean populations and populations in the Faeroe Islands and Iceland compared to the rest of the continent (Roman and Palumb, 2004). Areal impact over total stock is very limited. Even within Wadden sea and even Lower Saxony, a very small percentage covered. Out of the 35% of fishable area, only about 2% is actually used for seed collection and rope growing (client pers. comm.) Although green crab population densities are not uniform across the range that are found and can change dramatically, stakeholders and the team agreed that the fishery overlaps with <1% of the total range where green crab is found. A score of 1 was therefore allocated.</p>
Rationale for temporal scale of fishing activity	<p>The fishery operates all year round, but activity is not counted in full days, as with finfish fisheries. Operations are tidal and weather dependent, so boats are typically operational for a few of hours at a time on any particular day. Stakeholders agreed that this translated to around 100 days worth of effort. The score is therefore 3.</p>
Rationale for intensity of fishing activity	<p>Stakeholders' opinion was that the fishery has a negligible impact on this species. Their argument being that there are more individuals because of the fishery, due to additional mussel prey items on seed collectors (SMCs), helping to improve survivability. Green crab are removed by hand as the mussels are brought onboard and discarded overboard. This is part of the fishery's bycatch protocol. High survivability is believed fro this species. A score of 1 was allocated through stakeholder consensus.</p>
Rationale for choosing most vulnerable sub-component	<p>Population size was chosen as the most vulnerable sub-component.</p> <p>Population size was chosen as the most vulnerable sub-component, as fishing has the most direct affects the population size. The species has a high reproductive capacity (highly fecund – Cohen and Carlton, 1995) so reproductive capacity is not affected. The total population is not available to the fishery as much of the National Park remains closed to fishing and so the area remains largely unexploited. The species is known to be an invasive, taking advantage of all available prey sources and planktonic larval stages (Thresher et al 2003) is a broadcast spawner, and its geographical range and sex structure is also not likely to be affected. Score 1.</p>
Rationale for Consequence score	<p>On the assumption that the stock impacted here is the NW European stock, an insignificant change to the population size/growth rates is anticipated. This is due to the small number of vessels in the fishery (five in total), and the catch variability. The overall volume that these species are discarded in the UoCs is unlikely to be detectable against background variability of the population.</p>

As this species received a SICA consequence score of 1 (MSC \geq 80), a Productivity Susceptibility Analysis (PSA) is not required under version 1.3 of the MSC Certification Requirements (CC2.3.6.5).

Table 15. Scoring Template for PI 2.2.1 Bycatch Species (Reference: CR Table CC5) – Common starfish

PRINCIPLE TWO: Bycatch species outcome	Risk-causing activities from fishery under assessment	Spatial scale of fishing activity	Temporal scale of fishing activity	Intensity of fishing activity	Relevant subcomponents	Consequence Score	MSC score
Species: Common starfish (<i>Asteria rubens</i>)	<ul style="list-style-type: none"> Fishing Gear loss Bait collection Other identified risk-causing activities 	1	3	1	Population size	1	100
					Reproductive capacity		
					Age/size/sex structure		
					Geographic range		
Rationale for selecting worst plausible case scenario	As for green crab, see rationale in Table 14.						
Rationale for spatial scale of fishing activity	The distribution of this species is very large (NE Atlantic from Norway to Senegal, except the Mediterranean) (Vevers, 1949). The stock structure within this distribution is not known. As with green crab, the fishery interacts with a small fraction of the overall distribution of the species. Based on the small rationale, the stakeholders and team allocated this species a score of 1.						
Rationale for temporal scale of fishing activity	The fishery operates all year round, but activity is not counted in full days, as with finfish fisheries. Operations are tidal and weather dependent, so boats are typically operational for a few of hours at a time on any particular day. Stakeholders agreed that this translated to around 100 days worth of effort. The score is therefore 3.						

Rationale for intensity of fishing activity	<p>Stakeholders' opinion was that the fishery has a negligible impact on this species. Their argument being that there are more individuals because of the fishery, due to additional mussel prey items on seed collectors (SMCs), helping to improve survivability. Starfish are removed by hand as the mussels are brought onboard and discarded overboard. This is part of the fishery's bycatch protocol. High survivability is believed for this species. A score of 1 was allocated through stakeholder consensus.</p>
Rationale for choosing most vulnerable sub-component	<p>Population size was chosen as the most vulnerable sub-component, as fishing has the most direct affects the population size. The species has a high reproductive capacity (highly fecund – Fish and Fish, 1996) so reproductive capacity is not affected. The total population is not available to the fishery as much of the National Park remains closed to fishing and so the area remains largely unexploited. The species is known to have highly variable dynamics, with rapid outbreaks from low to high density (Vevers, 1949). The species is a broadcast spawner, and its geographical range and sex structure is also not likely to be affected. Score 1.</p>
Rationale for Consequence score	<p>On the assumption that the stock impacted here is the NW European stock, an insignificant change to the population size/growth rates is anticipated. This is due to the small number of vessels in the fishery (five in total), and the catch variability. The overall volume that these species are discarded in the UoCs is unlikely to be detectable against background variability of the population.</p>

As this species received a SICA consequence score of 1 (MSC ≥ 80), a Productivity Susceptibility Analysis (PSA) is not required under version 1.3 of the MSC Certification Requirements (CC2.3.6.5).

Table 16. Scoring Template for PI 2.2.1 Bycatch Species (Reference: CR Table CC5) – Pacific oyster

PRINCIPLE TWO: Bycatch species outcome	Risk-causing activities from fishery under assessment	Spatial scale of fishing activity	Temporal scale of fishing activity	Intensity of fishing activity	Relevant subcomponents	Consequence Score	MSC score
Species: Pacific oyster (<i>Crassostrea gigas</i>)	<ul style="list-style-type: none"> • Fishing • Gear loss • Bait collection • Other identified risk-causing activities 	1	3	1	Population size	1	100
					Reproductive capacity		
					Age/size/sex structure		
					Geographic range		
Rationale for selecting worst plausible case scenario	As for green crab, see rationale in Table 14.						
Rationale for spatial scale of fishing activity	Similar to green crab and common starfish, Pacific oyster has a wide distribution in NW Europe. This invasive species was introduced in the 1960s for aquaculture purposes, and has established itself expanded rapidly throughout the receiving ecosystems, forming extensive and dense reef structures (Troost, 2010). As per the rationale of the previous species above (Table 14 and Table 15), the fishery's overlap with its distribution is minimal, and in addition, its presence was introduced and not part of the native biota in the fishery. Score 1.						
Rationale for temporal scale of fishing activity	The fishery operates all year round, but activity is not counted in full days, as with finfish fisheries. Operations are tidal and weather dependent, so boats are typically operational for a few of hours at a time on any particular day. Stakeholders agreed that this translated to around 100 days worth of effort. The score is therefore 3.						

Rationale for intensity of fishing activity	<p>Stakeholders' opinion was that the fishery has a negligible impact on this species. Their argument being that there are more individuals because of the fishery, due to additional surface area on mussel beds and seed collectors (SMCs), helping to improve survivability. Spat settling of Pacific oyster is variable due to environmental conditions and not directly impacted by the fishery. The fishery operates over a small area of the National Park and there are closed sites where the fishery cannot operate. Given its invasive nature, and lack of natural competition/predation, a score of 1 was allocated through stakeholder consensus.</p>
Rationale for choosing most vulnerable sub-component	<p>Population size was chosen as the most vulnerable sub-component, as fishing has the most direct affects the population size. The species has a high reproductive capacity (highly fecund FAO, 2005) so reproductive capacity is not affected. The total population is not available to the fishery as much of the National Park remains closed to fishing and so the area remains largely unexploited. Pacific oysters are protandrous hermaphrodites, most commonly maturing first as males, growing rapidly in good conditions (FAO, 2005). They have the ability, once they settle out of the water column to crawl, using the larval foot, to seek a suitable settlement location for attachment. The species is a broadcast spawner, and its geographical range and sex structure is also not likely to be affected. Score 1.</p>
Rationale for Consequence score	<p>On the assumption that the stock impacted here is the NW European stock, an insignificant change to the population size/growth rates is anticipated. This is due to the small number of vessels in the fishery (five in total), and the catch variability. The overall volume that these species are discarded in the UoCs is unlikely to be detectable against background variability of the population.</p>

As this species received a SICA consequence score of 1 (MSC ≥ 80), a Productivity Susceptibility Analysis (PSA) is not required under version 1.3 of the MSC Certification Requirements (CC2.3.6.5).

Appendix 3 Peer Review Reports

Appendix 3.1 Peer Review 1

Overall Opinion

<i>Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?</i>	Yes	Conformity Assessment Body Response
<p><u>Justification:</u></p> <p>I believe that the assessment team has reached the correct conclusion that this fishery should be certified based on the evidence presented in the report. During the original certification under MSC CRv1.3, there were 10 conditions, primarily in relation to impacts of the fishery on the habitat and ecosystem and management issues, all of which were closed after the 4th surveillance audit in 2017. As the fishery has been re-assessed under MSC CRv1.3, it is not surprising that no new conditions have been raised.</p> <p>The original certification contained an additional UoA regarding translocation of mussel seed into the fishery. However the assessment team’s conclusion during the re-assessment that any sourcing of mussel seed from within the Wadden Sea ecosystem does not constitute a translocation seems reasonable. There is no requirement therefore for a third UoA in the reassessed fishery.</p> <p>The assessment team has correctly concluded that this Catch and Grow (CAG) fishery meets the MSC scope criteria for enhanced fisheries.</p> <p>The use of the RBF for the scoring of PI 2.2.1 for three bycatch species (green crab, starfish, Pacific oyster) is appropriate.</p> <p>There are a few PIs for which I considered that there was a lack of information in the rationales on which to fully assess the scores. However none of these queries have implications for the overall conclusion that the fishery should be re-certified.</p> <p>For Principle 1, I agree with the assessment team’s decision that it is not necessary to score P1 because there is no translocation of mussels, and there is evidence that the fishery does not have an impact on the target stock. Indeed it is likely that the relaying of seed mussel from ephemeral mussel beds which are subject to high predation rates and vulnerable to storms may actually enhance production in the fishery.</p> <p>For Principle 2 the fishery scores highly because there are no</p>		<p>Thank you for your comments. Further clarifications/additions have been made to the PIs where more information was needed.</p>

retained species, very little bycatch and no evidence of impact on ETP species, and since recent studies have demonstrated that there are few stable intertidal mussel beds, on which fishing is not permitted, and no stable sub-littoral mussel beds, there is little impact of the fishery on habitat and ecosystem features.

For Principle 3, the fishery has strong governance and there is a comprehensive management system in place. Along with the small number of licences and the lack of any infringements in the fishery recorded by management authorities in the last ten years, the fishery consequently scores highly for P3.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?

N/A

Conformity Response

Assessment

Body

Justification:

There were no new conditions raised during the re-assessment of this fishery.

N/A

If included:

Do you think the client action plan is sufficient to close the conditions raised?

N/A

Conformity Response

Assessment

Body

Justification:

There were no new conditions raised during the re-assessment of this fishery, and therefore no requirement for a client action plan.

N/A

For reports using the Risk-Based Framework please follow [the link](#).

For reports assessing enhanced fisheries please follow [the link](#).

General Comments on the Assessment Report (optional)

The report provides a comprehensively-referenced and well-written description of the various components of the catch and grow (CAG) fishery for mussels. There is a detailed rationale presented for all scores under Principles 2 and 3 for both UoAs. Potential traceability issues are evaluated in detail.

For the catch data presented, I assume that the figures relate to production of commercial-sized mussels from the culture plots. It would be helpful if figures (if available) could also be given for the

weight of mussels relayed from the two different UoAs, i.e. from dredging of wild seed mussels, and from rope-grown culture of seed mussels.

I was a little confused about the definitions of retained and bycatch species provided in section 2.4.1 on page 14. The discussion talks about 'management in accordance with limit and target reference points' and 'primary or managed species criteria'. This seems to be mixing up the categories of retained and bycatch species under MSC CRv1.3 (which is used in this assessment), where the categories relate solely to whether the species is retained or discarded, and the new categories of primary and secondary species used under CRv2.0.

[Team response: Thank you for this. The definition of retained and bycatch species has been adjusted in keeping with version 1.3 definitions.](#)

There are a few key acronyms missing from the Glossary, e.g. AIS, ACAP, CITES, CMS, NMUEBK, SPA, SAC, TMAP etc.

[Team response: These have been added to the glossary.](#)

As mentioned above, the report is very well-referenced. However there are a few key references missing from the reference list, e.g. Dankers and Zuidema (1995), Dolmer (1998), Ens (2009) and Nehls (2007).

[Team response: These have been added to the references.](#)

Performance Indicator Review

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
Example:1.1.2	No	No	NA	The certifier gave a score of 80 for this PI. The 80 scoring guidepost asks for a target reference point that is consistent with maintaining the stock at Bmsy or above, however the target reference point given for this fishery is Bpa, with no indication of how this is consistent with a Bmsy level.	
1.1.1	N/A	N/A	N/A	Principle 1 is not scored.	
1.1.2	N/A	N/A	N/A		
1.1.3	N/A	N/A	N/A		
1.2.1	N/A	N/A	N/A		
1.2.2	N/A	N/A	N/A		

1.2.3	N/A	N/A	N/A		
1.2.4	N/A	N/A	N/A		
2.1.1	Yes	Yes	N/A		
2.1.2	Yes	Yes	N/A		
2.1.3	Yes	Yes	N/A		
2.2.1	RBF used	RBF used	N/A	<p>It might be helpful to state that a PSA is not required for PI 2.2.1 if a consequence score of 1 or 2 is returned from the SICA.</p> <p>Minor comment. I find it confusing that, despite using the RBF for this PI, the team has scored a “Y” or “N” for each scoring issue. The RBF is used because there are no reference points for the three bycatch species, so it seems unusual to then assess whether the species are “likely/highly likely to be within biologically based limits”. The RBF returns a score for the PI, so there is no need to provide a Y or N for each scoring issue.</p>	<p>A statement regarding the PSA has been added in Appendix 2 Risk Based Framework (RBF) Outputs after each SICA table.</p> <p>“Y” or “N” for each scoring issue has now been removed and replaced with “Scored using SICA” to avoid confusion.</p>
2.2.2	Yes	Yes	N/A		N/A

2.2.3	No	Yes	N/A	Whilst it appears that there is minimal bycatch in the mussel fishery, much of the information is anecdotal in nature, and there is no quantitative information on bycatch rates of the three bycatch species considered in the assessment. Whilst a score of 80 is probably still justified, perhaps a recommendation could be made to provide some quantitative bycatch data for the fishery. Such information is available for other CAG mussel fisheries, e.g. North Menai Straits mussel fishery.	The team agree with this comment and have added a non-binding recommendation that quantitative data on bycatch species could be collected.
2.3.1	Yes (both UoAs)	Yes (both UoAs)	N/A		N/A
2.3.2	Yes (both UoAs)	Yes (both UoAs)	N/A		N/A
2.3.3	Yes (both UoAs)	Yes (both UoAs)	N/A		N/A
2.4.1	Yes (both UoAs)	Yes (both UoAs)	N/A		N/A
2.4.2	Yes (UoA1) Yes (UoA2)	No (UoA1) Yes (UoA2)	N/A	For UoA 1 there needs to be some additional rationale supporting the score for SIs c and d of 100 for bottom culture.	Rationales are now expanded to be more clear for SI(c) and SI(d) for bottom-culture

2.4.3	Yes (UoA1) Yes (UoA2)	No (UoA1) Yes (UoA2)	N/A	For SIa, there is no rationale as to whether or not intertidal seed collection meets the SG100. The score is given as 80, but the rationale for SIc suggests that the score for SIa should be 100.	Further text is now added to clarify the score for SI(a). SI(a) SG100 considers the full range of vulnerable habitats beyond that relevant to the scale of the fishery. SI(c) only asks if habitat distributions over time are measured which, with respect to intertidal mussel beds in the fishery, they are, so SG100 was met in that instance.
2.5.1	Yes (both UoAs)	Yes (both UoAs)	N/A	I agree that the lack of fishery-specific evidence for Lower Saxony means that the SG100 is not met.	Thank you. No further comment needed.
2.5.2	Yes (both UoAs)	Yes (both UoAs)	N/A		N/A
2.5.3	Yes (both UoAs)	Yes (both UoAs)	N/A	Minor point. The overall score for this PI should be 90, not 85.	Thank you. This has been changed in both the individual scoring rationale and summary scoring tables. P2 aggregate score is adjusted from 89.3 to 89.7 as a result.
3.1.1	Yes	Yes	N/A		N/A

3.1.2	No	Yes	N/A	<p>For Sic, to justify that SG80 is met, there needs to be more detail on how the nature conservation/environmental NGOs are consulted, particularly as they believe that they are not a key party in the consultation process.</p>	<p>From the late 1990s when the discussions on a Blue Mussel Management Plan began, the conservation/environmental NGOs were involved in the process, although there was no legal basis for this at that time. The NGOs have regular meetings with the Ministry of Environment, cosignatory of the management Plan, and therefore have the possibility to comment on the Plan at any time. Whenever the Management Plan was renewed the NGOs were invited to forward their comments. In August 2009, the Federal Nature Conservation Act has been renewed and provide now for the involvement of conservation/environmental NGOs. They have to be informed of the content of a plan and they are entitled to issue statements. The Lower Saxony law has been adopted only in February 2010 and has incorporated the new regulations.</p> <p>The team considers therefore that SG80 is met. This text has been added to Sic.</p>
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3.1.3	Yes	No	N/A	<p>The rationale needs to demonstrate that the precautionary approach is explicitly stated and required within the Federal and State legislation and in the Management Plan in order to justify a score of 100.</p> <p>Minor point. The rationale states that the number of licences is limited to 4, whereas elsewhere in the report the number is given as 5. The number of licences and the number of vessels may be different, and if so, some clarification in the report is required.</p>	<p>Although the expression is not used neither in the Federal nor State legislation, nor in the Management Plan, the precautionary approach is the basis of all fisheries legislation in Germany. The Federal Sea Fisheries Law fully implements the CFP and the latter clearly defines the precautionary approach as the basis of fisheries management. The Lower Saxony Fisheries Regulation relates to the Federal Law. In the Management Plan you find clearly precautionary measures like the closure of 26% of the park area for the seed mussel fishery, the limitation of culture plots to 1,300 ha, the limitation of fishing licences, the closure of the fishery if the surface of stable mussel beds and/or the total biomass is below fixed values.</p> <p>The team considers that SG100 is met and no modification to the PI has been made in the report.</p> <p>The number of fishing licences is limited to four, operating five vessels. The fifth vessel completes 'farm' activities, rather than actively fishing. The text has been modified to explain this and why there are seven vessels listed in Table 5.</p>
3.1.4	Yes	Yes	N/A		N/A
3.2.1	Yes	Yes	N/A		N/A

3.2.2	Yes	Yes	N/A		N/A
3.2.3	Yes	No	N/A	Slb. Whilst it seems reasonable to assume that the threat of sanctions provides some degree of deterrence to non-compliant activity, no evidence is presented that sanctions “demonstrably provide effective deterrence” and therefore the score of 100 seems to be too high.	<p>The fishery complies since years with the rules fixed by law. Throughout all controls by the competent authorities no infringements or violations have been detected.</p> <p>The team is of the opinion that the fishery can't be punished with a lower score because it always complies and sanctions couldn't show deterrent effects. No changes to scoring have been made.</p>
3.2.4	Yes	Yes	N/A		N/A
3.2.5	Yes	Yes	N/A		N/A

For reports using the Risk-Based Framework:

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well-referenced? Yes/No	Justification: Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response:
1.1.1	N/A	N/A		N/A
2.1.1	N/A	N/A		N/A
2.2.1	Yes	Yes	The RBF workshops and the assessment team provided strong evidence to support the conclusion that the mussel fishery	Thank you. This comment has been added to the

			causes insignificant change to the population size/growth rates of the green crab, starfish and Pacific oyster stocks. It might be helpful to state that a PSA is not required for PI 2.2.1 if a consequence score of 1 or 2 is returned from the SICA.	report in Appendix 2, RBF outputs.
2.4.1	N/A	N/A		N/A
2.5.1	N/A	N/A		N/A

For reports assessing enhanced fisheries:

Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	Yes	Conformity Assessment Body Response:
<p>Justification:</p> <p>The assessment team has correctly concluded that this Catch and Grow (CAG) mussel fishery meets the MSC scope criteria for enhanced fisheries. However the use of ropes for catching mussel spat would conventionally be considered as a habitat-modified (HM) fishery and so section 3.1.4 should also consider whether “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.” Nevertheless, the assessment team undertook a detailed evaluation of whether the production of pseudofaeces from the seed mussel collection ropes has any impact on the habitat and ecosystem, and so the issue is covered elsewhere within the assessment report.</p> <p>The assessment team concluded that translocation does not occur in this fishery as all seed mussels that are relayed on the culture plots originate from the Wadden Sea. There is therefore no requirement to score additional PIs in relation to Genetic Outcome under Principle 1 or translocation PIs under Principle 2.</p>		<p>Thank you. Considerations to whether modified habitats are reversible and do not cause serious or irreversible harm to the natural ecosystem’s structure and function are now included in section 2.1.4 of the report.</p>

With no translocation in this fishery and the presentation in the report of strong evidence that the fishery does not impact the stock (the collection and relaying of mussel seed is likely to increase recruitment) the assessment team have made the correct decision that Principle 1 does not need to be scored.

Appendix 3.2 Peer Review 2

Overall Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	Yes	Conformity Assessment Body Response
Justification: Although I've questioned the SG100 scores of some PIs (2.4.1, 2.4.2, 2.5.2, and 3.1.1, see below), I still agree in the general determination of the team that (subject to no objections) the fishery meets the requirements for MSC certification.		Thank you.

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe?	Yes/No	Conformity Assessment Body Response
Justification: N/A		N/A

If included:

Do you think the client action plan is sufficient to close the conditions raised?	Yes/No	Conformity Assessment Body Response
Justification: N/A		N/A

General Comments on the Assessment Report (optional)

Good report and well-written.

Some inconsistencies though apparent on the legislation behind and requirements under environmental directives and assessments. For clarification:

As stated under PI2.5.2 – 'Natura 2000' is the collective term for the Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated respectively under the Habitats Directive and Birds Directive (together as the Habitat Regulations). Is it not driven by Marine Strategy Framework Directive.

Team response: Thank you. Reference to the Marine Strategy Framework Directive has been removed.

In report section 3.5.3 it says ‘...The main point is that the management plan has been extended without conducting an Environmental Impact Assessment (EIA)’. What it is really referring to is Habitat Regulations Assessment. The EIA Directive is entirely separate.

Team response: There is no Habitat Regulations Assessment in the German legislation. According to the competent Ministry, a preliminary assessment is carried out at the end of the five-year term of the Management Plan to determine whether the fishery is likely to have significant environmental effects (based on the SEA Directive 2001/42/EC and the German EIA Act). To this day, the Ministry did not see any need for a SEA because the mussel population is in very good conditions.

Performance Indicator Review

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
1.1.1	N/A	N/A	N/A	N/A	N/A
1.1.2	N/A	N/A	N/A	N/A	N/A
1.1.3	N/A	N/A	N/A	N/A	N/A
1.2.1	N/A	N/A	N/A	N/A	N/A
1.2.2	N/A	N/A	N/A	N/A	N/A
1.2.3	N/A	N/A	N/A	N/A	N/A
1.2.4	N/A	N/A	N/A	N/A	N/A

Performance Indicator	Has all the relevant information available been used to score this Indicator? (Yes/No)	Does the information and/or rationale used to score this Indicator support the given score? (Yes/No)	Will the condition(s) raised improve the fishery's performance to the SG80 level? (Yes/No/NA)	Justification Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response
2.1.1	Yes	Yes	N/A	<p>The assessment clearly demonstrates that there are no retained species in the fishery and SG100 is met by default.</p> <p>Agree with PI 100 for both UoAs</p>	Thank you. No further comment necessary.
2.1.2	Yes	Yes	N/A	<p>The assessment clearly demonstrates that there are no retained species in the fishery and SG100 is met by default.</p> <p>Agree with PI 100 for both UoAs</p>	Thank you. No further comment necessary.
2.1.3	Yes	Yes	N/A	<p>The assessment clearly demonstrates that there are no retained species in the fishery and SG100 is met by default, supported by continued management and monitoring of this.</p> <p>Agree with PI 100 for both UoAs</p>	Thank you. No further comment necessary.

2.2.1	Yes	Yes	N/A	<p>The SICA and qualification for the small amount of associated, non-vulnerable bycatch species appears clear enough to justify the SG100 scores; supported by the apparent lack of associated concern by stakeholders.</p> <p>Agree with PI 100 for both UoAs</p>	Thank you. No further comment necessary.
2.2.2	Yes	Yes	N/A	<p>The SG80 is well reasoned/justified. Agree the lack of strategy precludes the SG100 but also that it appears to be unnecessary, as again supported by stakeholders.</p>	Thank you. No further comment necessary.
2.2.3	Yes	Yes	NA	<p>The PI of 80 for both UoAs is well reasoned/justified. More detailed monitoring /assessment and quantification would be required to achieve 100 for any or all PIs.</p>	Thank you. No further comment necessary.
2.3.1	Yes	Yes	N/A	<p>UoA 1: Seed collection via dredging / nets and bottom culture:</p> <p>SI a. SG100 for harbour porpoise is clearly demonstrated.</p> <p>SI b. The lack of data but otherwise well considered impacts and context regarding the, grey seals, common seals, harbour porpoise, oystercatchers, and eider ducks supports the SG80 score.</p> <p>SI c. SG100 for common seals and harbour porpoise, and SG80 for the oystercatcher and</p>	Thank you. No further comment necessary.

				<p>common eider are well considered. I agree regarding the considerations of potential disturbance (noise and visual) and the loss of food resource for the oystercatcher and eider given the contextualised spatial and temporal limitations of the fishery, and scale of other food resources apparently available.</p> <p>The overall PI score of 90 therefore seems correct.</p> <p>UoA 2: Seed collection via ropes and nets and bottom culture: Again the respective considerations are well made and the eventual PI of 95 is agreed.</p>	
2.3.2	Yes	Yes	N/A	<p>UoA 1: Seed collection via dredging / nets and bottom culture <u>and</u></p> <p>UoA 2: Seed collection via ropes and nets and bottom culture:</p> <p>SI a – Adhering to the Management Plan appears to bring the fishery’s impact to a well-determined level.</p> <p>Less clear is the requirement under provision of Article 6 of the Habitat Regulations. The issues being apparently raised around this for the fishery seem complex (and out of scope for this assessment). When the HRA is eventually undertaken by the Competent</p>	Thank you. No further comment necessary.

				<p>Authority in question it should better enable a strategic approach. SG80 agreed.</p> <p>SI b – Good rationale and agree with SG80.</p> <p>SI c – On consideration that the associated HRA is yet to be undertaken and the duty lies with the Competent Authority (above), not the fishery, agree with the SG100 as the fishery appears to be well managed.</p> <p>SI d – Appropriately defined for eiders/oystercatchers (SG80) and seals/porpoise (SG100)</p> <p>Overall, PIs of 85 is agreed.</p>	
2.3.3	Yes	Yes	N/A	<p>For both UoA 1: Seed collection via dredging / nets and bottom culture <u>and</u></p> <p>UoA 2: Seed collection via ropes and nets and bottom culture</p> <p>Fully agree with all the conclusions, respective SG scores, and overall PI score of 85</p>	Thank you. No further comment necessary.

2.4.1	No	No	N/A	<p>UoA 1: Seed collection via dredging/nets and on-growing:</p> <p>I agree with all scores apart from SG100 for the intertidal seed collection. No direct consideration of the dredging impacts on the benthic habitats and communities, and their ecological role. The quantification and rationale presented suggest no serious or irreversible harm, but I would not consider it well-evidenced. The overall PI score would also need re-evaluating.</p> <p>UoA 2: Seed collection via ropes and nets and bottom culture:</p> <p>Agree with the evidence and the PI of 80.</p>	<p>Whilst there might not be direct evidence of the impact of this fishery on the benthic communities when the intertidal beds are fished, evidence does exist to show the annual footprint of the intertidal mussel harvest to be either non-existent or to comprise a very low fraction of the overall intertidal area. This evidence of such a low level of activity therefore enables the reasonable assertion that serious or irreversible harm is highly unlikely as per the criteria required to meet SG100. We therefore stand by our score in this instance.</p>
2.4.2	No	No	N/A	<p>UoA 1: Seed collection via dredging/nets and on-growing</p> <p>SI, a, b, c - The management is well explained, and seems effective, but there is no evidence of it being tested or alternative options being or having been considered to reduce environmental impact. If this exists it would need detailing to achieve the SG100 scores for the intertidal seed collection and bottom culture aspects in my interpretation. SG80 appears met however.</p> <p>SI d - SG100. Agree</p>	<p>UoA 1&2: SI(a) does not require testing or alternative options to score SG100. We consider the arrangement between the fishery and the State Fisheries Directorate and the National Park Authority to be designed to manage the impact of the fishery on the mussel beds within the fishery's footprint. The licensing process continually assesses the fishery's activities and the quantity of mussels available for feeding birds. Should mussel stocks fall below these levels then no harvesting would be permitted.</p> <p>UoA 1: SI(b) – evidence (or testing) demonstrates the strategy in place is working as the intertidal mussel beds are presently at a 10-year high in terms of mussel quantity. This is assessed annually under the management strategy</p>

				<p>UoA 2: Seed collection via ropes and nets and bottom culture:</p> <p>SI a,b, c – as above any evidence of alternative options considered to reduce environmental impact would need detailing to achieve the SG100 scores for the suspended mussel culture and bottom culture aspects in my view/interpretation. ie it seems more management (partial strategy) than strategy.</p> <p>SI d - SG100. Agree</p> <p>Both PI scores would need reassessing.</p>	<p>providing sound and detailed data and therefore more than just an objective basis for confidence; we therefore consider that SG100 is met. With regard to bottom culture, before any new plots are licensed, site-specific assessments are undertaken to ensure no adverse impacts occur. Again, this provides direct information about the habitats involved but we acknowledge there is no site-specific testing in this instance as a follow-up to provide evidence the strategy is working and we have revised our score to SG80.</p> <p>UoA 2: SI(b) – as per UoA1 above, the SG100 score for bottom culture has been reduced to SG80. There is no change to the SG80 score for SMC.</p> <p>UoA 1 and 2: SI(c) – this SI assess only if the strategy is being implemented successfully. The licensing procedures / process, habitat assessments and vessel monitoring are all documented for intertidal harvesting and bottom culture, providing evidence of their successful implementation, therefore SG100 is met. Whether or not the strategy is working i.e. achieving its objective is considered in SI(d).</p> <p>In all cases, a review of alternative measures is not a requirement under the v1.3 habitat PIs.</p>
2.4.3	Yes	Yes	N/A	<p>UoA 1: Seed collection via dredging/nets and on-growing <u>and</u></p> <p>UoA 2: Seed collection via ropes and nets and bottom culture:</p> <p>I agree with the evidence and rationale presented here to achieve the respective SG</p>	<p>Thank you. No further comment necessary.</p>

				scores and overall PI scores of 80.	
2.5.1	Yes	Yes	N/A	<p>UoA 1: Seed collection via dredging / nets and bottom culture, <u>and</u></p> <p>UoA 2: Seed collection via ropes and nets and bottom culture</p> <p>I agree with the evidence and rationale presented here to achieve the respective SG scores and overall PI scores of 80. As mentioned in the report, further detailed, clear evidence would need to achieve higher.</p>	Thank you. No further comment necessary.
2.5.2	No	No	NA	<p>UoA 1: Seed collection via dredging / nets and bottom culture, <u>and</u></p> <p>UoA 2: Seed collection via ropes and nets and bottom culture</p> <p>SI a – the assessments say ‘The plan states that the mussel fishery is carried out in accordance with the environmental protection and Natura 2000 conservation objectives of the National Park’, but this has yet to be undertaken (by the Competent Authority). (Note: It also states ‘These</p>	<p>More detail has been added to demonstrate that SG100 is met and an ecosystem strategy exists.</p> <p>Reference to MSFD is now removed - we acknowledge the oversight.</p>

				<p>measures and licensing and approval processes (as outlined within the Fishery Management Plan) together with the conservation objectives for the Natura 2000 areas (driven by the Marine Strategy Framework Directive)' - Natura 2000 and MSFD are driven by entirely separate directives).</p> <p>Otherwise, the Marine Plan and associated requirements appear effective and represent at least a partial strategy. Would need more detail/assessment to achieve SG100 though.</p> <p>SI b, c, d – agree on the SG scores.</p> <p>Overall PI score would need reassessing.</p>	
2.5.3	Yes	Yes	N/A	<p>UoA 1: Seed collection via dredging / nets and bottom culture, <u>and</u></p> <p>UoA 2: Seed collection via ropes and nets and bottom culture</p> <p>Agree with the individual SG scores and overall PI scores of 85.</p>	Thank you. No further comment necessary.

3.1.1	No	No	N/A	<p>SI a – Describes the binding legislation very well but not clear on how they have been enacted. With the Habitat Regulations Assessment not yet applied to this fishery (by the Competent Authority – i.e. not the fishery’s direct responsibility) it would need more to detail how this is being addressed to demonstrate ‘binding procedures governing cooperation with other parties’ for SG100. I would suggest it otherwise meets SG80 .</p> <p>SI b, c, d – agree with the evidence and rationale.</p> <p>Overall PI would need reassessing re the above.</p>	<p>There is an effective national legal system consisting of federal and State laws and policies and a Management Plan. This framework governs the cooperation between fishery, authorities and other stakeholders. The requirements of SI a are met, it is not about whether and how this framework is applied.</p> <p>The team therefore considers that the score of 100 is justified.</p> <p>With regard to the Environmental Assessment, it should be emphasised that the Management Plan runs for five years and can be renewed for another five years “<i>if there are no compelling reasons for a change in content</i>” (§ 7 of the Management Plan). Before the end of a term the competent Ministries commission a preliminary assessment. If this assessment concludes that there are no such reasons, the Management Plan is renewed without changes and thus without an SEA (There is no HRA in the German legislation). The present plan is in force since 2009 and has been renewed 2013 for another five years.</p>
3.1.2	Yes	Yes	N/A	<p>Agree with all SG scores/reasoning, and overall PI80</p>	<p>Thank you. No further comment necessary.</p>
3.1.3	Yes	Yes	N/A	<p>Agree with the SG score/reasoning, and overall PI100.</p> <p>Again though, the Management Plan and its decision making for the fishery should be further guided when its Habitat Regulations Assessment is undertaken, for reasons</p>	<p>Thank you. No further comment necessary.</p>

				mentioned above.	
3.1.4	Yes	Yes	N/A	Agree with the SG score/reasoning, and overall PI80.	Thank you. No further comment necessary.
3.2.1	Yes	Yes	N/A	Agree with the SG score/reasoning, and overall PI90.	Thank you. No further comment necessary.
3.2.2	Yes	Yes	N/A	Agree with all respective SG scores/reasoning, and overall PI95	Thank you. No further comment necessary.
3.2.3	Yes	Yes	N/A	Agree with all respective SG scores/reasoning, and overall PI100	Thank you. No further comment necessary.
3.2.4	Yes	Yes	N/A	Agree with all respective SG scores/reasoning, and overall PI90	Thank you. No further comment necessary.
3.2.5	Yes	Yes	N/A	Agree with all respective SG scores/reasoning, and overall PI80	Thank you. No further comment necessary.

Performance Indicator	Does the report clearly explain how the process used to determine risk using the RBF led to the stated outcome? Yes/No	Are the RBF risk scores well-referenced? Yes/No	Justification: Please support your answers by referring to specific scoring issues and any relevant documentation where possible. Please attach additional pages if necessary.	Conformity Assessment Body Response:
1.1.1				
2.1.1				
2.2.1	Yes	Yes	Overall sound rationale was used along with good use of references in undertaking it.	Thank you. No further comment necessary.
2.4.1				
2.5.1				

For reports using the Risk-Based Framework:

For reports assessing enhanced fisheries:

Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	Yes	Conformity Assessment Body Response:
Justification: The assessment explains why the fishery does not appear to have impact on the wild, natural stock of blue mussels (and potentially increases them through capture and relaying of seed/spat); and that there are is feed or any disease-preventing components used in the fishery.		Thank you. No further comment necessary.

Appendix 4 Stakeholder submissions

Appendix 4.1 Submissions prior to PCDR publication

A written submission via email was received from Dr Rösner of WWF Germany on 26th October 2017. Dr Rösner was unable to attend the site visit so opted for this medium to present his submission:

Since we discussed the sustainability of this fishery during the course of the first certification process, and at the objection we had to file in 2013, WWF did not see enough progress. This concerns our fundamental argument that the fishery, as it is, does not comply with the National Park regulations and goals (though this assessment could change if the methods of the fishery would change) and that it does not meet the MSC criteria.

Team Response: The assessment team thank Dr Rösner for his submission and have given the input due consideration. The assessment team attempt to address these comments below.

As you are aware, the fishery was first certified by the then CAB, FCI in October 2013. Following the inclusion of ten conditions and its accompanying Client Action Plan, the fishery demonstrated that it met the MSC Fishery Standard. Since then the fishery has made steady progress to meet these conditions, including investigating the fishery's impact on development of stable mussel beds, steps to ensure decision-making is based on the precautionary approach and closer communication and dialogue with nature conservation NGOs.

As per the MSC Certification Requirements for re-assessment, the assessment team has evaluated the fishery against the MSC Fisheries Standard (v1.3)⁸ and conclude that fishery is still in conformity with the MSC principles and criteria.

As you know the fishery is supposed to take place on the basis of a "Miesmuschelbewirtschaftungsplan" from the "Bundesland Niedersachsen" ("Lower Saxony"). While the last such plan in place expired already in 2013, a new one has not been legally decided upon so far. WWF and other environmental NGOs active for the National Park (BUND, Mellumrat, NABU, Niedersächsischer Heimatbund) had then to criticise a draft version of the new plan from 24 June 2014 for a number of reasons, including that it still did not require an appropriate assessment of the fishery on the basis of the EU nature directives and of the national nature law. Though the whole draft was not part of a formal participation process, as also required, we filed a statement on 15 July 2014 (would be available in German language on request).

Team Response: According to the letter of Mr. Prawitt/Lower Saxony Ministry of Food, Agriculture and Consumer Protection of 05/01/2017 the Management Plan came into force the 19/08/2009 and expired the 18/08/2014. According to §9 of the National Park Law the Management Plan Blue

⁸ Re-assessment commenced prior to 1st October 2017, the date by which all existing fisheries shall apply the new standard requirements at their first re-assessment.

Mussel Fishery in the National Park “Lower Saxony Wadden Sea“ has a term of five years and “*will be automatically renewed for another period of five years unless there are compelling reasons to change the content*” (Management Plan paragraph 7). This renewal clause allows for the plan’s renewal for another term of five years until 18th August 2019 and has not therefore expired.

However, it was not before 30 November 2016 that a new version of the plan was sent to us as the basis for a meeting with the concerned ministries and the mussel fishery sector (and again this was not part of a formal participation process). The meeting took place on 07 December 2016. Unfortunately, also in the new version of the plan, our arguments concerning non-compliance with the National Park regulations and goals were not taken into account. Also, the requirement for an appropriate impact assessment was still not part of the plan. During the meeting there was also no real move on these issues. The ministry argued that in the absence of a new version of the plan the old one would continue to be valid. However, we doubt that there would be a legal basis for this decision.

Team Response 3: As mentioned above, the renewal clause in the current management plan means that the plan is still legally in use. The clause in the plan provides the legal basis.

As follow-up to that meeting the representative of the mussel fishery approached the environmental NGOs (BUND, NABU, Niedersächsischer Heimatbund, WWF) to come together and to discuss a solution. This was a move we several times suggested and which we considered very positive. There was a meeting then on 16 January 2017 with the representatives of the mussel fishery and the environmental NGOs concluding that both should try to find jointly a constructive solution for the critical issues within one year, i.e. until the end of 2017. Though it was not at all clear whether they will be successful at the end, both sides were of the opinion that such talks should be given a good chance. Though the environmental NGOs did not accept the new version of the Miesmuschelbewirtschaftungsplan, they suggested to accept that the present situation continues for the time span of a year, i.e. until the end of 2017. We did this with the vision that in the end there should be a solution which serves both a then sustainable mussel fishery and a National Park which would be – as far as the impact from the mussel fishery is concerned – much better protected than it is now.

Having so far described the situation until our last stakeholder comment on the occasion of the Year 3 Surveillance Audit, in the time since then there had been several meetings between the representatives of the mussel fishery and the environmental NGOs, the last one on 19 Oct 2017. Unfortunately, as of now, there is no clear result to be reported and also the Miesmuschelbewirtschaftungsplan continues to be a kind of draft-plan without formal participation and impact assessment, and therefore no legal basis.

With regard to the latter I would like to cite the “Niedersächsischer Landtag, 17. Wahlperiode, Drucksache 17/8072“ (Link: http://www.landtag-niedersachsen.de/ps/tools/download.php?file=/ltnds/live/cms/dms/psfile/docfile/41/17_8072591d5cb465740.pdf&name=17-8072.pdf&disposition=attachment). In this report the government presented its decision on the “Entwurf eines Gesetzes zur Änderung des Niedersächsischen Ausführungsgesetzes zum Bundesnaturschutzgesetz sowie weiterer Gesetze zum Naturschutzrecht“

and commented on page 25 on the Miesmuschelbewirtschaftungsplan (named “Bewirtschaftungsplan“ there). Concerning the legal situation the government determines: “Wegen seiner die Vorschriften des § 9 Abs. 2 NWattNPG konkretisierenden und ausfüllenden Wirkung nimmt der Bewirtschaftungsplan an der Außenwirkung dieser gesetzlichen Vorschrift Teil und ist damit (auch) bei behördlichen Entscheidungen zu beachten. Der Bewirtschaftungsplan wird damit von § 36 Satz 1 Nr. 2 BNatSchG erfasst. Damit unterliegen seine Aufstellung und Fortschreibung dem Beteiligungstatbestand des § 63 Abs. 2 Nr. 3 BNatSchG.“ This statement confirms our legal view that the NGOs would have a right to comment and that there is an appropriate impact assessment required. As mentioned, there was no formal participation process and no appropriate impact assessment so far.

Team Response: As stated in the original PCR, nature NGOs are recognised under §63 Bundesnaturschutzgesetz and do of course have a legal right to comment. There are provisions in the management system to allow this, including appealing against a decision in court for example when a new fishing licence is granted.

A “formal” participation process is not specifically required under the MSC requirements, but there is certainly process for consultation and participation. This is further highlighted by the client group’s attempt to form a ‘roundtable’ with NGOs to make the process more inclusive and transparent.

Further to this, the “Entwurf eines Gesetzes zur Änderung des Niedersächsischen Ausführungsgesetzes zum Bundesnaturschutzgesetz sowie weiterer Gesetze zum Naturschutzrecht“ is referenced. This “Draft act amending the Lower Saxony Implementation Law for the Federal Nature Conservation Law” was introduced in May 2017, but the law has not yet been amended. That means the formal participation of environmental NGOs is not yet regulated.

With regard to appropriate assessments, this was raised during the objection process during the initial certification with references to seed collector sites. The assessment team fully agree with the NGOs that legally under Article 6 of the Habitats Directive and in keeping with previous European Case Law (for example Case C-127/02⁹), management plans for fisheries inside Natura 2000 sites are required. Further to this, this is irrespective of if the fishing activity was authorised before the Habitats Directive came into effect (C-266/08 at para. 44¹⁰). Moreover the fishery also agree that an Appropriate Assessment is needed prior to the enactment of the new fishery management plan. However the legal requirement to produce an appropriate assessment, rests with the competent authority, not the fishery.

The whole issue translate also into that conditions 1, 2, 3, 8 and 10 – in my impression all of them being related to these issues – are not fulfilled yet.

Though the focus of this comment is on the Miesmuschelbewirtschaftungsplan, I also have the

⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62002CJ0127>

¹⁰ <http://curia.europa.eu/juris/document/document.jsf?docid=75516&doclang=ET>

impression that there are even more conditions, e.g. those related to translocation/import, that had not been fulfilled to the necessary extent.

In summary, as of now a valid Miesmuschelbewirtschaftungsplan cannot assumed to exist at least from January 2018 onwards. However, I would not like to give up to be optimistic that during the remaining year 2017 the discussions between the mussel fishery and the NGOs could have a result which would allow in the near future to find a common solution, which would over some time both improve the situation for nature and would make the mussel fishery truly sustainable. This is why I had noted above that it would be better to have more time for stakeholder comments. But for the moment being the situation unfortunately is as described above.

Team Response: The team evaluate the management plan still to be in force, as it was renewed by the Ministry until August 2019. The Ministries have given their consent to offer the NGOs to participate in the process and the fishery has offered to approach the Ministry together with the NGOs to ask for an Appropriate Assessment. Please also see the letter from the Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz (Lower Saxony Ministry of Food, Agriculture and Consumer Protection) regarding the approval of the 2019 – 2023 mussel fishery management plan in this appendix. They also acknowledge directly the opportunity for nature conservations to review and comment on this process and aim for consensus wherever possible. The fishery believe that any further limitations to fishing activities would have the effect that the fishery would be uneconomical.

I hope this helps you with evaluating the situation.

Again, on behalf of the CU Pesca assessment team, thank you for your input.

*Kind regards,
Hans-Ulrich Rösner"*

During the period for the submission of new information by stakeholders following the passing of the 9 month PCDR deadline, two further submissions was received from WWF Germany on the 23rd and 24th July 2018. The team have responded to this separately here.

Dear Charlotte Gwyther, dear Kat Collinson,

Thank your for the opportunity für WWF Germany to provide new information concerning the Germany Lower Saxony mussel dredge and mussel culture fishery.

Team response: The assessment team thank Dr Rösner and WWF Germany for their submission and continued interest in this recertification process. The assessment team attempt to address these comments below. This submission, following the request for ‘new information’, does not change the team’s analysis of the fishery or its compliance to the MSC Fisheries Standard nor require re-scoring of Performance Indicators, however we hope that we have satisfactorily addressed your comments.

WWF ist contributing to the discussion on the compliance of this fishery with the MSC standard since the course of the first certification process. Unfortunately, we do not see progress which would justify a re-certification. The fishery does not comply with the goals and the legal requirements of the protected area that it operates in, and for this and for other reasons does not meet the MSC criteria. We refer to our earlier statements on this issue, which, unfortunately, continue to be valid.

Team response: We would like to echo our previous response to the October 2017 WWF submission (above). The fishery was successfully certified with the inclusion of ten conditions and its corresponding Client Action Plan. Since then, the fishery has made steady progress to meet these conditions, including investigating the fishery’s impact on development of stable mussel beds, steps to ensure decision-making is based on the precautionary approach and closer communication and dialogue with nature conservation NGOs. The fishery’s compliance to the laws and regulations of the National Park laws and regulations are corroborated by the statement from the Fisheries Office (Staatliches Fischereiamt in Bremerhaven) in the following stakeholder submission. The State Government mandated process for applying for fishing licences and fishing operations for seed and consumption mussels are indeed also strictly adhered to by the fishery.

One item of particular relevance is the management plan for the fishery. As you might know the fishery is supposed to take place on the basis of a „Miesmuschelbewirtschaftungsplan“ from the „Bundesland Niedersachsen“ („Lower Saxony“). While the last such plan in place expired already in 2013, a new one has, as far as WWF is informed, not been legally decided upon so far. WWF and other environmental NGOs active for the National Park, where the fishery operates in (BUND, Mellumrat, NABU, Niedersächsischer Heimatbund) criticised a draft version of a new plan from 24 June 2014 for a number of reasons, including that it did not require an appropriate assessment of the fishery on the basis of the EU nature directives and of the national nature law. We submitted our statement commenting the draft plan on 15 July 2014, despite the fact that the whole draft plan was not part of a formal participation process, as it would have been required (our statement is in German language and available on request).

Team response: According to the letter of Mr. Prawitt/Lower Saxony Ministry of Food, Agriculture and Consumer Protection of 05/01/2017 the Management Plan came into force the 19/08/2009 and expired the 18/08/2014. According to §9 of the National Park Law the Management Plan Blue Mussel Fishery in the National Park “Lower Saxony Wadden Sea” has a term of five years and “will be automatically renewed for another period of five years unless there are compelling reasons to

change the content” (Management Plan paragraph 7). This renewal clause allows for the plan’s renewal for another term of five years until 18th August 2019 and has not therefore expired. The team cannot however comment on the Government’s activity or inactivity in accepting eNGO comments on the 2014 draft plan.

However, it was not before 30 November 2016 that a new version of the plan was sent to us as the basis for a meeting with the concerned ministries and the mussel fishery sector (and again this was not part of a formal participation process). The meeting took place on 07 December 2016. Unfortunately, also in the new version of the plan our arguments concerning non-compliance with the goals and the legal requirements of the protected area were not taken into account in an appropriate extent. Also, the requirement for an appropriate impact assessment was still not part of the plan. During the meeting there was also no real move on these issues. The ministry argued that in the absence of a new version of the plan the old one would continue to be valid. However, we doubt that there would be a legal basis for such a decision.

Team response: As mentioned above, the renewal clause in the current management plan means that the plan is still legally in use. The clause in the plan provides the legal basis. Again, the State Government’s action or inaction is not under scrutiny in this assessment and its decision to accept eNGO comments is not in the scope of this assessment. There is a stakeholder consultation process by which stakeholders have chance to express their concerns to the Fisheries Office, via the advisory council of the National Park or through other institutions and channels. Whether the comments are accepted by the Ministries are out of influence of the fishery.

As follow-up to that meeting the representative of the mussel fishery approached the environmental NGOs to come together and to discuss a solution. This was a move we several times suggested and which we acknowledged very much. There were a number of meetings then from January 2017 to February 2018 where both the representatives from the mussel fishery and the environmental NGOs tried to find jointly a constructive solution for the critical issues. To give these discussions a chance the environmental NGOs suggested to accept the present situation with the „Miesmuschelbewirtschaftungsplan“ to continue for the time span of a year, i.e. until the end of 2017. They did this with the vision that in the end there would hopefully be a solution which serves both a then sustainable mussel fishery and a National Park which would become in practice – as far as the impact from the mussel fishery is concerned – better protected than before. Unfortunately, in February 2018 both parties concluded that presently they cannot find a solution where they could agree upon. The „Miesmuschelbewirtschaftungsplan“ also continues be a kind of draft-plan without formal participation and impact assessment, and therefor no legal basis. With regard to that statement we would like to cite e.g. the „Niedersächsischer Landtag, 17. Wahlperiode, Drucksache 17/8072“

([Link: http://www.landtag-niedersachsen.de/ps/tools/download.php?file=/ltns/live/cms/dms/psfile/docfile/41/17_8072591d5cb465740.pdf&name=17-8072.pdf&disposition=attachment](http://www.landtag-niedersachsen.de/ps/tools/download.php?file=/ltns/live/cms/dms/psfile/docfile/41/17_8072591d5cb465740.pdf&name=17-8072.pdf&disposition=attachment)). In this report the government presented its decision on the „Entwurf eines Gesetzes zur Änderung des Niedersächsischen Ausführungsgesetzes zum Bundesnaturschutzgesetz sowie weiterer Gesetze zum Naturschutzrecht“ and commented on page 25 on the „Miesmuschelbewirtschaftungsplan“ (with the term „Bewirtschaftungsplan“ there). Concerning the legal situation the government determined: „Wegen seiner die Vorschriften des § 9 Abs. 2 NWattNPG konkretisierenden und ausfüllenden Wirkung nimmt

der Bewirtschaftungsplan an der Außenwirkung dieser gesetzlichen Vorschrift Teil und ist damit (auch) bei behördlichen Entscheidungen zu beachten. Der Bewirtschaftungsplan wird damit von § 36 Satz 1 Nr. 2 BNatSchG erfasst. Damit unterliegen seine Aufstellung und Fortschreibung dem Beteiligungstatbestand des § 63 Abs. 2 Nr. 3 BNatSchG.“ This statement confirmed our legal view that the NGOs would have a right to comment and that there is an appropriate impact assessment required. As mentioned, there was no formal participation process and no appropriate impact assessment so far. In summary, as mentioned, there is no valid „Miesmuschelbewirtschaftungsplan“.

Team response: Our response is the same as in reply to the October 2017 submission from WWF. As stated in the original PCR, nature NGOs are recognised under §63 Bundesnaturschutzgesetz and do of course have a legal right to comment. There are provisions in the management system to allow this, including appealing against a decision in court for example when a new fishing licence is granted.

A “formal” participation process is not specifically required under the MSC requirements, but there is certainly process for consultation and participation. This is further highlighted by the client group’s attempt to form a ‘roundtable’ with eNGOs to make the process more inclusive and transparent.

Further to this, the “Entwurf eines Gesetzes zur Änderung des Niedersächsischen Ausführungsgesetzes zum Bundesnaturschutzgesetz sowie weiterer Gesetze zum Naturschutzrecht“ is referenced. This “Draft act amending the Lower Saxony Implementation Law for the Federal Nature Conservation Law” was introduced in May 2017, but the law has not yet been amended. That means the formal participation of environmental NGOs is not yet regulated.

With regard to appropriate assessments, this was raised during the objection process during the initial certification with references to seed collector sites. The assessment team fully agree with the eNGOs that legally under Article 6 of the Habitats Directive and in keeping with previous European Case Law (for example Case C-127/02¹¹), management plans for fisheries inside Natura 2000 sites are required. Further to this, this is irrespective of if the fishing activity was authorised before the Habitats Directive came into effect (C-266/08 at para. 44¹²). Moreover the fishery also agree that an Appropriate Assessment is needed prior to the enactment of the new fishery management plan. However the legal requirement to produce an appropriate assessment, rests with the competent authority, not the fishery.

We also have to conclude that almost all conditions (except Nr. 4) from the first certification period had not been fulfilled!

Team response: The team do not agree with this conclusion. Please see our scoring rationales for our justifications.

Kind regards,

Hans-Ulrich Rösner

¹¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62002CJ0127>

¹² <http://curia.europa.eu/juris/document/document.jsf?docid=75516&doclang=ET>

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Dear Charlotte,

Thanks for the receipt! On behalf of WWF I would like to add the following information:

1. There is the following rather recent report: Reise K, Buschbaum C. 2017. Muschelbänke in der Unterwasserwelt des Wattenmeeres – Erkenntnisse zu Miesmuscheln im Sublitoral. Studie im Auftrag des WWF Deutschland. Online: https://www.wwf.de/fileadmin/user_upload/PDF/Muschelbaenke-in-der-Unterwasserwelt-des-Wattenmeeres.pdf. I am not sure whether you are already aware of it?

Team response: Thank you for this other submission. The team are indeed aware of this report and have cited it in this report.

The report presents historical evidence that prior to the mussel fishery it was quite normal to find natural mussel beds also of older age in the subtidal of the Wadden Sea. This is important, because the occurrence of such natural subtidal mussel beds, and the mussel fishery being the major factor, or one of the major factors, responsible for their disappearance, had been disregarded so far.

Team response: The team notes Chapter 7, point 7 of the WWF Report says: “The mussel fishery, based on bottom cultures, has so far prevented, because of their high demand for young mussels from natural settlements, their further development to perennial subtidal mussel beds with many age groups and a species-rich community. This in turn complicates the settlement of young mussels in the subtidal zone and has interrupted the natural dynamics of subtidal mussel beds in the Wadden Sea.” There are several activities that may affect the presence of natural mussel beds, which are referenced in our response below and there is no direct evidence to suggest that the mussel fishery is the “major factor” to the decline of stable mussel beds in the National Park. The team would like to quote the paper’s own statement that: “Long-term changes on individual mussel beds as well as of regional populations are characteristic in both, intertidal and subtidal zones. These changes are primarily driven by extreme weather events, while biotic interactions tend to have more modest effects. The spread of introduced Pacific oysters has caused regional declines of mussel populations. In the deeper subtidal there is still space for mussel beds without these oysters”.

It is well-documented that the National Park is also used by other fisheries such as the brown shrimp (German and Dutch) and cockle fisheries, as well as other water users, such shipping lanes or cables. Figure 23 below (Baers et al., 2017, a chapter in the 2017 Wadden Sea Status Report) highlights the extent of other fisheries in the National Park and water of Lower Saxony, which will also have an arguably more significant effect on the benthic habitat than this fishery. [Baers et al \(2017\)](#) also make reference to a study ([WWF, 2016](#)) which completed a detailed analysis on the German shrimping fleets activities between 2007 – 2013. This investigation showed in those years that 69.1 % of the fishing activities took place within the borders of the National Parks, 27.9% of which occurred in the Nationalpark Niedersächsisches Wattenmeer. Baers et al. (2017) go on to state “(In Schleswig-Holstein and) Lower Saxony mussel beds continued to deteriorate until 2005 despite reduced fishing impact: between 2015 – 2013 the areas of mussels beds remained constant but low”.

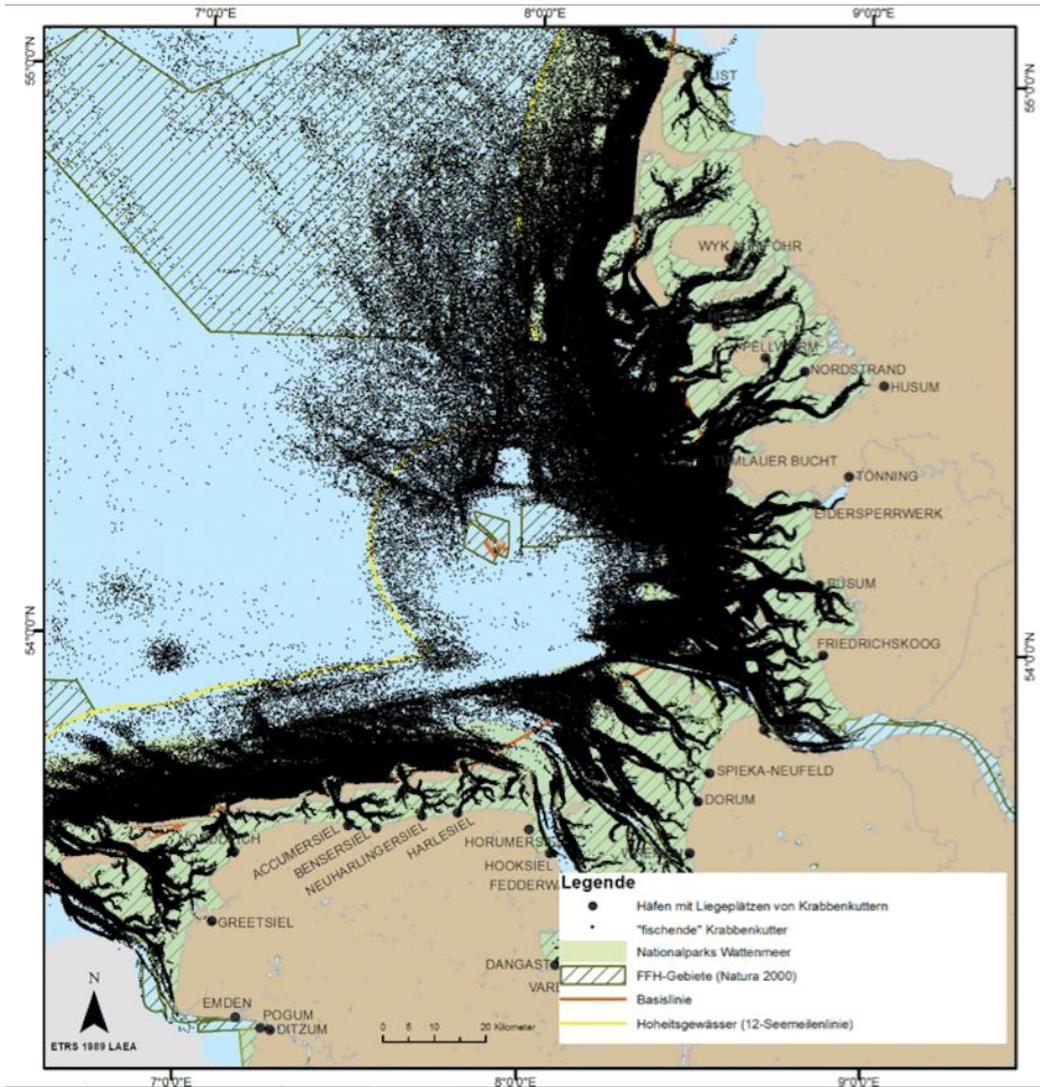


Figure 23. German shrimping fleet distribution showing VMS data of actively fishing vessels 2007 – 2013 (source: Baers et al., 2017, Wadden Sea Status Report).

The team would also like to refer Dr Rösner to Figure 5 and Figure 6 in this report, which illustrates the extent of the area actually used by the fishery. Fishing is forbidden in 26% of the National Park (subtidal and intertidal areas collectively) by the legislation¹³ and there are also other parts of the National Park which are not fished, although it is not restricted by law and due to the lack of mussel beds. Additionally areas may not be accessible due to unsuitable water conditions (i.e. too shallow/deep or water flow too strong) or because the area is designated for other users, like shipping lanes or cables. In reality, the potential “fishable” areas (where the seed fishery and rope cultures could take place) constitutes 35% of the National Park area. Out of the 35% of fishable area, only about 2% of that is actually used for seed collection (and which is restricted from 15th December – 31st March annually).

¹³ Nationalparkgesetz Niedersächsisches Wattenmeer and additional the Bewirtschaftungsplan Miesmuschelfischerei im Nationalpark “Niedersächsisches Wattenmeer 2009-2013” (Management Plan Blue Mussel Fishery in the National Park “Lower Saxony Wadden Sea” 2009-2013 (see section 1.1 for more information on the management of the fishery).

Further to this, the area is also affected by dredging from both the Ems and the Jade estuaries and from within the confines of the National Park itself. Please find below an image from Schultze and Nehls (2017), another chapter in the 2017 Wadden Sea Status Report. The [report](#) estimates 0.1 million tonnes have been dredged from the Lower Saxony area, which has led to increased the amount of sediment in the water column and smothering of potential mussel beds. The recovery rates after such impacts varies from a few years to decades (ICES, 2016).

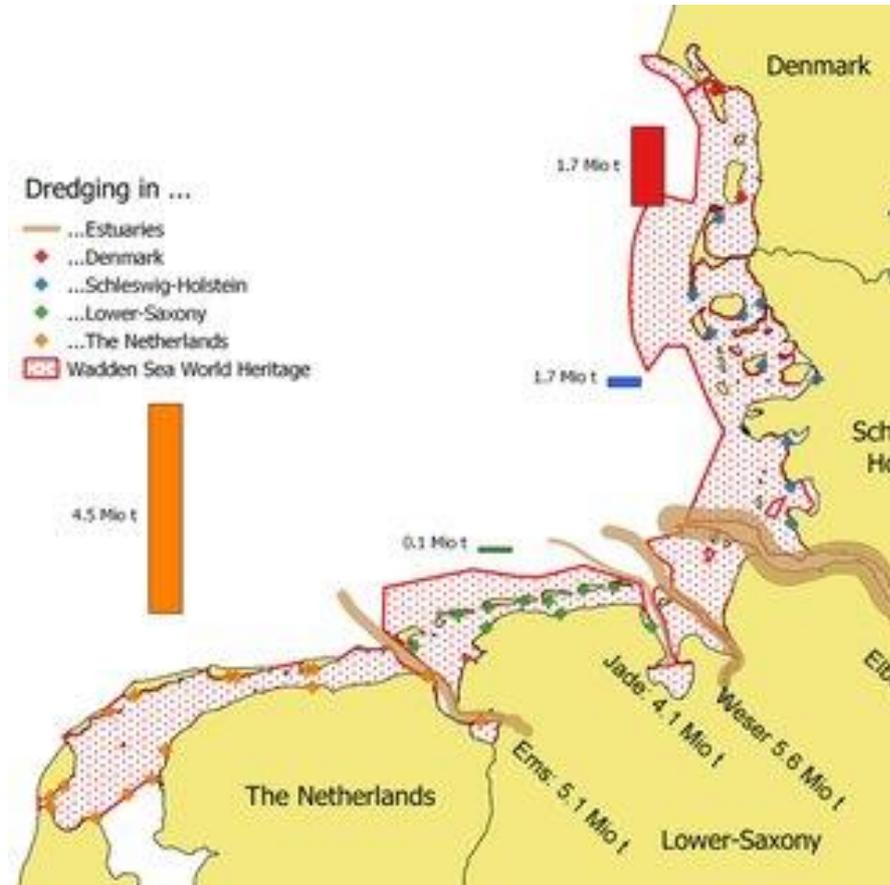


Figure 24. Locations and averaged amounts of dredged sediments per year (2006-2013) within the Wadden Sea areas of the Netherlands, (orange symbols), Germany (green and blue symbols), Denmark (red symbols) and the shipping lanes within the rivers Ems, Jade, Weser and Elbe (source Schultze and Nehls, 2017).

Based on these evidential examples, the team does not agree with Dr Rösner’s statement for this fishery being the major factor for mussel bed disappearance.

2. Adjacent to the Wadden Sea of Lower Saxony, in the Wadden Sea of Schleswig-Holstein, there was also a controversial discussion about the mussel fishery for many years. In 2015 this discussion had been resolved with a framework agreement between the mussel fishery, the Schleswig-Holstein government, and the environmental NGOs. This agreement basically described a way and an extent of a mussel fishery supposed to be in line with the environmental legislation (which is quite similar to the one valid for Lower Saxony). Among other issues, according to the framework agreement, the mussel fishery was to be restricted to four tidal basins, meaning that all the others tidal basins were to be closed. Also the seed mussel fishery remained forbidden in the intertidal in the whole Wadden Sea of Schleswig-Holstein, all in all resulting in around 87 % of the area of the National Park to be closed for mussel fishery.

Team response: Indeed the team are aware of the situation in the case of Schleswig-Holstein. Both the management plan and the National Park Law in Lower Saxony provide the framework to regulate the fishery's operations, something which the client group has demonstrably complied to for many years (see letter from the Fisheries Office on the following page). The mussel fishery is restricted by the management plan and National Park Law (as well as the Fisheries Law and Coastal Fisheries Regulations) in terms of area and biomass and even the time of year that mussels may be harvested.

Although not specifically restricted by law to the percentage quoted for the Schleswig-Holstein mussel fishery, the total area that the Lower Saxony mussel fishery may operate is extremely limited. Fishing is forbidden in 26% of the National Park (subtidal and intertidal areas collectively) by the legislation¹⁴ and there are also other parts of the National Park which are not fished (for example due to them being in exclusion zones for shipping or cables or being unfishable due to the presence of Pacific oysters, or adverse fishing conditions). In reality, the potential "fishable" areas (where the seed fishery and rope cultures could take place) constitutes 35% of the National Park area. Out of the 35% of fishable area, only about 2% of that is actually used for seed collection.

Following the framework agreement and based on it there was a formal application of the mussel fishery for licenses. This had then to be checked by an appropriate environmental assessment, which justified the approach. Therefore, in spring 2017 the new regulation became valid. As you might know (ME Certification was the CAB at this time), parallel to that the mussel fishery applied for MSC certification (<https://fisheries.msc.org/en/fisheries/schleswig-holstein-blue-shell-mussel/@assessments>). The fulfillment of the framework agreement had be laid down as conditions in the PCR. In the view of WWF the MSC certification in Schleswig-Holstein was appropriate and justified.

Team response: There is a formal application process for mussel fishing licences in this fishery also. Every mussel fisher must apply for a licence, the application for which will be reviewed by the Fisheries Directorate (that will also consult the National Park authorities). The Lower Saxony Fisheries Law (§ 17) provides for a limitation of mussel fisheries licences in the interest of care/preservation. The number of mussel fishing vessels are further restricted to a maximum number of five. The process by which fishers must apply for licences is governed by the management authority, not the fishery. The assessment team fully agree with the NGOs that legally under Article 6 of the Habitats Directive and in keeping with previous European Case Law (for example Case C-127/02¹⁵), management plans for fisheries inside Natura 2000 sites are required. Further to this, this is irrespective of if the fishing activity was authorised before the Habitats Directive came into effect (C-266/08 at para. 44¹⁶). Moreover the fishery client group also agree that an Appropriate Assessment is needed prior to the enactment of the new fishery management plan (which to the

¹⁴ Nationalparkgesetz Niedersächsisches Wattenmeer and additional the Bewirtschaftungsplan Miesmuschelfischerei im Nationalpark "Niedersächsisches Wattenmeer 2009-2013" (Management Plan Blue Mussel Fishery in the National Park "Lower Saxony Wadden Sea" 2009-2013 (see section 1.1 for more information on the management of the fishery).

¹⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:62002CJ0127>

¹⁶ <http://curia.europa.eu/juris/document/document.jsf?docid=75516&doclang=ET>

team's understanding is in process). The formation of the Roundtable discussions between the fishery client group and eNGOs you reference in your earlier submissions above is testament. However the legal requirement to produce an appropriate assessment, rests with the competent authority, not the fishery.

The case of the mussel fishery in Schleswig-Holstein needs to be taken into account for the assessment of the mussel fishery in Lower Saxony. There are a few differences to be considered, but the differences between the two areas would not justify a much heavier impact of the fishery in Lower Saxony. A closure of the mussel fishery in the intertidal and a closure of the subtidal in the large majority of the tidal basins, equivalent to the situation in the National Park in Schleswig-Holstein, would be appropriate there as well in order comply with the goals of the National Park and with nature legislation.

Although adjacent in location, the two fisheries are not comparable as they are governed by different management bodies as you yourself make reference to. Further to this, it is not for the team to impose such area closures as a condition of this fishery's continued certification, especially when the fishery client group has demonstrably made improvements to the information and management of the fishery, above its legal obligations; and in its compliance to the laws and regulations by which it is bound.

*Kind regards,
Hans-Ulrich*

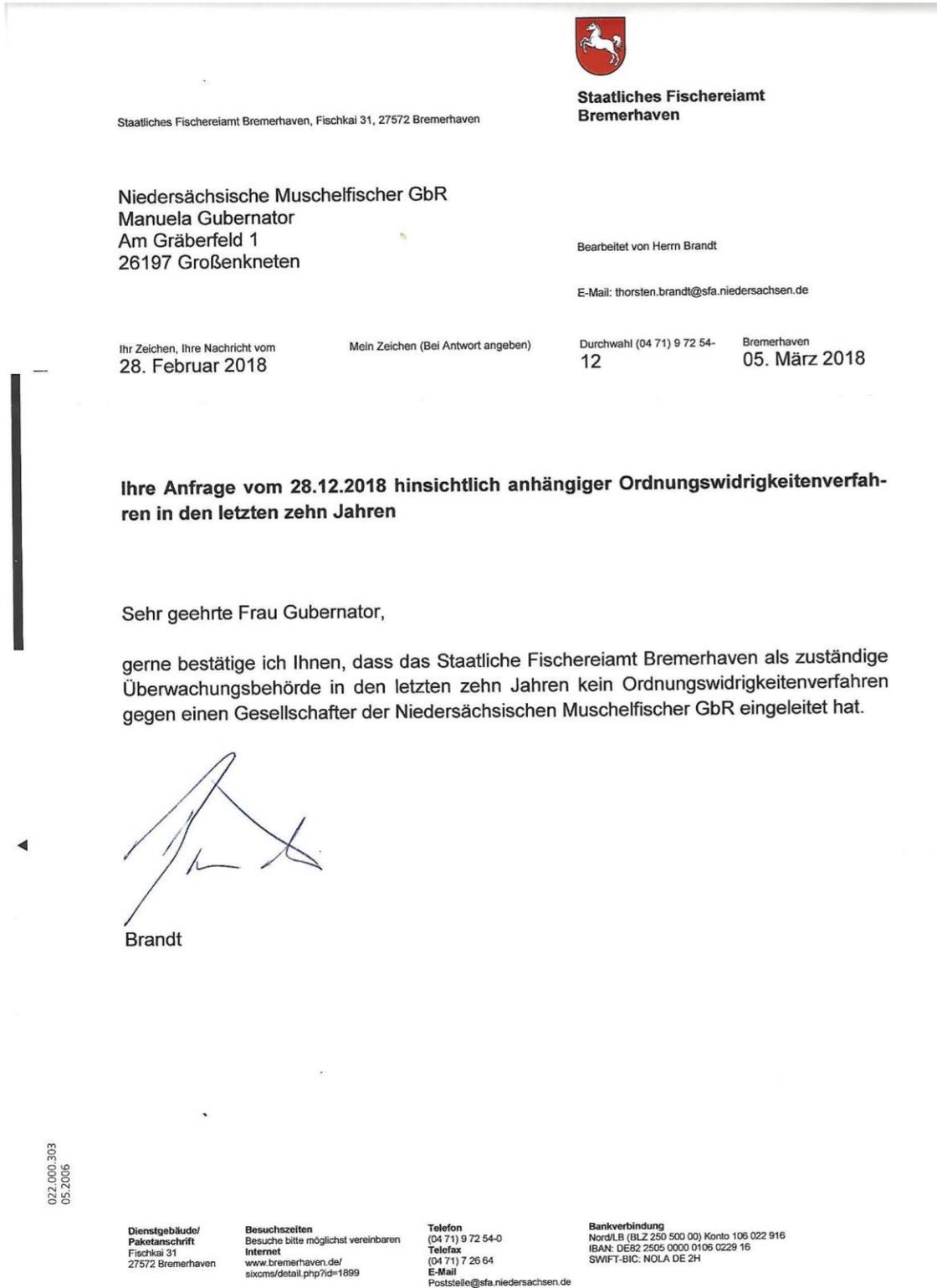
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The below letter was submitted by the Fisheries Office in regard to compliance of the mussel fishery.



The English translation is provided below:

Your request from 28/02/2018 with regard to pending regulatory offence procedures in the last ten years

Dear Ms. Gubernator,

I am happy to confirm that the State Fisheries Office Bremerhaven as the competent monitoring authority has not initiated any regulatory offence procedure against a member of the Niedersächsische Muschelfischer GbR in the last ten years.

The below letter was submitted by the Fisheries Office in regard to the approval of the 2019 – 2023 mussel fishery management plan.



**Niedersächsisches Ministerium für Ernährung,
Landwirtschaft und Verbraucherschutz**

Niedersächsisches Ministerium für Ernährung, Landwirtschaft und Verbraucherschutz
Postfach 2 43, 30002 Hannover

Niedersächsische Muschelfischer GbR
Frau Manuela Gubernator
Am Gräberfeld 1
26197 Großenkneten

Bearbeitet von
Dr. Olaf Prawitt
E-Mail
olaf.prawitt@ml.niedersachsen.de

Ihr Zeichen, Ihre Nachricht vom

Mein Zeichen (Bei Antwort angeben)

Durchwahl 0511 120-
2017
Telefax

Hannover
19.06.2018

Verabschiedung Bewirtschaftungsplan Miesmuschelfischerei 2019-2023

Sehr geehrte Frau Gubernator,

vielen Dank für Ihre Nachfrage nach dem Stand der Verabschiedung des nächsten Miesmuschelbewirtschaftungsplans.

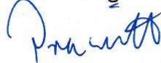
Das Niedersächsische Landwirtschaftsministerium und das Niedersächsische Umweltministerium haben sich darauf verständigt, den Miesmuschelbewirtschaftungsplan für die Jahre 2019-2023 noch in diesem Jahr zu verabschieden.

In den nächsten Tagen werden Sie ein Schreiben erhalten, in dem wir den Sachstand zu den Ergebnissen des Runden Tisches erfragen, der 2017 zwischen den Vertretern der Muschelfischereibetriebe und der Umweltverbände eingerichtet wurde. Wir streben an, dort erzielte einvernehmliche Ergebnisse nach Möglichkeit in den nächsten Bewirtschaftungsplan einfließen zu lassen.

Der Plan wird von den zuständigen Behörden unter Beachtung des Schutzzwecks des Nationalparks sowie unter Berücksichtigung der erforderlichen umweltrechtlichen Prüfungen erstellt und erlassen. Dabei wird den nach § 3 des Umwelt-Rechtsbehelfsgesetzes vom Land Niedersachsen anerkannten Naturschutzvereinigungen entsprechend den Bestimmungen des § 63 Abs. 2 Nr. 3 BNatSchG Gelegenheit zur Stellungnahme und zur Einsicht in die einschlägigen Sachverständigen Gutachten gegeben werden.

Mit freundlichen Grüßen

Im Auftrage



Dr. O. Prawitt



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The English translation is provided below:

Dear Mrs Gubernator,

Thank you for your request for approval of the next mussel management plan.

The Lower Saxony Ministry of Agriculture and the Lower Saxony Ministry of the Environment have agreed to adopt the mussel management plan for the years 2019-2023 later this year.

In the next few days, you will receive a letter asking for the state of play on the results of the roundtable, which was set up in 2017 between the representatives of the shellfish industry and the environmental organisations. We aim to achieve consensual results wherever possible in the next management plan.

The plan is drawn up and issued by the competent authorities in compliance with the protection of the National Park and taking into account the necessary environmental audits. According to §3 of the Environmental Remedies Act, the landowners' association of Niedersaschen recognises protected nature conservation associations according to the provisions of §63, para. 2 no. 3 BNatSchG opportunity to comment and to inspect the relevant expert opinions.

Appendix 4.2 Submissions following PCDR publication


Comments on the Public Comment Draft Report for MSC-Certification of the „Germany Lower Saxony Mussel Fishery“

6th November, 2018

The Public Comment Draft Report (PCDR) for MSC-Certification of the „Germany Lower Saxony Mussel Fishery“ had been published on 9th October 2018 (<https://fisheries.msc.org/en/fisheries/germany-lower-saxony-mussel-dredge-and-mussel-culture/@assessments>). WWF has already made a number of submissions concerning the MSC certification for this fishery since 2011. Together with NABU, WWF also objected against the first certification in 2013. While that objection was rejected, the comments on this case by WWF and NABU are to be found at https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Stellungnahme_MSC-Zertifizierung_Muschelfischerei.pdf.

WWF acknowledges at least some progress with the management of the fishery. This progress is mainly due to some improved communication and a better knowledge base. There is, however, no progress concerning the impact of the fishery on the Wadden Sea National Park where the fishery is operating in. In the view of WWF also many of the conditions linked to the first certification in 2013 had not been fulfilled yet. It is referred to the comments provided over the years, which are not repeated here.

In the following WWF is commenting on some overarching issues of particular relevance for the assessment of the Performance Indicators (PI`s) in the PCDR by the Conformity Assessment Body (CAB):

1. There is no valid management plan for the fishery

WWF has the strong view that the management plan for the fishery has expired and that at present there is no valid management plan, as would be legally required, but also being a requirement for a MSC certification. The CAB rejected this view, in particular by citing the old management plan that the management plan „will be automatically renewed for another period of five years unless there are compelling reasons to change the content“ (e.g. p. 221). However, the core message of the WWF statements concerning the mussel fishery in the Wadden Sea National Park in Lower Saxony is that there are compelling – and also legal – reasons to change the present management. That means there is no valid management plan as long as the plan has not been changed accordingly.

2. Appropriate impact assessment is still missing

WWF acknowledges that, in contrast to earlier statements, the CAB and the fishery agree that legally an appropriate assessment for the fishery is required (e.g.

p. 223). However, there is no such assessment. The CAB tries to justify this by arguing that *„the legal requirement to produce an appropriate assessment, rests with the competent authority, not the fishery.“* (e.g. p. 223). Indeed there are deficiencies with the government fulfilling its tasks here, but in the end impact assessments are primarily a duty of those who have an impact on nature. It should be reminded that one of the main reasons while MSC came into existence many years ago was the global necessity to compensate for governmental deficiencies in fishery management. How can a good management of a fishery being certified when a legal requirement for such an important issue is on the one hand required, but on the other hand not being carried out? That does not fit to MSC principle 3 that requires that certified fisheries must comply with relevant laws.

3. Cumulative impacts on Blue mussel habitats are ignored

In the CAB's reaction to the WWF submissions correctly a number of other impacts influencing natural mussel banks are mentioned, such as extreme weather events (p. 229), brown shrimp fishery (p. 230) or dredging (p. 231). However, it seems that this list aims to support the view that the presence of other impacts would make the impact of the mussel fishery negligible. WWF believes, and this being a fundamental issue in environmental legislation, the opposite is the case, as all relevant impacts must be considered in a cumulative way. Thus, in the presence of other impacts on the National Park and its habitats the mussel fishery must be managed more restrictive, not less. In contrast to what the CAB suggested (p. 231), WWF in an earlier submission mentioned already that there are other relevant impacts beyond the mussel fishery (p. 229: *„...the mussel fishery being the major factor, or one of the major factors, responsible for their disappearance...“*).

4. The impact on the National Park is strongly underestimated

The CAB repeatedly argues that the impact of the fishery on the Wadden Sea National Park would be small and is trying to prove this by a „2 % argument“ (e.g. p. 49: *„In fact, annually at most 2% of the total National Park area is used by the fishery including seed mussel fishery and culture plots.“*, or p. 232: *„In reality, the potential “fishable” areas (where the seed fishery and rope cultures could take place) constitutes 35% of the National Park area. Out of the 35% of fishable area, only about 2% of that is actually used for seed collection.“*).

On this argument the CAB is basing many further considerations with regard to the PI assessments and scorings. However, the „2 % argument“ is misleading: Two habitat types (the „intertidal blue mussel bed“ - i.e. without Pacific oysters – and the „subtidal blue mussel bed“) are almost completely fished away (e.g. partly confirmed by the CAB on p. 17: *„This means that in the subtidal in principle nearly all mussels located by the mussel sector can be fished...“*). These two habitat types, being an integral part of a natural Wadden Sea, may be impacted by the fishery close to 100 %, and thus damaging the National Park in its

entirety. That impact may not be hidden by a misleading „2 % argument“, which incorrectly allows for a much too high scoring for the habitat PI`s.

5. Fishing on intertidal mussel beds impacts species and habitats

The CAB argues that seed mussel fishery in the intertidal would be irrelevant for conservation because it rarely happens. The reason for this to happen rarely is mainly that the older intertidal mussel beds are nowadays also inhabited by Pacific oysters, making them unusable for the fishery, so that „only“ newly developing mussel beds are targeted. However, given that there is also an impact by the introduced Pacific oysters on Blue mussels and their habitat, WWF considers it even more important to protect those young intertidal mussel beds which does not yet contain Pacific oysters. As they are targeted by the fishery the nowadays rare habitat type „intertidal blue mussel bed“ (i.e. without Pacific oysters) is heavily impacted, resulting in a wrong scoring for the habitat PI`s.

This may also harm the Oystercatcher population which is addressed in the assessment of the PI`s for the „Endangered, Threatened or Protected“ species („ETP“ species). For these PI`s the CAB concludes that the impact would be negligible as there are also many other factors possibly contributing to the decline of the species and that Oystercatchers have learned to feed also on small Pacific oysters. WWF is opposing this view: Feeding on small Pacific oysters may be less favourable in energetic input and thus a poor alternative for feeding on blue mussels. Also it is probable that the lack of newly developing mussel beds with lots of blue mussels to feed on contributes to the serious decline of Oystercatchers in the Wadden Sea. And, thirdly, considering also other impacts on the Oystercatcher population, cumulative impacts need to be taken into account (see above at #3). Overall, the impact on ETP species (i.e. on Oystercatchers) may be underestimated in the scoring.

6. Mature subtidal mussel beds cannot develop

WWF argues that stable/mature mussel beds would exist also in the subtidal if they would not be fished away already as seed mussels (Reise & Buschbaum 2017, https://www.wwf.de/fileadmin/user_upload/PDF/Muschelbaenke-in-der-Unterwasserwelt-des-Wattenmeeres.pdf). That does certainly not mean that all subtidal mussel beds would become mature, probably most of them would disappear before due to natural forces. But it means that there is a potential for some of them to grow and to become mature, which would be much more than none old mussel beds in the subtidal, and which has to be taken into account.

In contrast to this the CAB argues that the impact of the fishery on subtidal mussel beds would be negligible. One argument is that „*Surveys were undertaken and failed to detect any stable subtidal mussel beds in the areas in which the fishery operates...*“ (p. 37). However, it is not surprising that no stable/mature subtidal mussel beds can be found as long as they are fished away already when they are young, as seed mussels. The CAB also argues that „*...the fishery may well be adding to the total mussel biomass in the system...*“ (p. 23). But this is not the issue meant by WWF, the argument is not so much about bio-

mass, it is more about the quality of an undisturbed natural habitat with its specific biodiversity within the Wadden Sea National Park.

At one point the CAB partly acknowledges that there must be more in the subtidal than what can be found today (p. 23: *...although the location of the beds may be persistent....*). Overall, it has to be assumed that a natural habitat type is missing in the Wadden Sea completely due to the mussel fishery, thus the scoring for the habitat PI's is too high.

7. Translocation remains translocation also within the Wadden Sea

WWF appreciates that translocation of mussels is not among the units of certification. Unfortunately, as a result of the present process this would not entirely be true as certain translocations will just not be called translocation anymore (p. 16: *„The assessment team evaluated this and decisions made on translocations and other MSC certified fisheries in the Wadden Sea and came to the conclusion that any sourcing of mussel seed from within the Wadden Sea ecosystem does not constitute a translocation.“*).

To exclude the risk of transferring further alien species together with the translocated mussels it is not so important whether the translocated mussels would originate in the same ecosystem but what the actual distance is and whether there are some barriers for a natural spread. Therefore, WWF objects both the translocation from the Dutch Wadden Sea (with the additional risk that there seem to be translocated mussels in the Dutch Wadden Sea from the Dutch Delta area with an even higher proportion of alien species) and the translocation from the Schleswig-Holstein Wadden Sea into the Wadden Sea of Lower Saxony. The CAB's additional argument that both would originate from MSC certified sources (p. 24) does not make it better, as the risk for the further introduction of alien species remains the same. WWF strongly suggests to exclude any translocation activities from outside the Wadden Sea area of Lower Saxony from the certification.

8. Harmonisation with other mussel fisheries is lacking

The CAB argues that the fishery needs no harmonisation with the mussel fishery in the Schleswig-Holstein part of the Wadden Sea (p. 50: *„Likewise, since management of mussel fisheries in Germany is at state rather than federal level, the management jurisdictions and regulations for this fishery are different from those in Schleswig Holstein – the National Parks are likewise different. No harmonisation was therefore required for Principle 3.“*). WWF does not agree with this argument, as the overall legal requirements in these cases are given by the EU Habitat Directive and by the German Bundesnaturschutzgesetz, and they are the same for the two National Parks. In the case of the Schleswig Holstein Wadden Sea the fishery is restricted to a limited set of tidal basins and there is a complete ban for all the other tidal basins and for the whole intertidal, all this on the basis of an appropriate impact assessment in line with e.g. the EU Habitat Directive. This would be required under principle 3 also in Lower Saxony.

Conclusions

Unfortunately, WWF's trust in the appropriateness of MSC certification processes had become low (see statement https://www.wwf.de/fileadmin/fm-wwf/Publikationen-PDF/Erklaerung_WWF_zur_MSC_Reform.pdf, which asks for improvement). While it would be the role of the MSC itself to improve the standard it is the role of the CAB to evaluate a fishery properly on the basis of the existing standard and not to ignore important arguments which are highly relevant even under the present MSC standard. Based on the arguments given above and in the earlier submissions, WWF does not agree with the provisional determination that the Germany Lower Saxony Mussel Fishery would be in conformity with the MSC Principles and Criteria for sustainable fishing.

In addition WWF is concerned that if the fishery would be re-certified as it is, and with the PCDR as it is, this would mean that (1) the fishery would miss the chance to go for real environmental progress which would in the longer term be more sustainable for them, (2) the MSC would risk a further loss of credibility, and (3) the National Park would miss the chance for a better management.

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Response to WWF Germany

The assessment team thank WWF Germany for their time in participating and commenting on this re-assessment, and have responded to the NGO's comments below.

1. Valid management plan

Although it is the view of WWF Germany, that the management plan for the fishery has expired, according to the Lower Saxony Ministry of Food, Agriculture and Consumer Protection, the clause in the 'expired' management plan (Management Plan paragraph 7) is valid. This renewal clause allows for the plan's renewal for another term of five years until 18th August 2019 and has not therefore expired. As this plan is legally in place by the State Government, there is therefore compliance to that law.

There is not a MSC requirement for a 'management plan', so the CAB rejects the comment that this is a requirement of MSC certification. The MSC requirements require the management system to have fishery specific management objectives, consistent with achieving outcomes expressed by MSC Principles 1 and 2; decision-making processes that result in measures and strategies to achieve the fore-mentioned objectives and amongst others, a management system within an appropriate and effective legal framework, which is capable of delivering sustainability in the UoAs. These have all been demonstrated to be in place in the fishery, some presented in the form of the management plan.

2. Appropriate impact assessment

The Lower Saxony Law on Environmental Impact Assessment provides the possibility to conduct a pre-assessment to identify potential adverse environmental impacts. This has been done in 2013, at the end of the last five-year term of the management plan and it will be done at the end of the term of the plan in force currently. Only if such adverse impacts are identified the Administration is required to conduct a Strategic Environmental Assessment. This has not been the case so far.

Further to this, the Habitats Directive S6(1) "Member States shall establish the necessary conservation measures involving, if need be, appropriate management plans..." Specifically S6(3), "Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned".

Both of those sub-sections place emphasis on the Member State and the management authority to ensure that an appropriate assessment is carried out, not the fishery. The fishery has demonstrated its compliance to the fishery management regulations in place.

The assessment team remains with rationale expressed in our original comments.

3. Cumulative impacts

The assessment team does not change its view on this matter. The fishery has continued to reduce its impact as far as is economically viable for the fishery. It adheres to Coastal Fisheries Regulation of a restriction of 1300 hectares, the fishery closure, minimal size limits and number of vessels able to

participate in the fishery, as proven by testimony from the State Government (see earlier in this Appendix). The scope of an MSC fishery assessment only goes as far as to assess the impact of the fishery on the ecosystem, which under the PIs has demonstrably been scored in this reassessment as complying with the MSC Fisheries Standard. The assessment team is not saying the mussel fishery does not create an impact (as reflected in the Principle 2 scores), merely that there are other substantial external fishery factors which this assessment does not have scope to examine. The fishery has taken considerable steps to provide insight and knowledge into its own interactions with the Lower Saxony Wadden Sea habitat and ecosystem, which has been sufficient to show that the fishery is highly likely not to reduce habitat structure and function to a point where there would be serious or irreversible harm, which is what is required by the Performance Indicator scoring issues.

4. National Park impact

WWF references the report where it states that in relation to subtidal mussel beds *“This means that in the subtidal in principle nearly all mussels located by the mussel sector can be fished...”* but does not cite later text which makes it clear that this is not the case in reality.

On p.39 the report states that *“The harvest of wild mussels [>5cm] for consumption is a rare event, the last ones harvested in Lower Saxony was [sic] in 2005, where only 160 tonnes were taken (Figure 22). This type of harvest is outside the scope of this certification and is not considered eligible to bear the MSC ecolabel.”* On the basis that also no mussels between 4 -5 cm can be fished, no mussels >4 cm are taken from the Lower Saxony, and to therefore suggest the fishery may take 100% of all available mussels is misleading.

The report (p. 20, p.22 and p.39) demonstrates that most settlement of seed mussel harvested in the subtidal is ephemeral and would naturally disappear and states that the subtidal seed which is harvested is sourced from exposed locations unlikely to develop into stable beds. Given the evidence to show the overall mussel stock in the Lower Saxony Wadden Sea is at its highest recorded value in 15 years (p.34) and 6x above the agreed minimum value for the region. If the fishery really was impacting close to 100% of the existing mussel habitat then this observed increase in stocks would be highly unlikely to be occurring. Therefore for WWF to suggest the fishery is affecting *“...close to 100%...”* of these habitats is misleading.

Section 2.4.5.1 makes it very clear that only one or two intertidal locations (of a known 102 locations) might be fished in any given year for seed mussels with none having been fished since 2009. Again, for WWF to suggest that the fishery may impact 100% of the available mussel habitats is misleading. Since the National Park is consulted with regard to the issuing of permits for mussel harvest it would not be in its own interest to permit a 100% harvest.

5. Intertidal mussel bed impact

At no point in this report does the assessment team argue *“that the seed mussel fishery in the intertidal would be irrelevant for conservation because is rarely happens”*.

Furthermore, the scope of a MSC assessment, is only to evaluate the fishery’s impact, it has no ability to include the impact of the Pacific oysters introduction of the area, and therefore the team may only adhere what the PIs require the team to evaluate. The fishery exists to provide the fishers with a livelihood, they adhere to all restrictions put in place by fishery regulations.

With regards to oystercatcher populations, the team do not feel a change to the scoring is warranted. The statements that WWF Germany make in their submission do not cite the research

literature to which they have made their argument, so the team cannot accept these comments as a basis to re-evaluate the relevant PIs.

‘Cumulative impacts’, in the way WWF Germany describe are out of scope of this assessment and the team have no prescription to assess. Cumulative impacts with other fisheries were considered (see Section 3.1 of this report) in this reassessment, and deemed not to be an issue. The MSC introduced requirements for cumulative impact assessments in Principle 2 with the release of the Fisheries Certification Requirements v2.0. These requirements are to ensure that MSC certified fisheries will no longer cumulatively be at risk of generating negative impacts on Principle 2 species (and habitat). For ETP species, the combined impacts of MSC fisheries on all ETP species needs to be evaluated, but only in cases where either national and/or international requirements set catch limits for ETP species and only for those fisheries subject to the same national legislation or within the area of the same binding agreement’. There are no catch limits, international or national for oystercatchers in this fishery.

The peer reviewers have deemed this approach and subsequent scoring correct.

6. Mature subtidal mussel beds

p. 23: „...*although the location of the beds may be persistent...*“ We consider this quotation is used out of context. Mussel beds tend to be found in the same locations, i.e. potentially because of the hydrodynamics of the coast, but there is no evidence that it is the fishery removing all the seed. The variability in the amount of mussel seed found each year during the surveys is indicative of external factors in my mind affecting the settlement patterns. The ephemeral nature of the seed mussel beds has already been mentioned in response to the comments above and illustrates the accepting role of natural factors in limiting the establishment of stable subtidal mussel beds. Furthermore and in relation to this, the report states on p.20 the seed mussel is harvested from the subtidal only from “...*relatively exposed areas with a higher risk of storm damage and/or starfish predation...*”. Therefore, those seed mussels fished from the limited areas permitted within the subtidal are those least likely to persist and develop into stable beds.

WWF states the “Overall, it has to be assumed that a natural habitat type is missing in the Wadden Sea completely due to the mussel fishery”. By WWF’s own admission, this is an assumption that the lack of stable subtidal beds is solely due to the mussel fishery and WWF present no evidence to support this. As the Assessment report clearly states (p. 42, Wolff, 2010), there are other factors, which might limit the establishment of these beds such as the extensive dredging within the area, which can smother the seed, or weather action that may wash them away.

The assessment team feels that a change to the scoring is not required.

7. Translocation

The approach taken to the assessment was based the consideration that an ecosystem is biological community of interacting organisms and their physical environment. The Wadden Sea Quality Status Report (CWSS, 2017) describes the Wadden Sea ecosystem as “characterised by enormously productive marine biota and linkages far beyond its narrow geographical boundaries”. According to [UNESCO](#), “the Wadden Sea is the largest unbroken system of intertidal sand and mud flats in the world. The site covers the Dutch Wadden Sea Conservation Area, the German Wadden Sea National Parks of Lower Saxony and Schleswig-Holstein, and most of the Danish Wadden Sea maritime conservation area. It is a large, temperate, relatively flat coastal wetland environment, formed by the intricate interactions between physical and biological factors that have given rise to a multitude of transitional habitats with tidal channels, sandy shoals, sea-grass meadows, mussel beds, sandbars,

mudflats, salt marshes, estuaries, beaches and dunes. The area is home to numerous plant and animal species, including marine mammals such as the harbour seal, grey seal and harbour porpoise. Wadden Sea is one of the last remaining large-scale, intertidal ecosystems where natural processes continue to function largely undisturbed.”

The team therefore feels they were justified in their definition on the constituting ecosystem defined in this assessment, in the absence of other physical or biological factors, which would warrant the ecosystem to be defined on a smaller scale. Furthermore, both peer reviewers have agreed with the team’s assessment on whether translocation occurs and the definition of the Wadden Sea ecosystem.

To be clear, the team’s aim was not to deny non-native species introductions, but to describe and characterise the ecosystem, as required in an assessment and therefore adhere to this definition consistently throughout the assessment. Given the scope of the Wadden Sea ecosystem, the input of mussel seed into this fishery is within the same ecosystem. The team would also like to highlight that as part of the initial certification cycle, a condition was raised led to an independent study being conducted by GIMARES, which presented a valid documented risk assessment that demonstrates that the movement of mussels from outside the Lower Saxony Wadden Sea (but still within the Wadden Sea area and same ecosystem) to Lower Saxony is highly unlikely to introduce diseases, pests, pathogens or non-native species into the surrounding ecosystem. This was taken into consideration also.

For argument’s sake, should translocation have been deemed to occur in this fishery, the team would have evaluated the fishery with PIs 2.6.1, 2.6.2 and 2.6.3 of Annex CK of the MSC Certification Requirements v1.3. These PIs do require evaluation of likely the introduction of non-native species (defined in PI 2.6.1 as “species not already established in the ecosystem”). This PI wording further supports the team’s original argument, as no seed imports occur outside of the ecosystem, as the fishery is not allowed, meaning introduction of non-native species in the MSC’s context is not possible.

In accordance with the UNESCO request of 2009, §26 of the Sylt declaration (CWSS, 2010b) and §33 of the Tønder Declaration (CWSS, 2014), a framework for tackling alien species in the Wadden Sea was created. The Wadden Sea [Strategic Framework Alien Species](#) document noted the potential for introduction of alien species from sources outside the Wadden Sea, with the Trilateral policy and action being that Germany and the Netherland stop these seed imports as “they are a frequent vector for alien species”. This is why seed is only sourced from inside the Wadden Sea.

All movement of mussels is documented, whether this is within the mussel seed source (outside Lower Saxony, seed dredge/trawl or what SMC area) or the grow-out areas. A registration document is also completed, a requirement of fishery management (the state office for fisheries) in Niedersachsen. Information includes amongst other details such as date of harvest, wild or cultured mussels, and the quality status of the production area.

The comment regarding sourcing from MSC certified fisheries was added merely to highlight that seed is coming from MSC sustainable sources, which have also undergone the rigorous MSC process.

8. Harmonisation

Overlap with other MSC fisheries was considered, as demonstrated by Table 6, but “fishery specific” should have been specified. This has been clarified in the text in Section 3.1 and Table 6. The Principle 3 scores were checked between Schleswig-Holstein and this fishery, the difference in PI

3.1.2 is confirmed to be due to differences at the State level. The issue of the appropriate assessment has been addressed in point 2 above.

MSC Technical Oversights

Ref.	Type	Page	Requirement	Reference	Details	PI	CAB response
28985	Minor	180	FCR-7.10.6.1 v.2.0	A rationale shall be presented to support the team's conclusion.	PI 3.2.2 SI b - Although the rationale refers to relevant legislation, the rationale does not detail the specific decision-making processes that are employed to achieve the fishery- specific objectives and respond to all issues in a transparent manner to support the score of SG 100.	3.2.2	This has been amended in the rationale for this PI to detail specific decision-making processes as requested.
28986	Guidance	183	FCR-7.10.6.1 v.2.0	A rationale shall be presented to support the team's conclusion.	PI 3.2.3 SI b - Whilst the rationale states that sanctions exist, further details and examples of the type of sanctions that could be applied could be provided to support the rationale.	3.2.3	This has been amended in the rationale for this PI to provide a sanction example as requested.
28988	Minor	63 - 64	FCR-7.12.1.4 v.2.0	7.12.1.4 For each risk factor, there shall be a description of the risk present and details of the mitigation or management of risk.	Minor, Table 11 Row 2 and 6 (p63-64) FCR 7.12.1.5. The report describes the sourcing of seeds from certified fisheries as well as vessel participation in other fisheries. It is unclear how traceability is maintained 1) to ensure only certified seed is used for this fishery; and, 2) in the event that there was a change in the certification status of one or more elements of those fisheries (whether for seed production or the others fishing activities of those vessels).	-	Text has been added to Table 11 for clarity as requested.
28989	Minor	65	FCR-7.12.2.1 v.2.0	The CAB shall determine and document the scope of the fishery certificate, including the parties and categories of parties eligible to use the certificate and the point(s) at which chain	The report describes different entities engaged in the fishery (vessels, landing points, transport/ logistics vehicles, agents, traders, auction). Although some are described as having or requiring CoC (traders) or not (agents), the status of others is less clear. It is also unclear where change of ownership takes place in the different scenarios. For example, does change of ownership always occur when loading onto transport vehicles? In which case, the auction	-	Text has been added to Section 4, as to provide clarification on the ownership and CoC status of the product derived from the fishery. The process for landing at Greetsiel and Benersiel is now described.

				<p>of custody is needed.</p> <p>a. Chain of custody certification shall always be required following a change of ownership of the product to any party not covered by the fishery certificate.</p> <p>b. Chain of custody certification may be required at an earlier stage than change of ownership if the team determines that the systems within the fishery are not sufficient to make sure all fish and fish products identified as such by the fishery originate from the UoC.</p>	<p>would need CoC as would the agents, unless the agents control product between landing and transport? In addition, the process of landing at Greetsiel and Bensorsiel is not described. Please clarify the different scenarios and how any traceability risks are addressed.</p>		<p>The team hopes that this is now clear.</p>
28990	Guidance	64	FCR_7.12.1.3 v.2.0	<p>7.12.1 The CAB shall determine if the systems of tracking and tracing in the UoA are sufficient to ensure all fish and fish products identified and sold as certified by the UoA originate from the appropriate Unit of Certification (UoC).</p> <p>7.12.1.3 The CAB shall</p>	<p>The report does not include Row 6 from the Full Assessment Reporting Template, which requires a description about any transshipment and associated risks in the fishery.</p>	-	<p>This was an oversight and has now been included in Section 4, Table 11</p>

				document the risk factors outlined in the “MSC Full Assessment Reporting Template”, identifying any areas of risk for the integrity of certified products and how they are managed and mitigated.		
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Appendix 5 Surveillance Frequency

Table 17. Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
1	Off-site audit	1 auditor on-site with remote support from 1 auditor	The assessment team have determined that the surveillance level for this fishery should be set at level 3. No new conditions were raised during the reassessment and all conditions raised during the fishery's initial assessment were closed by the year 4 surveillance audit. The fishery is low risk and scored highly across all Principles. All information can be provided remotely to an assessment team.

Table 18 Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
1	November 2018	November 2019	N/A as it is proposed that the first surveillance is conducted on the certificate anniversary date.

Table 19. Fishery Surveillance Programme

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 3	Off-site surveillance audit	Off-site surveillance audit	Off-site surveillance audit	On-site surveillance audit & re-certification site visit

Appendix 6 Stakeholders

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Appendix 7 Objections Process

No objections were received.