

MSC SUSTAINABLE FISHERIES CERTIFICATION

OHV Dutch Waddenzee and Oosterschelde Hand Raked cockle



Final Report

August 2017

Prepared For: **Vereniging van Handkokkelvissers 'Op Handkracht Verder'**
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Authorship and Peer Reviewers

1.1 Assessment Team

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

Assessment team leader: Rod Cappell

Primarily responsible for assessment under Principle 3

Rod Cappell is Director with Poseidon based in Northern Ireland and has 20 years of experience in the maritime sector. Rod holds degrees in marine biology, marine resource development and a post-graduate qualification in environmental economics. Recent work includes exploring the economic impact of the CFP reform's discard ban. Rod has also worked on a range of European fisheries projects including a review of effort management regimes, Regulatory Impact Assessments and evaluations of EC policy, including CFP reform, cessation measures and EFF funding.

Rod's MSC experience has included a variety of UK and European fisheries at pre-assessment and main assessment level. His completed main assessments include Greenland lumpfish fishery, Dutch flatfish fisheries, hand-raked cockles, Scandinavian Nephrops fisheries, whitefish in the Barents Sea and various mussel fisheries. His surveillance experience continues with these fisheries extends to Greenland shrimp & North Sea Haddock. Rod is also providing support and benchmarking for Fishery Improvement Plans in the UK and in China.

Expert team member: Fiona Nimmo

Primarily responsible for assessment under Principle 2

Fiona Nimmo is an Associate Director with Poseidon Aquatic Resource Management Ltd and has over 10 years' experience in commercial fisheries, marine environmental and renewable energy consultancy. Fiona is a Principle 2 expert and assessor for the Marine Stewardship Council certification scheme and has worked on full and pre-assessments in the UK, Denmark, Germany, Sweden, the Netherlands, and Spain and in the Asian region. She has worked on six MSC full assessments as the Principle 2 expert and has also adopted Team Leader responsibilities for one of these assessments. Fiona has completed a number MSC pre assessments at various scales including at a district level for English Inshore Fisheries and Conservation Authorities, as part of Project Inshore; a national level for the Danish fleet across 33 species and 10 gear types; regional level for 2 species across the Bay of Bengal region (eight countries); as well as for single fisheries. Fiona is currently involved in the Spanish Project Medfish which has reviewed Spanish fisheries in the Mediterranean and undertaken pre-assessments for a selection of fisheries. In addition, Fiona has undertaken numerous surveillance audits, both on-site and remotely.

Fiona has a keen knowledge on EU Policy in relation to fisheries and their management to protect environmental features and ecology. She has also undertaken a number of independent studies looking at MSC fisheries including a recent value chain analysis of the Scottish haddock supply chain to determine quantitative and qualitative benefits of a fishery being MSC certified. She also undertook work for the OECD examining the distribution and transmission of costs and benefits in different types of capture fisheries certification schemes, including the MSC.

In other areas of expertise, Fiona leads Poseidon's work in the renewable energy market having project managed EIAs for wind and tidal developments, and undertaken numerous commercial fisheries impact assessments for offshore wind and tidal EIAs, feasibility and scoping studies. Projects involve extensive consultation with the industry, data gathering, analyzing and quantification to determine the impacts of proposed developments on the

commercial fisheries sector. This provides very practical experience in the use of economic impact assessment and valuation results by both the fishing industry and marine developers.

Expert team member: Julian Addison

Primarily responsible for assessment under Principle 1

Dr Julian Addison is an independent fisheries consultant with 30 years' experience of stock assessment and provision of management advice on shellfish fisheries, and a background of scientific research on shellfish biology and population dynamics and inshore fisheries. Until December 2010 he worked at the Centre for Environment, Fisheries and Aquaculture Science (Cefas) in Lowestoft, England where he was Senior Shellfish Advisor to Government policy makers, which involved working closely with marine managers, legislators and stakeholders, Government Statutory Nature Conservation Organisations and environmental NGOs. He has experienced shellfish management approaches in North America as a visiting scientist at DFO in Halifax, Nova Scotia and at NMFS in Woods Hole, Massachusetts. For four years he was a member of the Scientific Committee and the UK delegation to the International Whaling Commission providing scientific advice to the UK Commissioner. He has worked extensively with ICES and was Chair of the Working Group on the Biology and Life History of Crabs, a member of the Working Group on Crangon Fisheries and Life History and a member of the Steering Group on Ecosystems Function. He has recently completed or is currently undertaking MSC full assessments for the Newfoundland and Labrador snow crab fishery, the Ireland and Northern Ireland bottom grown mussel fisheries, both the Estonia and Faroe Islands Barents Sea cold water prawn fisheries, the Nephrops fishery in the Skagerrak and Kattegat, the Swedish shrimp fishery in the Skagerrak and Norwegian Deep and the Eastern Canada offshore lobster fishery. He has also undertaken various MSC pre-assessments and surveillance audits and has carried out peer reviews of MSC assessments in both Europe and North America of lobster, cold water prawn, razorfish, cockle and scallop fisheries. Other recent work includes a review of the stock assessment model for blue crabs in Chesapeake Bay, USA, and an assessment of three Alaskan crab fisheries under the FAO-based Responsible Fisheries Management scheme.

1.2 Peer Reviewers

As a reduced re-assessment, only one Peer Review was required. The Peer reviewer used for this report was Andrew Hough. A summary CV for Andrew is available in the **Assessment downloads** section of the fishery's entry on the MSC website.

Andrew has been active in the development of Marine Stewardship Council certification since 1997, when involved in the pre-assessment of the Thames herring fishery. He was a founding Director of Moody Marine, led the establishment of Moody Marine fishery certification systems and has represented Moody Marine at all MSC workshops until 2011. He has also worked with MSC on several specific development projects, including those concerned with the certification of small scale/data deficient fisheries.

He has been Lead Assessor (and often also expert team member) on many fishery assessments to date. This has included Groundfish (e.g. cod, haddock, pollock, hoki, hake, flatfish), Pelagics (e.g. tuna species, herring, mackerel, sprat, krill, sardine) and shellfish (molluscs and crustacea); included evaluation of the environmental effects of all main gear types and considered many fishery administrations including the North Atlantic, South Atlantic, Pacific, Southern Ocean and in Europe, North America, Australia and New Zealand, Japan, China, Vietnam and Pacific Islands. He has recently acted solely as an expert team member of Principle 2 inputs of European inshore fisheries and Falkland Islands Toothfish.

He has carried out peer reviews for various CABs including fisheries for molluscs, crustacea and freshwater finfish. Other assessments include Chain of Custody assessments for merchants, processors, distributors and retailers.

Andrew has also been involved in the development of certification schemes for individual vessels (Responsible Fishing Scheme) and evaluation of the Marine Aquarium Council standards for trade in ornamental aquarium marine species.

Consultancy services have included policy advice to the Association of Sustainable Fisheries, particularly with regard to the implications of MSC standard development, and assistance to fisheries preparing for, or engaged in, MSC assessment.

1.3 RBF Training

Rod Cappell, Fiona Nimmo and Julian Addison have been fully trained in the use of the MSC's Risk Based Framework (RBF).

2 Changes since Initial Assessment

2.1 Overview

Table 1. TAC and Catch Data

TAC	Year	2015/16	Amount	1,183t (cockle meat)
UoA share of TAC	Year	2015/16	Amount	1,183t (UoC 2 – zero)
UoC share of TAC	Year	2015/16	Amount	1,183t (UoC 2 – zero)
Total green weight catch by UoC	Year (most recent)	2015/16	Amount	5,927t (889t cockle meat)
	Year (second most recent)	2014/15	Amount	8,493t (1,274t cockle meat)

2.2 Specific Changes since Initial Assessment

2.2.1 Overall

2.2.1.1 Units of Certification

UoC 1

Species:	Cockles (<i>Cerastoderma edule</i>)
Geographical area:	ICES Subarea IVc - Waddenzee and Oosterschelde – Netherlands EEZ
Method of capture:	Hand rake
Stock:	Waddenzee cockle
Management System:	
Client Group:	All members of Vereniging van Handkokkelvisser's 'Op Handkracht Verder' (OHV) targeting the Waddenzee Cockle stock using hand rake as fishing method.
Other Eligible Fishers:	none

UoC 2

Species:	Cockles (<i>Cerastoderma edule</i>)
Geographical area:	ICES Subarea IVc - Waddenzee and Oosterschelde – Netherlands EEZ
Method of capture:	Hand rake
Stock:	Oosterschelde cockle
Management System:	
Client Group:	All members of Vereniging van Handkokkelvisser's 'Op Handkracht Verder' (OHV) targeting the Oosterschelde Cockle stock using hand rake as fishing method.
Other Eligible Fishers:	none

The two Units of Certification have not changed since the original assessment. They remain the hand-raking of cockle (*Cerastoderma edule*) in the Waddenzee and the Oosterschelde. Only the Waddenzee fishery is currently fished. The Oosterschelde cockle

fishery remains closed to all harvesting as long as the harvestable biomass remains below the agreed level to enable exploitation.

There are 31 licenses allocated to individual fishers. All of these 31 licensed cockle hand-rakers in the Netherlands are members of the Dutch Organisation of Professional Cockle hand-raking fishermen (Vereniging van Handkokkelvissers, OHV).

The 10 additional licenses (that were added to the original 21 to total 31) expired in August 2016. An evaluation was carried out prior to renewal giving another 6-year license period to fish.

2.2.2 Principle 1

2.2.2.1 Stock structure and definition of stock

During the original certification assessment, cockle populations in the Waddenzee and Oosterschelde were considered as separate stock units, and there is no new information that challenges that separation of stocks.

2.2.2.2 Harvest strategy

Since the original certification assessment, there have been some minor changes to the harvest strategy. These include a change in categorization of open/closed areas and short-term measures to control fishing effort and ensure that the annual quota was not exceeded. However, the major elements of the harvest strategy remain as they were at the original certification and are set out below.

The National Shellfish Policy document (Min LNV, 2004) 'Space for marine harvest' (Ruimte voor een zilte oogst) sets the policy for shellfish fisheries up to 2020. The cockle fisheries are managed through a co-management system in which the government delegates the responsibility to the fishing sector for the development of fishing plans for open fishing areas. The other two keystones of cockle fishery management are related to the classification of the Waddenzee and the Oosterschelde sites by the EU Habitats and the Birds Directives as Special Areas of Conservation (SAC) and Special Protection Areas (SPA) respectively. The Nature Conservation Act amended in 2005 requires an annual appropriate environmental assessment to be carried out to ensure that the fishery does not pose any risk to the conservation status of these sites. As such, fisheries management has a priority to meet the conservation objectives of these Natura 2000 sites, i.e. ensure the status of interest features (birds and habitats) is maintained. The harvest strategy is therefore designed to ensure that there is no negative impact on important habitats and on wintering birds, by ensuring the availability of sufficient food for birds, but is also precautionary in relation to maintaining the productivity of the stock at sustainable levels.

The cockle fishery management plan comprises therefore a license issued by Min EZ and permit from the Provinces of Friesland (Waddenzee) and Zeeland (Oosterschelde), the annual cockle fishing plan produced by OHV, which is guided by fisheries regulations (under the Fisheries Act), and the long-term agreement (LTA) for the Waddenzee agreed by nature conservation interests and the OHV in April 2011. The LTA has subsequently been approved and adopted by Min EZ and incorporated into OHV's annual fishing plan. The long-term agreement is to be evaluated at the latest in 2018. The signatories of the long-term agreement (OHV, Province of Friesland, Min EZ and Coalitie Wadden Natuurlijk) are consulted during the development of the cockle fishing plan and Nature Conservation Act license. There is a

common understanding that as long as the application for the license is based on the long-term agreement there is no need for extensive debate. The Min. EZ and the provincial authorities review the appropriate assessment and the fishing plan prior to the issuing of annual licenses and fishing permits respectively.

The harvest strategy contains the following elements:

- A restrictive licensing scheme, and fishing zone allocation to ensure a more even distribution of fishing effort across permitted areas
- A precautionary TAC in the Waddenzee of 2.5% of the total harvestable stock. The calculation of the harvestable biomass takes into account densities of cockles greater than 50 per m².
- In the Waddenzee, cockles may be harvested only by hand raking. Mechanical harvesting by dredges is not permitted.
- In the Oosterschelde, there is an ecological food reservation for birds of 5000 tonnes of cockles (cockle meat). Fishing is permitted only when stock surveys show that stock biomass exceeds the 5000 tonnes (cockle meat) threshold.
- In the Oosterschelde harvesting is permitted by both hand raking and mechanical dredging. If fishing is permitted, a 1/17th share of the fishable amount is reserved for hand raking.
- A network of closed areas aimed at the protection and restoration of important habitats. In the Waddenzee in addition to the permanently closed areas (A), there are also C areas where fishing is only permitted for 3 vessels at a time. If stock biomass falls below a threshold level only 2 vessels are permitted in these C areas.
- A minimum landing size (MLS) of 21 mm
- Gear restriction - the distance between nodes of the net mesh must be 2.2 cm.
- A maximum of 5% by-catch and no more than 8% of cockles may be below MLS
- No fishing at low tide, in closed areas, near seal haul-out areas, on seagrass beds, on mussel beds, or if there is ice in the Waddenzee.

2.2.2.3 Monitoring and assessment of the Waddenzee and Oosterschelde cockle stocks

Independent cockle surveys continue to be carried out on an annual basis each spring to estimate population biomass and its distribution by the Institute for Marine Resources & Ecosystem Studies (IMARES), now renamed as Wageningen Marine Research. Annual quotas are allocated based on the results of the assessment. The survey methodology has essentially remained unchanged over recent years. The Waddenzee is surveyed by using a stratified sampling approach. Stratification is based on cockle density where the intensity of sampling increases with cockle density based on information from previous years. The sampling strategy in the Oosterschelde is not stratified because of the small size of the site. Figure 3.9 and 3.12 shows distribution of sampling stations in the Waddenzee and Oosterschelde, respectively.

Samples are taken using either a modified dredge or a cockle scoop and consist of samples of 0.4 m² and 7cm deep and 0.1m² and 7cm deep, respectively. Data on age are also collected to provide estimates of age structure. On tidal flats samples are taken by accessing the tidal area by foot whereas subtidal areas are sampled from hired commercial vessels or a Government inspection vessel.

Number of cockles per sample is counted and data on weight and height of cockles are gathered to allow conversion of numbers of cockles to weight. The numbers of cockles per sample are expressed in numbers per m². The total cockle stock biomass is calculated for each station and it is multiplied by the area of the corresponding stratum. The sum of the

biomass of all strata gives the overall cockle biomass. The overall harvestable fishing stock is defined as areas in which cockles are found at densities greater than 50 per m².

Further details of the sampling methodology can be found in the latest IMARES (Wageningen Marine Research) stock survey report (van Asch et al., 2016)

2016 Stock Survey

The IMARES (Wageningen Marine Research) report presents the results of the cockle stock survey carried out in the spring and then extrapolates the survey data to provide an estimate of cockle stocks at the beginning of September (the start of the new season) from which the annual quota can be calculated. In 2013, the season changed to commence on 1st September each year. In 2016 the survey in the Waddenzee was extended to include a few subtidal areas that are historically known to potentially harbour cockles.

Sampling stations and the observed density of cockles in the Waddenzee and Oosterschelde are shown in Figures 1 to 3.

Figure 1. Cockles densities (number / m2) in the western Waddenzee in spring 2016. (Source: van Asch et al., 2016)

A distinction is made between littoral sites (blue) and subtidal sites (purple). The red areas represent the permanently closed (A) areas, and the yellow areas represent those areas (C) that are opened on a limited basis.

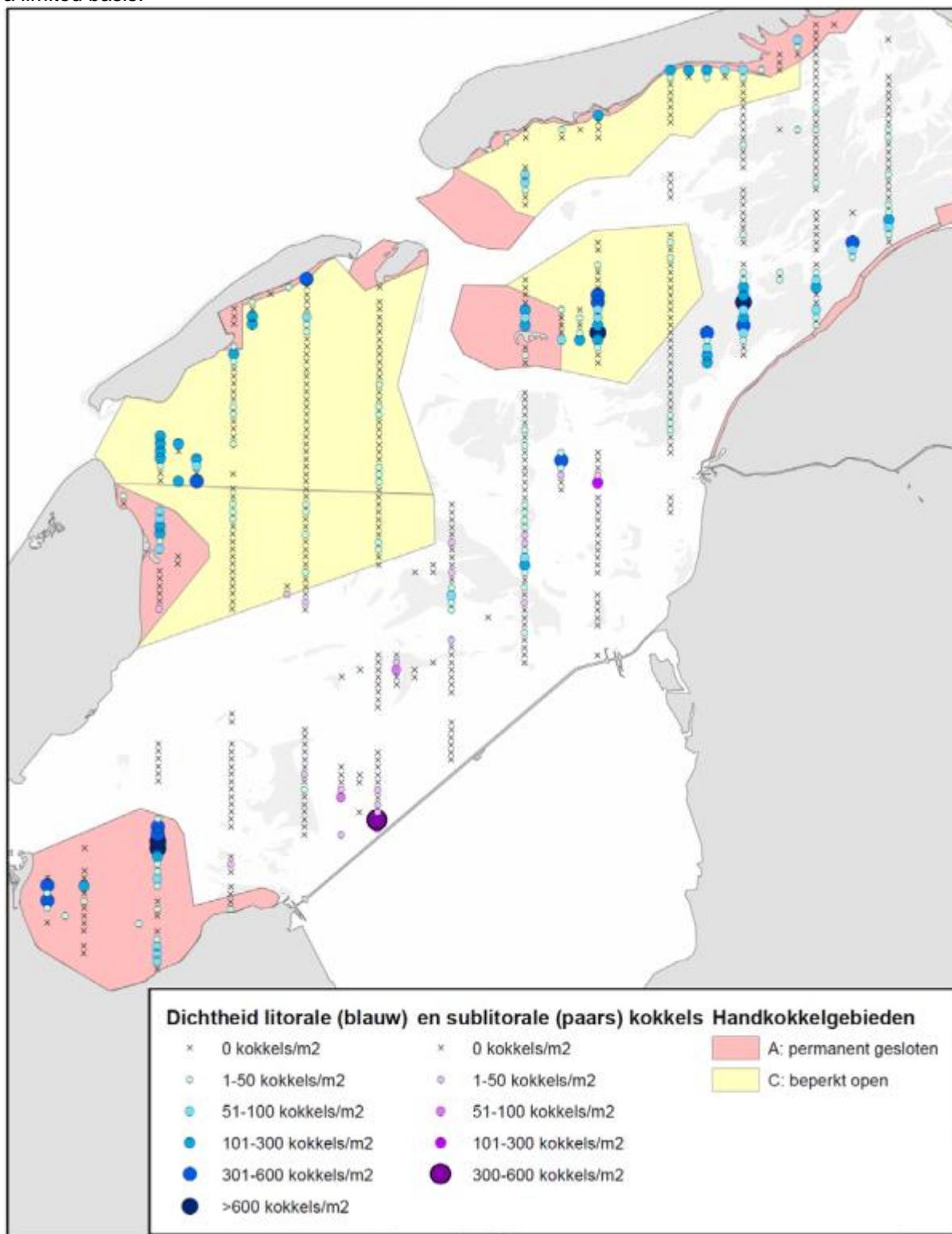


Figure 2. Densities of littoral cockles (number / m²) in the eastern Waddenzee in spring 2016. (Source: van Asch et al., 2016)

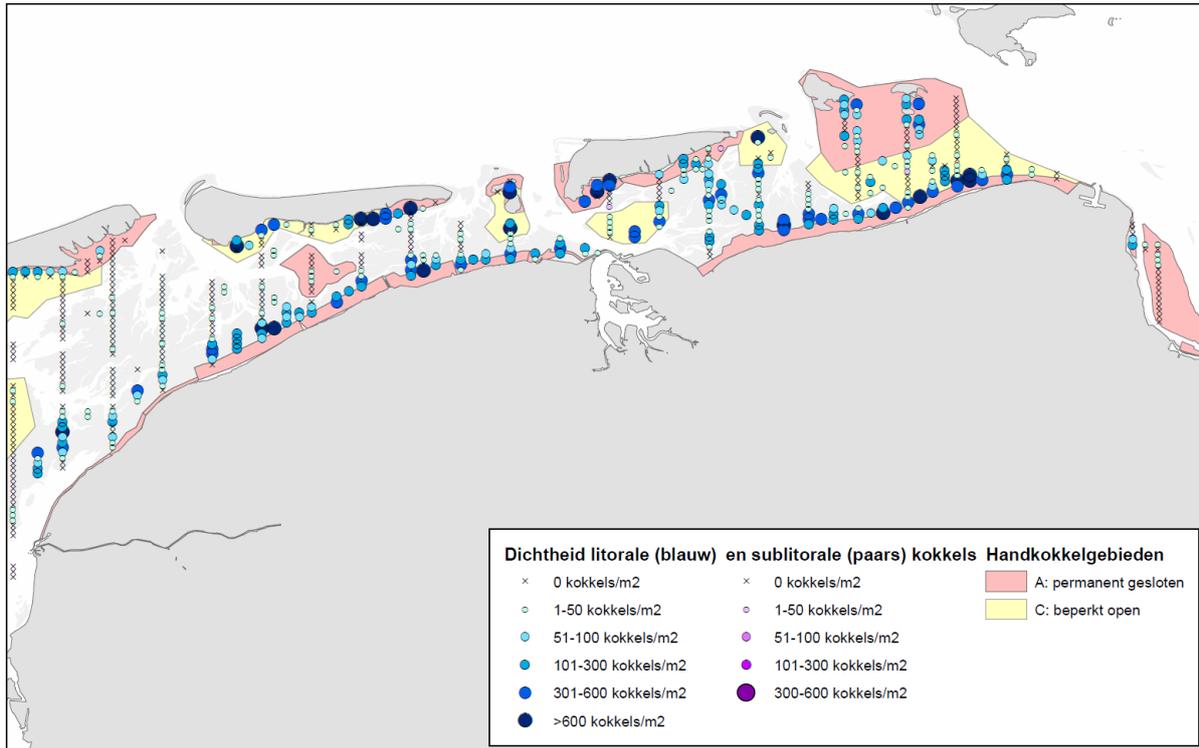
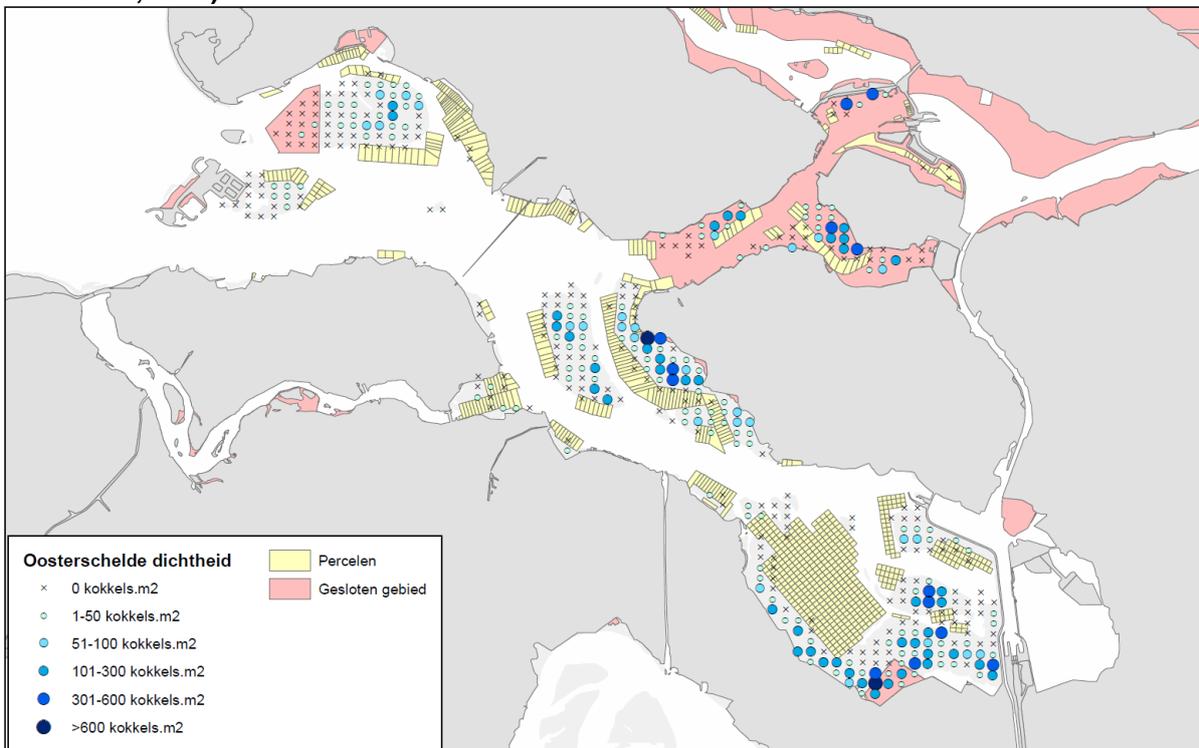


Figure 3. Cockles densities (number / m²) in the Oosterschelde in spring 2016. (Source: van Asch et al., 2016)



The 2016 cockle stock survey showed that the total biomass of cockles in the Waddenzee in the spring decreased slightly compared with 2015, but stock biomass continues at a relatively high level in comparison with historical levels over the last 26 years (Figure 4). The estimated total biomass of cockles in the Waddenzee on 1st September 2016 is 391.9 million kg of which

253.2 million kg are cockles in harvestable densities (>50 individuals per m²), and with an average of 15% flesh weight this results in 58.8 million kg wet flesh weight total biomass and 38.0 million kg wet flesh weight harvestable biomass (Figure 5). An additional 7.6 million kg fresh weight cockles were found in the newly-sampled subtidal areas. The annual quota for the Waddenzee is calculated for season 2016-2017 as 2.5% of 38.0 million kg which is 950 tonnes.

The 2016 cockle stock survey showed that the total biomass of cockles in the Oosterschelde in the spring increased significantly in comparison with 2015, although stock biomass is still low in comparison with recent years (Figure 6). The estimated total biomass in the Oosterschelde on 1st September 2016 is 22.7 million kg, of which 11.0 million kg are cockles in harvestable densities (>50 individuals per m²), and with an average of 15% flesh weight this results in 3.4 million kg wet flesh weight total biomass and 1.65 million kg wet flesh weight harvestable biomass (Figure 7). The harvestable stock biomass estimate of 1650 tonnes is therefore below the threshold of 5000 tonnes flesh weight bird reserve and the fishery in the Oosterschelde remains closed for the 2016-2017 season.

Figure 4. Cockle biomass in the Waddenzee in 1990-2016, categorized by age class, ranging from 0-year in white to more than two years in dark blue. (Source: van Asch et al., 2016)

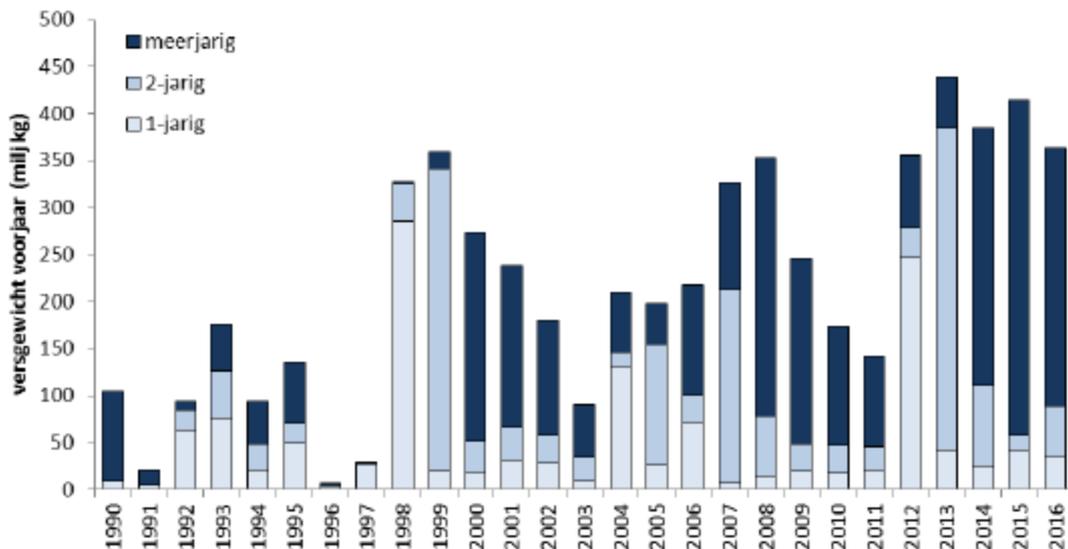


Figure 5. The estimated cockle stock (flesh weight) in autumn from 1990-2016 in the Waddenzee calculated from the IMARES spring stock survey. Categories are harvestable densities (>50 cockles per m2, light blue), fished stock (dark blue, not available yet for 2016) and non-harvestable densities (<50 cockles per m2, white). (Source: van Asch et al., 2016)

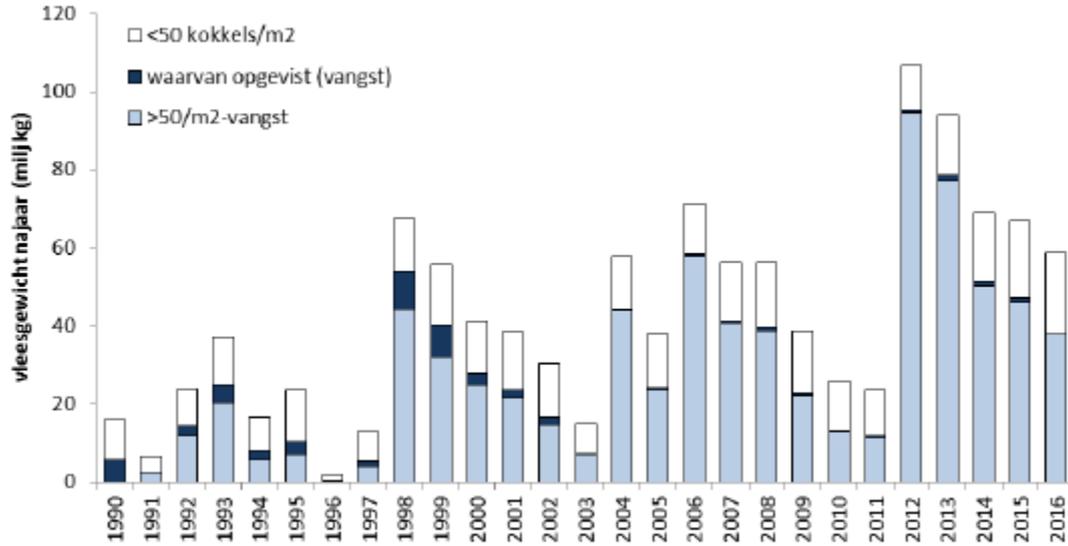


Figure 6. Cockle biomass in the Oosterschelde in 1990-2016, categorized by year class, ranging from 0-year in white to more than two years in dark blue. (Source: van Asch et al., 2016)

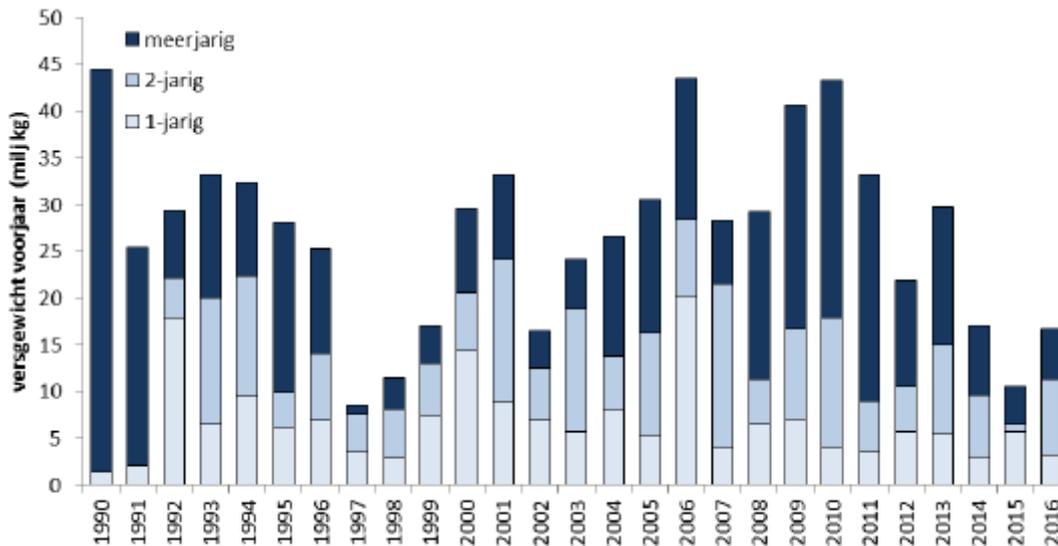
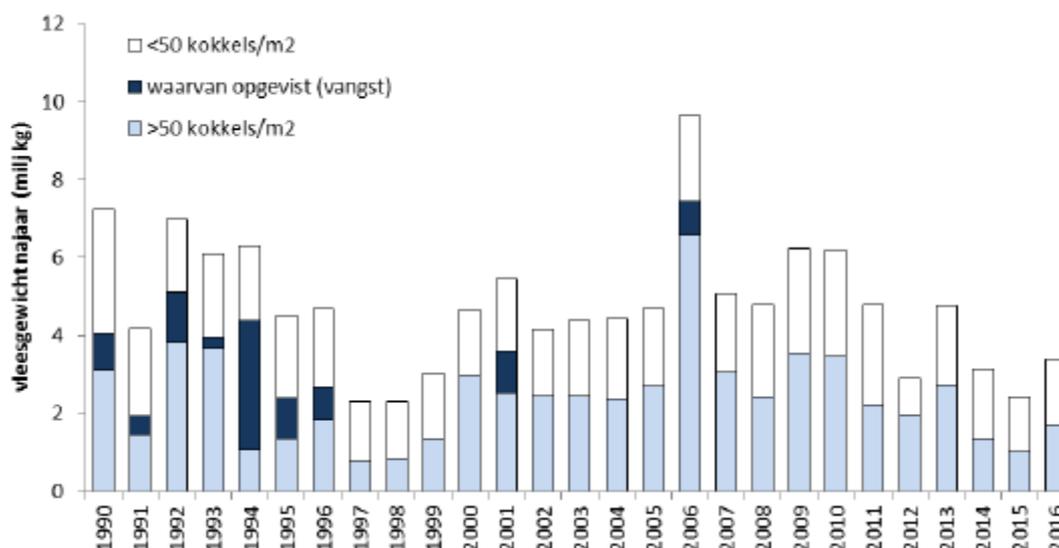


Figure 7. The estimated cockle stock (flesh weight) in autumn from 1990-2016 in the Oosterschelde calculated from the IMARES spring stock survey. Categories are harvestable densities (>50 cockles per m2, grey), fished stock (dark blue) and non-harvestable densities (<50 cockles per m2, white). (Source: van Asch et al., 2016).



Landings of cockles in the Waddenzee in the calendar year 2015 were 1129 tonnes, which was lower than in 2013 and 2014 but still much higher than the period from 1995 to 2010, and the stock size remains high in comparison with historical levels, so that the exploitation rate in the Waddenzee for 2015 was only 2.39% (Table 2). However annual quotas are set for the fishing season beginning 1st September, and the landings for the fishing season 2015-2016 were 889 tonnes (Table 3) representing an exploitation rate of 1.88% which is significantly below the precautionary TAC of 2.5% (Table 3).

Table 2. Landings and exploitation rates (calculated as percentage of exploitable stock biomass landed) in the Waddenzee for calendar years 2005-2015. (Source: Client)

Year	Stock size (>50/m2)	Landings (tonnes)	Exploitation rate (%)
2005	24000	365	1.52
2006	58500	570	0.97
2007	41300	614	1.49
2008	39500	626	1.58
2009	22600	410	1.81
2010	13100	304	2.32
2011	22800	318	1.39
2012	95200	911	0.96
2013	78500	1212	1.54
2014	51500	1344	2.61

Year	Stock size (>50/m ²)	Landings (tonnes)	Exploitation rate (%)
2015	47300	1129	2.39

Table 3. Annual quotas and subsequent landings by fishing season in the Waddenzee.
(Source: Client)

Season year to year	Quota (tonnes)	Landings by season (tonnes)
2006 – 2007	700	726.2
2007 – 2008	1050	745.8
2008 – 2009	1050	588.1
2009 – 2010	575	462.4
2010 – 2011	264	264.9
2011 – 2012	570	385.3
2012 - 2013	2380	1399.6
2013 - 2014	1963	1314.0
2014 - 2015	1288	1274.0
2015 - 2016	1183	889.0
2016 - 2017	950	

2.2.3 Principle 2

A new appropriate assessment for the Wadden Sea has been carried out to determine the impact of the fishery on the interest features listed for the Waddenzee designated site (Agonus, 2016). The previous assessment was conducted in 2009. This continues to identify no impact on bird species with the highly precautionary TAC set for the fishery.

The Oosterschelde appropriate assessment has not been updated since the initial MSC assessment, as the fishery has remained closed during this period. There are therefore no significant changes to the previous MSC assessment.

The species listed within the SAC and SPA designations for the Wadden Sea and Oosterschelde are provided in the table below. Species highlighted in green have the potential to be impacted by the cockle fishery based on provision of food source (i.e. clam eating birds); all other species have the potential to be impacted by the cockle fishery through disturbance.

Other new information since the initial assessment was provided during the second surveillance audit in the form of maps illustrating the spatial extent of fishery operations. This confirmed that fishing operators adhered to agreement to avoid sensitive sites such as seal haul-out areas.

Table 4: Species protected by the Wadden Sea and Oosterschelde SPAs and SACs.

Wadden Sea			
Birds Directive			Habitats Directive
Annex I species	Migratory species		
A034 Spoonbill	A005 Grebe	A130 Oystercatcher	H1095 sea lamprey (<i>Petromyzon marinus</i>)
A037 Little Swan	A017 Cormorant	A137 Bontbekplevier	H1099 river lamprey (<i>Lampetra fluviatilis</i>)
A045 Brandgans	A039 Tundra Bean Goose	A141 Grey Plover	H1103 Fint (<i>Alosa fallax</i>)
A081 Marsh harrier	A043 Greylag Goose	A142 Kievit	H1364 Grey seal (<i>Halichoerus grypus</i>)
A082 hen harrier	A046 Rotgans	A143 Red Knot	H1365 Harbour seal (<i>Phoca vitulina</i>)
A103 Peregrine	A048 Bergeend	A144 Sanderling	
A132 Avocet	A050 Wigeon	A147 Curlew	
A138 Strandplevier	A051 Gadwall	A149 Dunlin	
A140 Goudplevier	A052 Teal	A156 Godwit	
A157 Bar-tailed Godwit	A053 Mallard	A160 Curlew	
A191 Sandwich Tern	A054 Pintail	A161 Black Rider	
A193 Common Tern	A056 Shoveler	A162 Redshank	
A194 Arctic tern	A062 Topper	A164 Greenshank	
A195 Dwergstern	A063 Eider	A169 Turnstone	
A197 Black Tern	A067 Goldeneye	A183 Small-backed gull	
A222 Velduil	A069 Red-breasted Merganser	A070 Goosander	

Oosterschelde			
Birds Directive			Habitats Directive
A054 Pintail	A138 Kentish Plover	A069 Red-breasted Merganser	1340 Microtus oeconomus arenicola
A056 Shoveler	A137 Ringed Plover	A160 Curlew	1365 Harbour seal <i>Phoca vitulina</i>
A052 Teal	A081 Marsh Harrier	A017 Cormorant	
A050 Wigeon	A037 Cygnus columbianus bewickii	A034 Spoonbill	
A053 Mallard	A026 Little Egret	A140 Golden Plover	
A051 Gadwall	A103 Peregrine	A141 Grey Plover	
A043 Greylag Goose	A125 Coot	A007 Slavonian Grebe	
A169 Turnstone	A130 Oystercatcher	A005 Great Crested Grebe	
A046 Brent Goose	A157 Bar-tailed Godwit	A132 Avocet	
A045 Barnacle Goose	A048 Shelduck	A195 Little Tern	
A067 Goldeneye	A161 Spotted Redshank	A193 Common Tern	
A144 Sanderling	A164 Greenshank	A194 Arctic Tern	
A149 Dunlin	A162 Redshank	A191 Sandwich Tern	

A143 Red Knot	A142 Lapwing	A004 Little Grebe
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2.2.4 Principle 3

There are no significant changes to the management system since the original assessment.

The permission to fish consists of the public license from MinEZ to fish for cockles and a private license from the MinEZ to fish on their land. The 31 licenses are allocated by name, but this is to be amended to a company name to enable a single license user to be named who may differ from the owner of the license. This enables those wishing to retire from active fishing to retain the asset, while still restricting the individuals able to operate.

The management authority, MinEZ, lease land to Natuurmonumenten to manage National Parks, including the Schiermonnikoog National Park.

The long-term agreement established in 2011 between MinEZ, the Province of Friesland, a coalition of nature interest groups and the OHV is to be evaluated at the latest in 2018. The intention is for this to align with the Waddenzee management plan for the Natura 2000 site, but the latter is still to be finalised.

2.3 Previous assessments

The fishery was originally certified on 30th October 2012 and has since been the subject of four annual surveillance audits. A summary of the condition related to the fishery and when this was closed is presented in table 5. With the condition closed, the re-assessment of the fishery could be progressed.

Table 5. Summary of Previous Assessment Conditions

Condition	PI	Year closed	Justification
Condition 1: Habitat information:	2.4.3	Year 2	The client provided maps illustrating the spatial extent of fishery operations. This confirmed that fishing operators adhered to agreement to avoid sensitive sites such as seal haul-out areas.

The certificate expires 30th October 2017.

2.4 Changes to the Reporting Template that require an update

Version 1.3 of the CR

Principle One: Target Species Background (Full Assessment Reporting Template (FA Template) v.1.3, Section 3.1)

Cockles are not key low trophic level species, as they do not meet all the criteria set out in paragraph CB2.3.13 of the MSC Certification Requirements V1.3. In particular, cockles do not form dense schools, a large proportion of the total energy in the ecosystem does not pass between the species and higher and lower trophic levels in the food chain, and there are other species at this trophic level through which energy can be transmitted from lower to higher trophic levels.

Principle Three: Management System Background (FA Template v.1.3, Section 3.5)

The UoCs are fisheries operating within the inshore areas of the Netherland's EEZ and are therefore within a single jurisdiction.

3 Evaluation Procedure

3.1 Assessment Methodologies

The assessment was undertaken in line with version 2 of the FCR based on version 1.3 of the fisheries standard. The original assessment was using version 1.1 of the standard.

The RBF was used to score stock status PI 1.1.1. The UoCs scored 96 (Waddenzee) and 83.1 (Oosterschelde) and therefore no condition was set in relation to this PI.. The RBF was also used to score PI 2.2.1. The UoCs scored 100.

MSC V2.0 02/12/2015 of the 'MSC Reduced Re-Assessment Reporting Template' was used to produce this report.

The fishery is eligible for reduced re-assessment activities because (FCR v2.0 7.24.6):

- a. The fishery was covered under the previous certification or scope extension;
- b. The fishery had no conditions remaining after the 3rd surveillance audit, and
- c. All standard related stakeholder comments [none received] had been addressed by the 3rd surveillance audit.

3.2 Evaluation Processes & Techniques

3.2.1 Site Visits

A site visit to Leiden, Netherlands was undertaken by team leader, Rod Cappell in November 2016.

3.2.2 Consultations

Meetings were held with the client (Bert Keus) and the scientist at IMARES responsible for the cockle survey, Karin Troost. A telephone interview was undertaken with the Waddenzee fisheries officer, Nico Laros. E-mail correspondence with Geertjan Smits of Natuurmonumenten, an environmental NGO, was also conducted during the week of the surveillance audit.

A total of 75 stakeholder organisations and individuals having relevant interest in the assessment were identified and consulted during this surveillance audit. The interest of others not appearing on this list was solicited through the postings on the MSC website.

3.2.3 Evaluation Techniques

Version 1.3 of the MSC Fishery Certification Requirements is used for this re-assessment.

Updated documents relating to the fishery were inspected during the site visit. Maps showing fishing activity in the Waddenzee (the Oosterschelde remains closed to fishing) and the cockle surveys in certified areas were reviewed. The main document was the annual survey by IMARES (Wageningen Marine Research) from which the harvest strategy is determined.

The Risk Based Framework (RBF)

As neither analytical nor empirical stock status reference points were available for both target and bycatch species, the team decided to use the Risk-Based Framework (RBF) to score the outcome PIs of Principle 1 and Principle 2 Bycatch species. This is an alternative methodology introduced by the MSC to enable data-deficient fisheries to be assessed against the MSC standard. The RBF can only be used to assess certain Performance Indicators (currently 1.1.1

Stock Status; 2.1.1 Retained Species; 2.2.1 Bycatch species; 2.4.1 Habitats; and 2.5.1 Ecosystems). In this assessment, it has been used to score PI 1.1.1 Stock status and PI 2.2.1 Bycatch species.

The process for using the RBF is set out in the MSC Fishery Assessment Methodology (FAM). It is a complex process that involves two steps:

- **Scale Intensity Consequence Analysis (SICA)** – this is a structured qualitative assessment approach that uses expert judgement and anecdotal information to help to establish whether or not a particular aspect of the fishery meets the MSC standard. If the score given at the end of this analysis is 80 or above, then this score is the score given for the relevant PI. If the given score is below 80 (or for 1.1.1 in any case, as in this assessment), a second type of assessment is carried out: a Productivity-Susceptibility Analysis (PSA).
- **Productivity Susceptibility Analysis (PSA)** – The PSA scores the likely productivity and resilience to fishing pressure of the population in question against the likely susceptibility of the population to fishing pressure. On the productivity side, the analysis considers age and size at maturity, maximum age and size, fecundity, reproductive strategy and trophic level. On the susceptibility side, the analysis considers the extent to which the population overlaps with the fishery in terms of geographic range, depth and habitat, and the susceptibility of the species to the gear. Each of these elements is scored using tables that group the possible outcomes into three categories (i.e. low, medium or high risk).

Details of stakeholder consultation and the outputs from the SICA and PSA analyses are presented in Appendix 1.2.

4 Traceability

4.1 Eligibility Date

The fishery is currently certified, and it is expected that this reassessment will have completed by the time the current certificate expires on the 29th October 2017.

4.2 Traceability within the Fishery

Table 4 Traceability Factors within the Fishery:

Traceability Factor	Description of risk factor if present. Where applicable, a description of relevant mitigation measures or traceability systems (this can include the role of existing regulatory or fishery management controls)
Potential for non-certified gear/s to be used within the fishery	Only hand raking is permitted in the Waddenzee and the Oosterschelde remains closed. The control authorities (MinEZ Waddenzee fishery officers) patrol the open fishing area to ensure only hand-raking occurs. There is also public oversight of activities. The strongest deterrent to use of non-certified (and unlicensed gears) is from fellow fishers who are fully aware of activities and would take immediate action through the OHV.
Potential for vessels from the UoC to fish outside the UoC or in different geographical areas (on the same trips or different trips)	There is no potential for operators to fish outside the UoC area on the same trip as these are hand-gathering operations and the extent of the resource is within the defined UoC area.
Potential for vessels outside of the UoC or client group fishing the same stock	There are no other licensed fishers and non-licensed fishers would be immediately identified and stopped as per non-certified gears above.
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)	All UoC catch from Waddenzee and Oosterschelde is certified. There are no alternative fishing areas where non-certified product could be fished or introduced before sale. Therefore, there is no risk of non-certified catch mixing with certified catch before first point of sale. Sales notes specify the fishing ground.
Risks of mixing between certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)	The catch is sold live. There is no processing prior to first point of sale. The certified catch is specifically identified by batch code and kept separate from any other product.
Risks of mixing between certified and non-certified catch during transshipment	All UoC catch from Waddenzee and Oosterschelde is certified. There are no alternative fishing areas where non-certified product could be fished. All catch is certified and immediately transhipped in batches for sale. Sales notes document volumes and location of batches. Therefore, there is no risk of non-certified catch mixing with certified catch before first point of sale.
Any other risks of substitution between fish from the UoC (certified catch) and fish from outside this unit (non-certified	All UoC catch from Waddenzee and Oosterschelde is certified. There are no alternative fishing areas where non-certified product could be fished.

catch) before subsequent Chain of Custody is required	Therefore, there is no risk of substitution before first sale.
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4.3 Eligibility to Enter Further Chains of Custody

Chain of Custody should commence at the first point of sale, at which point the product shall be eligible to carry the MSC logo (under restrictions imposed by the MSC Chain of Custody standard).

Ownership changes after the cockles enter the facilities of the buyer/processor.

All members of Vereniging van Handkokkelvisserij 'Op Handkracht Verder' (OHV) targeting the Waddenzee and Oosterschelde cockle stock using hand rake as the fishing method are eligible to use the fishery certificate.

An up to date member list can be found on the MSC website, or by contacting Acoura Marine.

The eligible points of landing are:

Waddenzee

- Den Oever
- Harlingen
- Lauwersoog Pier van Holwerd
- Noordpolderzijl
- Eemshaven

Oosterschelde

- Colijnsplaat
- Yerseke
- Zierikzee

Only Waddenzee and Oosterschelde cockle stock caught in the manner defined in the Unit of Certification under restrictions detailed throughout the body of the final Public Certification Report for this fishery shall be eligible to enter the Chain of Custody. There are no restrictions on the fully certified product entering further chains of custody.

OHV does not require its own chain of custody certificate

5 Evaluation Results

5.1 Principle Level Scores

Table 4: Final Principle Scores

Final Principle Scores		
Principle	UoC1- Waddenzee	UoC2-Oosterschelde
Principle 1 – Target Species	89.4	85.4
Principle 2 – Ecosystem	94.7	93.0
Principle 3 – Management System	92.5	90.5

5.2 Summary of Scores

Prin- ciple	Component	PI No.	Performance Indicator (PI)	UoC	
				UoC 1	UoC 2
One	Outcome	1.1.1	Stock status	100	84
		1.1.2	Reference points	80	80
		1.1.3	Stock rebuilding		
	Management	1.2.1	Harvest strategy	85	85
		1.2.2	Harvest control rules & tools	100	100
		1.2.3	Information & monitoring	90	90
		1.2.4	Assessment of stock status	80	80
Two	Retained species	2.1.1	Outcome	100	100
		2.1.2	Management	100	100
		2.1.3	Information	90	90
	Bycatch species	2.2.1	Outcome	100	100
		2.2.2	Management	100	100
		2.2.3	Information	80	80
	ETP species	2.3.1	Outcome	100	100
		2.3.2	Management	95	95
		2.3.3	Information	95	95
	Habitats	2.4.1	Outcome	100	80
		2.4.2	Management	90	85
		2.4.3	Information	85	85
	Ecosystem	2.5.1	Outcome	90	90
		2.5.2	Management	100	100
		2.5.3	Information	95	95
Three	Governance and policy	3.1.1	Legal & customary framework	85	85
		3.1.2	Consultation, roles & responsibilities	95	95
		3.1.3	Long term objectives	100	100
		3.1.4	Incentives for sustainable fishing	80	80
	Fishery specific management system	3.2.1	Fishery specific objectives	100	80
		3.2.2	Decision making processes	95	95
		3.2.3	Compliance & enforcement	100	100
		3.2.4	Research plan	90	90
		3.2.5	Management performance evaluation	90	90

5.3 Summary of Conditions

All PIs scored 80 or above and all previous conditions were closed before re-assessment.
No conditions are set for this fishery.

5.4 Recommendations

No recommendations are made.

5.5 Determination, Formal Conclusion and Agreement

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 (and 80) against any MSC Criteria.

The assessment team therefore determine that the Shetland and Scottish Mainland Rope Grown mussel Enhanced fishery should be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

Acoura's confirm the recertification of the fishery.

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Appendices

Appendix 1 Scoring and Rationales

Appendix 1.1 Performance Indicator Scores and Rationale

Evaluation Table for PI 1.1.1 UoC 1 Waddenzee and UoC 2 Oosterschelde

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	It is likely that the stock is above the point where recruitment would be impaired.	It is highly likely that the stock is above the point where recruitment would be impaired.	There is a high degree of certainty that the stock is above the point where recruitment would be impaired.
	Met?	N/A	N/A	N/A
	Justification	<p>The Risk Based Framework (RBF) has been used to score this PI for both UoCs, because there are no reference points available, either derived from analytical stock assessments or using empirical approaches.</p> <p>The results of the RBF assessment were: - UoC 1 Waddenzee: SICA Score: 100 PSA Score: 96.0 UoC 2 Oosterschelde: SICA Score: 80 PSA Score: 84.2</p> <p>The MSC CRv1.3 Table CC19 indicates that if both the SICA and PSA scores are >80, the higher score of the two should be used to score this PI.i A score of 100 is therefore awarded for this PI for UoC 1 Waddenzee A score of 84.2 is therefore awarded for this PI for UoC 2 Oosterschelde</p>		
b	Guidepost		The stock is at or fluctuating around its target reference point.	There is a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years.
	Met?		N/A	N/A
	Justification	The Risk Based Framework (RBF) has been used to score this PI.		
References		See Appendix 1.2 of this report.		
Stock Status relative to Reference Points				
	Type of reference point	Value of reference point	Current stock status relative to reference point	

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Target reference point	N/A	N/A	N/A
Limit reference point	N/A	N/A	N/A
OVERALL PERFORMANCE INDICATOR SCORE:			UoC 1 100 UoC 2 84.2
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.1.2 UoC 1 Waddenzee and UoC 2 Oosterschelde

PI 1.1.2		Limit and target reference points are appropriate for the stock		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Generic limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	Reference points are appropriate for the stock and can be estimated.	
	Met?	N/A	N/A	
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		
b	Guidepost		The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity.	The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of precautionary issues.
	Met?		N/A	N/A
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		
c	Guidepost		The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome.	The target reference point is such that the stock is maintained at a level consistent with B_{MSY} or some measure or surrogate with similar intent or outcome, or a higher level, and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.
	Met?		N/A	N/A
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		

PI 1.1.2		Limit and target reference points are appropriate for the stock		
d	Guidepost		For key low trophic level stocks, the target reference point takes into account the ecological role of the stock.	
	Met?		N/A	
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		
References		MSC Certification Requirements v1.3, Annex CC, paragraph CC3.2.1.		
OVERALL PERFORMANCE INDICATOR SCORE:				UoC 1 80 UoC 2 80
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 1.1.3 UoC 1 Waddenzee and UoC 2 Oosterschelde

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Where stocks are depleted rebuilding strategies, which have a reasonable expectation of success, are in place.		Where stocks are depleted, strategies are demonstrated to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the specified timeframe.
	Met?	N/A		N/A
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored.		
b	Guidepost	A rebuilding timeframe is specified for the depleted stock that is the shorter of 30 years or 3 times its generation time. For cases where 3 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	A rebuilding timeframe is specified for the depleted stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.	The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the depleted stock.
	Met?	N/A	N/A	N/A
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored.		
c	Guidepost	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within a specified timeframe.	There is evidence that they are rebuilding stocks, or it is highly likely based on simulation modelling or previous performance that they will be able to rebuild the stock within a specified timeframe.	
	Met?	N/A	N/A	

PI 1.1.3		Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe	
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored.	
References		MSC Certification Requirements v1.3, Annex CC, paragraph CC3.3.1.	
OVERALL PERFORMANCE INDICATOR SCORE:			N/A
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.1 UoC 1 Waddenzee

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Y	Y	N

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Justification	<p>The harvest strategy is underpinned by the long-term agreement (LTA) for the Waddenzee agreed by nature conservation interests and OHV in April 2011, and subsequently approved and adopted by Min EZ. The National Shellfish Policy document 'Space for marine harvest' (Ruimte voor een zilte oogst) sets the policy for shellfish fisheries up to 2020, and the Dutch Government delegates the responsibility to the fishing sector for the development of fishing plans for open fishing areas. In addition the Nature Conservation Act requires an annual appropriate environmental assessment to be carried out to ensure that the fishery does not pose any risk to the conservation status of Natura 2000 sites. As such, fisheries management has a priority to meet the conservation objectives of the Natura 2000 sites. OHV produces an annual cockle fishing plan guided by fisheries regulations (under the Fisheries Act), and the Min. EZ and the Province of Friesland review the appropriate assessment and the fishing plan prior to the issuing of annual licenses and fishing permits respectively.</p> <p>The harvest strategy includes a restrictive licensing scheme, a highly precautionary TAC in the Waddenzee of 2.5% of the total harvestable stock, a prohibition on the use of mechanical dredging in the Waddenzee, a network of closed areas aimed at the protection and restoration of important habitats, a minimum landing size, mesh size regulations on the gear, restrictions on bycatch, and limitations on fishing at low tide, near seal haul-out areas, on seagrass beds, on mussel beds, or if there is ice in the Waddenzee. There is an annual stock survey of cockle abundance and biomass from which an annual TAC is calculated, and monitoring of landings to ensure that TACs are not exceeded.</p> <p>The harvest strategy is designed therefore to limit cockle fishing activity to a small part of the total cockle stock and to maintain large reserves of cockles as brood stock thereby safeguarding recruitment to the fishery. The TAC is adjusted annually in response to the state of the stock, and although there are no biologically-based reference points, the limited entry fishery with a highly precautionary TAC ensures that current fishery removals are less than natural mortalities and thus the fishery is highly unlikely to pose a risk to the productivity of the cockle population. The assessment team concluded that the harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives. The SG80 is met therefore.</p> <p>As the harvest strategy has been developed primarily to protect the nature conservation interests of the Waddenzee, it cannot be concluded that the harvest strategy has been designed to achieve stock management objectives and therefore the SG100 is not met.</p>		
b	Guidepost	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	Y	Y	N

PI 1.2.1		There is a robust and precautionary harvest strategy in place	
	Justification	Restricted entry to the cockle fishery, annual TACs, closed areas, technical conservation measures and robust monitoring and enforcement are proven methods for controlling exploitation rates, ensuring that the reproductive potential of the cockle stock is not impaired by the fishery in the Waddenzee. Annual stock surveys, in conjunction with monitoring of landings, provide evidence that the harvest strategy is achieving its objective of ensuring that cockle stocks remain at high levels, that recruitment has not been impaired, and annual appropriate environmental assessments ensure that the fishery does not impact on the conservation features within the Natura 2000 sites. There is evidence therefore that the harvest strategy is achieving its objectives and is able to maintain stocks at target levels, and so the SG80 is clearly met. However there is no evidence that the harvest strategy has been fully evaluated through, for example, a Management Strategy Evaluation (MSE), and therefore the SG100 is not met.	
c	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.	
	Met?	Y	
	Justification	Stock biomass is estimated on an annual basis from stock surveys, and annual TACs are based on the estimates of stock biomass. There is rigorous monitoring of landings to ensure that the TAC is not exceeded. Policing of fishing activities by patrol vessels and AIS data collected from all vessels show that there is good compliance with prohibitions on fishing in the closed areas. Monitoring is clearly in place and demonstrates that the harvest strategy is working. The SG60 is met.	
d	Guidepost		The harvest strategy is periodically reviewed and improved as necessary.
	Met?		Y
	Justification	The cockle fishing plan is updated on an annual basis as are appropriate assessments in the Natura 2000 sites. Annual licenses and fishing permits are issued by the Min. EZ and the provincial authorities following review of the appropriate assessment and the fishing plan. The long-term agreement (LTA) is due to be evaluated at the latest in 2018. It can be concluded that the harvest strategy is periodically reviewed and improved, and therefore the SG100 is met.	

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
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?	Not relevant	Not relevant	Not relevant
	Justification	Sharks are not a target species in this fishery, so this scoring issue is not scored.		
References		PNRW , 2011. Long Term Agreement for the Waddenzee Cockle Fishery Min LNV, 2004 Ens, B.J., A.C. Smaal & J. de Vlas, 2004.		
OVERALL PERFORMANCE INDICATOR SCORE:				85
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 1.2.1 UoC 2 Oosterschelde

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	The harvest strategy is expected to achieve stock management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving management objectives reflected in the target and limit reference points.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in the target and limit reference points.
	Met?	Y	Y	N

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Justification	<p>The National Shellfish Policy document 'Space for marine harvest' (Ruimte voor een zilte oogst) sets the policy for shellfish fisheries up to 2020, and the Dutch Government delegates the responsibility to the fishing sector for the development of fishing plans for open fishing areas. In addition the Nature Conservation Act requires an annual appropriate environmental assessment to be carried out to ensure that the fishery does not pose any risk to the conservation status of Natura 2000 sites. As such, fisheries management has a priority to meet the conservation objectives of the Natura 2000 sites.</p> <p>If the fishery is open, OHV produces an annual cockle fishing plan guided by fisheries regulations (under the Fisheries Act), and the Min. EZ and the Province of Zeeland review the appropriate assessment and the fishing plan prior to the issuing of annual licenses and fishing permits respectively.</p> <p>The key element of the harvest strategy in the Oosterschelde is that cockle fishing (mechanical and hand-raking) is only allowed when the stock exceeds the level of 5000 tonnes of cockle meat. In those cases the 1/17 and 16/17 share of the fishable amount is reserved for hand-raking and dredging, respectively. In addition the harvest strategy includes a restrictive licensing scheme, a network of closed areas aimed at the protection and restoration of important habitats, a minimum landing size, gear regulations for both the hand rake and hydraulic dredge, and fishing is only allowed when the cockle bed is covered by water. There is an annual stock survey of cockle abundance and biomass from which an annual TAC is calculated if the stock exceeds the ecological bird reservation of 5000 tonnes. When the fishery is open, there is rigorous monitoring of landings to ensure that TACs are not exceeded.</p> <p>The harvest strategy is designed therefore to limit cockle fishing activity to a relatively small geographical area in comparison with the distribution of the total cockle stock and to maintain large reserves of cockles as brood stock thereby safeguarding recruitment to the fishery. In previous years when the fishery was open, the overall area fished was approximately 20 % of the overall cockle ground. The TAC is adjusted annually in response to the state of the stock (currently the TAC is zero), and although there are no biologically-based reference points, the limited entry fishery ensures that the fishery is highly unlikely to pose a risk to the productivity of the cockle population. The assessment team concludes that the harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives. The SG80 is met therefore.</p> <p>As the harvest strategy has been developed primarily to protect the nature conservation interests of the Oosterschelde, it cannot be concluded that the harvest strategy has been designed to achieve stock management objectives and therefore the SG100 is not met.</p>		
b	Guidepost	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
	Met?	Y	Y	N
	Justification	<p>Restricted entry to the cockle fishery, a minimum biomass of 5000 tonnes before the fishery can be opened, annual TACs if the fishery is opened, closed areas, technical conservation measures and robust monitoring and enforcement are proven methods for controlling exploitation rates, ensuring that the reproductive potential of the cockle stock is not impaired by the fishery in the Oosterschelde. Annual stock surveys, in conjunction with monitoring of landings (currently zero), provide evidence that the harvest strategy is achieving its objective of ensuring that cockle stocks remain at high levels, that recruitment has not been impaired, and annual appropriate environmental assessments ensure that the fishery does not impact on the conservation features within the Natura 2000 sites. There is evidence therefore that the harvest strategy is achieving its objectives and is able to maintain stocks at target levels, and so the SG80 is clearly met. However there is no evidence that the harvest strategy has been fully evaluated through, for example, a Management Strategy Evaluation (MSE), and therefore the SG100 is not met.</p>		
c	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	Y		
	Justification	<p>Stock biomass is estimated on an annual basis from stock surveys. If the stock biomass is above 5000 tonnes, the fishery will be opened, and annual TACs will be based on the estimates of stock biomass. If the fishery is open, there is rigorous monitoring of landings to ensure that the TAC is not exceeded. Policing of fishing activities by patrol vessels and AIS data collected from all vessels show that there is good compliance with prohibitions on fishing in the closed areas. Monitoring is clearly in place and demonstrates that the harvest strategy is working. The SG60 is met.</p>		
d	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			Y
	Justification	<p>The cockle fishing plan is updated on an annual basis as are appropriate assessments in the Natura 2000 sites. Annual licenses and fishing permits are issued by the Min. EZ and the provincial authorities following review of the appropriate assessment and the fishing plan. It can be concluded that the harvest strategy is periodically reviewed and improved, and therefore the SG100 is met.</p>		

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
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?	Not relevant	Not relevant	Not relevant
	Justification	Sharks are not a target species in this fishery, so this scoring issue is not scored.		
References		Min LNV, 2004 Ens, B.J., A.C. Smaal & J. de Vlas, 2004. Min. LNV, 2005. Nature Conservation Act.		
OVERALL PERFORMANCE INDICATOR SCORE:				85
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 1.2.2 UoC 1 Waddenzee and UoC 2 Oosterschelde

PI 1.2.2		There are well defined and effective harvest control rules in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Generally understood harvest rules are in place that are consistent with the harvest strategy and which act to reduce the exploitation rate as limit reference points are approached.	Well defined harvest control rules are in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached.	
	Met?	Y	Y	
	Justification	<p>In the absence of limit and target reference points, MSC CRv1.3 Guidance (GCB2.6.6.1) is that there should be management tools and measures in place that are consistent with ensuring that the susceptibility of the target species to removal is within an acceptable risk range, and that the measures could be spatial, temporal or changes to gear overlap.</p> <p>Well defined harvest control rules are in place for the Waddenzee and the Oosterschelde. In the Waddenzee fishery a maximum of 2.5% of the estimated harvestable stock biomass can be harvested and hand raking is the only fishing gear permitted. In the Oosterschelde the fishery is opened only if the stock biomass exceeds 5000 tonnes of meat. Both hand raking and mechanical dredging are permitted in the Oosterschelde fishery. In addition to these low limits on removals, there is a network of closed areas in both the Waddenzee and Oosterschelde the objective of which is to protect important habitats. As a result, the overall area fished in the Waddenzee is around 3% of the overall cockle ground, and when the fishery was open in the Oosterschelde in previous years the overall area fished was approximately 20 % of the overall cockle ground. These rules ensure that the fishery poses low risk to the productivity of the cockle population. The susceptibility of the cockle population to be fished is low under current harvest control rules. The TAC varies in response to changing stock status demonstrating that the harvest control rules and tools are responsive. The SG80 is met.</p>		
b	Guidepost		The selection of the harvest control rules takes into account the main uncertainties.	The design of the harvest control rules takes into account a wide range of uncertainties.
	Met?		Y	Y

PI 1.2.2		There are well defined and effective harvest control rules in place		
	Justification	<p>As with most molluscan fisheries, the main uncertainty for the cockle stock is the variation in and unpredictability of recruitment. The harvest control rule uses stock biomass estimates from stock surveys to ensure that the level of harvesting of cockles in the Waddenzee is highly precautionary, and that fishing is only permitted in the Oosterschelde when the quantity of cockles required by shellfish-eating birds (5000 tonnes of cockle meat) is exceeded, thus ensuring in both areas that permitted exploitation rates take into account uncertainty related to the effect that fishing could have on stock biomass needed as food requirement for birds. The potential effects of fishing on marine habitats are also considered by closing potentially vulnerable areas to fishing. The management rules and tools respond to the uncertainty in recruitment by ensuring that a significant proportion of the stock remains invulnerable to fishing, through limiting the geographical area of the fishery, limiting the exploitation rate through limiting the number of licences, setting a minimum landing size above the average size at maturity and requiring the use of gear that minimises damage to juvenile cockles.</p> <p>Uncertainties are taken into account in the selection of the harvest control rules by using precautionary estimates of stock biomass, which do not take into account cockle beds in which the density is lower than 50 per m², and in the Waddenzee, there are some sub-tidal areas where cockles are found but which are not included in the stock biomass estimates.</p> <p>There are some uncertainties related to stock biomass estimates that have not been fully accounted for. For example, evidence from other fisheries has shown that a random allocation of sampling stations rather than a regular grid can reduce the uncertainty in stock estimates. Nevertheless the assessment team concluded that the design of the harvest control rules in both UoCs were highly precautionary and took into account a wide range of uncertainties, and therefore the SG100 is met for both UoCs..</p>		
c	Guidepost	There is some evidence that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.
	Met?	Y	Y	Y

PI 1.2.2		There are well defined and effective harvest control rules in place	
	Justification	<p>For both units of certification the main tool in use to control exploitation rates is the TAC that is set on an annual basis and depends on the stock biomass estimate. Evidence clearly shows that the TAC is an appropriate tool to control exploitation rates. There is good compliance with the TAC in the Waddenzee area, and the continued closure of the Oosterschelde to fishing because the annual stock survey showed that there were not sufficient cockles to support both shellfish-eating birds and a fishery provides evidence that the harvest control rules which are used to set the TAC are effective. In addition the tools in use have restricted the overall area fished in the Waddenzee to around 3% of the overall cockle ground, and when the fishery was open in the Oosterschelde in previous years the overall area fished was approximately 20 % of the overall cockle ground. The fishery has a comprehensive enforcement and control system and all catches are well recorded and controlled.</p> <p>The evidence available shows clearly that the management measures and harvest control tools in use for the cockle fishery are successfully ensuring that the susceptibility of the cockle stock to fishing activity does not increase. The SG100 is met therefore.</p>	
	References	<p>PNRW, 2011. Long Term Agreement for the Waddenzee Cockle Fishery Ens, B.J., A.C. Smaal & J. de Vlas, 2004. Min. LNV, 2005. Nature Conservation Act Annual landings data for cockles, <i>Cerastoderma edule</i>, from 2005-2015.</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		UoC 1	100
		UoC 2	100
CONDITION NUMBER (if relevant):		N/A	

Evaluation Table for PI 1.2.3 UoC 1 Waddenzee and UoC 2 Oosterschelde

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, fishery removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	Y	Y	Y
	Justification	<p>Comprehensive information on stock structure and recruitment variability is available for both the Waddenzee and the Oosterschelde through independent stock surveys conducted by IMARES on an annual basis to inform management. The fleet composition is well defined under current licensing regulations and fishing plans. Stock abundance is monitored annually through the IMARES stock surveys and comprehensive information on fishery removals is available through compulsory log books and rigorous monitoring of landings.</p> <p>The requirement for annual appropriate environmental assessments in Natura 2000 sites prior to the commencement of fishing means that additional information that is not directly related to the harvest strategy of the cockle fishery is available. Extensive research has been carried out in the Netherlands to understand the effect of the shellfish fishery on the ecosystem of the Dutch Waddenzee and Oosterschelde. (Ens et al., 2004). The long-term ecosystem effects of fishing were evaluated to develop sustainable fishing policies for the Waddenzee and the Oosterschelde. The SG100 is met therefore.</p>		
b	Guidepost	Stock abundance and fishery removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and fishery removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	Y	Y	N

PI 1.2.3		Relevant information is collected to support the harvest strategy	
	Justification	Stock abundance is monitored annually for the Waddenzee and Oosterschelde through the IMARES stock surveys at a level of accuracy and coverage consistent with calculation of annual TACs as part of the harvest control rule. Fishery removals are monitored through the compulsory use of log books by all vessels and rigorous monitoring of landings. The SG80 is met therefore. However there is no evidence that there is a good understanding of the inherent uncertainties in the data or that the assessment and management is robust to this uncertainty. For example, there are uncertainties in the estimate of the ecological food reservation for birds in the Oosterschelde which are not taken into account in the management of the cockle fishery and uncertainty in relation to stock estimates could be reduced. The SG100 is not met therefore.	
c	Guidepost		There is good information on all other fishery removals from the stock.
	Met?		Y
	Justification	In the Waddenzee all fishery removals are part of the UoC. When the fishery is open in the Oosterschelde, there are fishery removals using hydraulic dredges which are not part of the UoC, but these are monitored through the compulsory use of log books by all vessels and rigorous monitoring of landings. Recreational fishing for cockles using hand rakes is not permitted. Individuals may collect cockles by hand, but not using a rake, with a personal limit of 10kg per day. As raking is not permitted, such removals are considered by the authorities to be very small in comparison with the commercial fishery. The SG80 is met therefore.	
References		Annual landings data for cockles, <i>Cerastoderma edule</i> , from 2005-2015. PNRW, 2011. Long Term Agreement for the Waddenzee Cockle Fishery Ens, B.J., A.C. Smaal & J. de Vlas, 2004. van Asch, M., Troost, K., Blanco-Garcia, A., Brummelhuis, E.B.M., van den Ende, D. and van Zweeden, C. 2016.	
OVERALL PERFORMANCE INDICATOR SCORE:			UoC 1 90 UoC 2 90
CONDITION NUMBER (if relevant):			N/A

Evaluation Table for PI 1.2.4 UoC 1 Waddenzee and UoC 2 Oosterschelde

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Guidepost		The assessment is appropriate for the stock and for the harvest control rule.	The assessment is appropriate for the stock and for the harvest control rule and takes into account the major features relevant to the biology of the species and the nature of the fishery.
	Met?		N/A	N/A
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80 (paragraph CC3.4.1).		
b	Guidepost	The assessment estimates stock status relative to reference points.		
	Met?	N/A		
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		
c	Guidepost	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	N/A	N/A	N/A
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		
d	Guidepost			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			N/A

PI 1.2.4		There is an adequate assessment of the stock status		
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		
e	Guidepost		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		N/A	N/A
	Justification	As the RBF is used to score PI 1.1.1, Table CC1 of MSC CRv1.3, Annex CC states that this PI is not scored and is awarded a default score of 80.		
References		MSC Certification Requirements v1.3, Annex CC, Table CC1.		
OVERALL PERFORMANCE INDICATOR SCORE:				UoC 1 80 UoC 2 80
CONDITION NUMBER (if relevant):				N/A

Evaluation Table for PI 2.1.1

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	Guidepost	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	<p>Quality reports on foreign bodies from cockle landings produced by Lenger Seafoods (2011) (a key buyer, processor and distributor of Dutch landed cockles) confirm that no minor and no main retained species are landed within the hand raked cockle fishery</p> <p>The total catch is landed to the factory where 'foreign bodies' are cleaned and removed from the cockles. The quality report lists small levels of blue mussel <i>Mytilus edulis</i>, Pacific oyster <i>Crassostrea gigas</i>, Baltic clam <i>Macoma balthica</i>, common shore crab <i>Carcinus maenas</i> and spionid worm <i>Pygospio elegans</i> including empty shells, half shells, crab carapaces or worm casts for these species.</p> <p>While the total catch is landed by the cockle fleet, these species are removed and discarded at factory processing. All species are therefore considered under the Bycatch component, with the exception of blue mussels which forms dense beds/reef habitats that support a range of benthic communities and are assessed under the Habitat component.</p> <p>Interviews with fishermen confirm that no retained species are landed in conjunction with the cockle fishery and that no economic incentive exists for catching non-target species.</p> <p>Other MSC assessments confirm that there are no retained species within hand raked cockle fisheries (Hough and Holt, 2012).</p> <p>There are no main or minor retained species within this fishery and it therefore has no impact on retained species.</p> <p>Low risk to retained species under any future conditions of the hand raked fishery is expected. As per MSC Certification Requirements v1.3 paragraphs CB3.2.1, CB3.2.2 and CB3.5.3 the fishery meets SG 100.</p> <p>It is therefore appropriate to award a score of 100.</p>		
b	Guidepost			Target reference points are defined for retained species.
	Met?			Y

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		
	Justification	As per justification provided within 2.1.1.a.		
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	As per justification provided within 2.1.1.a.		
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	As per justification provided within 2.1.1.a.		
References		<p>Lenger Seafoods, 2011. Quality Report of foreign bodies within cockle landings from August to October 2011.</p> <p>Hough, A. and Holt, T. 2012. Public Certification report for Burry Inlet cockle fishery: MSC re-assessment.</p>		

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	
	Hough, A. and Holt, T. 2012 Public Certification report for Dee Estuary cockle fishery.	
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 2.1.2

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>There are no main retained species related with this fishery and therefore SG60 and SG80 are met.</p> <p>While there are no minor retained species related with this fishery CB3.3.2 requires scoring of this PI irrespective of the outcome score (for 2.1.1).</p> <p>A number of regulations and conditions within the OHV Cockle Fishing Plan 2016-2017 are relevant for managing any potential impact of this fishery to retained species including:</p> <ul style="list-style-type: none"> • The operational procedure of only targeting and collecting cockles; • Minimum mesh size of 2.2 cm between knots; • Weekly catch reports declared to the Fish Product Board (mussel office); • A network of closed areas including total exclusions, partial exclusions (effort restricted to three vessels per area) and seasonal closures (seal haul out areas); and • No hand raking permitted less than 40 m from mussel banks. <p>It is considered that these operations, regulations and conditions are sufficient to form a strategy to manage retained species, should retained species occur within this fishery in the future.</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

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	
	Justification	<p>There are no main or minor retained species and therefore the fishery meets SG60, SG80 and SG100.</p> <p>Furthermore, the EVA II project (Ens <i>et al.</i>, 2004) undertook research into the environmental impact of cockle suction dredging in the Waddenzee, leading to the exclusion of all suction dredgers from this area. The EVA II project did not study the effects of hand raking cockles, assuming them to be small in comparison with the effects of the mechanical fishery.</p> <p>However, the EVA II project (Ens <i>et al.</i>, 2004) provides evidence of mussel bed recovery that is directly attributable to newly recruited mussel beds being protected from cockle and mussel fishing practices. This provides evidence to support the assumption that fishery restrictions close to, and within, mussel beds will work to maintain/enhance mussel stock, and this evidence is applicable to hand raking.</p>	
c	Guidepost		<p>There is some evidence that the partial strategy is being implemented successfully.</p> <p>There is clear evidence that the strategy is being implemented successfully.</p>
	Met?		<p>Y</p> <p>Y</p>
	Justification	<p>The strategy is being implemented successfully.</p> <p>Enforcement is undertaken by Directie Regionale Zaken Noord (DRZ Noord) through at sea vessel patrols and NVWA through factory and landings inspections.</p> <p>One incident of non-compliance was recorded in 2003 for activity within a closed area, however no other fines or sanctions have been issued since.</p> <p>The fishermen continue to be well aware of all restrictions in place including the partial closed areas that are updated annually.</p>	
d	Guidepost		<p>There is some evidence that the strategy is achieving its overall objective.</p>
	Met?		<p>Y</p>
	Justification	<p>The lack of retained species, as evident within the Lenger Seafoods quality report (2011), provides confirmation that the OHV Cockle Fishing Plan 2016-2017 provides for minimal impact to retained species.</p> <p>The recovery of mussel beds confirms the Fishing Plan continues to achieve its overall objective in relation avoiding any potential retained species.</p>	

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		
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?	Not relevant	Not relevant	Not relevant
	Justification	Not relevant		
References		<p>Lenger Seafoods, 2011. Quality Report of foreign bodies within cockle landings from August to October 2011.</p> <p>Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effects of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch shellfish fishery policy (EVA II). Wageningen, Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz. 100 figs.; 10 tables; 242 refs.</p>		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 2.1.3

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	Qualitative and accurate quantitative data has been provided to allow determination of whether and to what extent (kg, % of catch) retained species are landed in conjunction with the hand raked cockle fishery (Lenger Seafoods, 2011. This information is both accurate and verifiable. Information is collected centrally by the Dutch Ministry of Economic Affairs and is adequate to determine the risk posed by the fishery. Information on retained species catch can be verified from source log sheets and can be cross referenced with landings inspection reports and at sea inspection reports.		
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

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		
	Justification	<p>A regular monitoring program involving stratified dredge sampling is undertaken annually in spring and summer to estimate distribution and biomass of shellfish species including cockles, blue mussels, Pacific oysters, razor shells and soft-shelled clams (Stralen van, 2008; Smaal <i>et al</i>, 2011).</p> <p>Long term small scale studies are also conducted in the Waddenzee using grab sampling or box cores (Vorberg <i>et al.</i>, 2009).</p> <p>The spread of the Pacific oyster (introduced to the Waddenzee in 1985) has received much attention in recent years and research projects have been conducted in all parts of the Waddenzee to determine its distribution and abundance (Nehls <i>et al.</i>, 2009). A common approach to monitoring of Pacific oyster has been developed by the (Trilateral Monitoring and Assessment Program) TMAP blue mussel group. In the Dutch Waddenzee no regular targeted monitoring for oysters is carried out, but oysters are sampled and registered in blue mussel inventories (Fey <i>et al.</i>, 2009).</p> <p>Similarly, in the Oosterschelde, Pacific oyster has been introduced as an enhanced fishery in significant quantities since 1964, where its broader environmental tolerances have been exploited over the native oyster <i>Ostrea edulis</i>. However, it is recognized as a ‘universal ecosystem transformer, taking over vast areas of suitable substrate and constructing reef structures” (Hough <i>et al.</i>, 2013). Wageningen Marine Research (formally IMARES), undertake Pacific oyster stock assessments in intertidal areas of the Oosterschelde (but not the subtidal or enhanced fishery/cultivated plots).</p> <p>Information is therefore considered to be sufficient to quantitatively estimate outcome status with respect to biologically based limits for any future potential retained species associated with the hand raked cockle fishery to a high degree of certainty.</p>		
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	N
	Justification	<p>Information is sufficient to inform the strategy in place as part of the Fishing Plan 2016-2017, including spatial distribution of mussel beds and therefore SG80 and SG60 are met.</p> <p>However, while information is considered adequate to support the management of retained species, it cannot be determined with a high degree of certainty whether they are achieving their objective. Research has primarily focused on the cockle dredge fishery, which has not operated in the Waddenzee since 2004. Evaluation to a high degree of certainty does not exist for the hand raked fishery.</p>		

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		
d	Guidepost		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	N
	Justification	<p>The data collected, as outlined in 60a justification, is sufficient to determine that there are no retained species in this fishery.</p> <p>Information is sufficient to determine that the risk of hand raked fishing to retained species is very low (Lenger Seafoods, 2011 and Agonus Fisheries Consultancy, 2016) and will continue to provide evidence of any increase in risk level e.g. by monitoring the scale of the fishery (through trends in cockles landings and mapping of fishing locations monitored through stock assessments and Appropriate Assessments (Agonus Fisheries Consultancy, 2016). However, factory quality reports are not undertaken on a regular basis within this fishery.</p> <p>Any increase in risk to retained species can be determined through monitoring the effort of the fishery (number of licences), its location (informed by Appropriate Assessments (Agonus Fisheries Consultancy, 2016)) and trends in landings of cockles (via fisheries statistics and stock assessments). Therefore SG 80 is met.</p> <p>While it is recognised that the impact to retained species is considered to be low, continued monitoring is not conducted in sufficient detail to assess all mortalities e.g. in situ mortalities as a result of fishing gear interaction.</p>		
References	<p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p> <p>Fey, F., J. Cremer, E. Dijkman, J. Jansen, L. Roupioz, A. Schmidt, and N. Dankers. 2009. Development of analysis techniques for the use of aerial photography in the monitoring of intertidal mussel beds and oyster beds. Report C004/09, Wageningen IMARES, Texel.</p> <p>Hough, A., Brand, A. and Jager, Z. Dutch Oyster Association Oyster Fishery. Public Certification Report. Intertek Moody Marine, 2013.</p> <p>Lenger Seafoods, 2011. Quality Report of foreign bodies within cockle landings from August to October 2011</p> <p>Nehls, G., Sophia Witte, Heike Büttger, Norbert Dankers, Jeroen Jansen, Gerald Millat, Mark Herlyn, Alexandra Markert, Per Sand Kristensen, Maarten Ruth, Christian Buschbaum and Achim Wehrmann, 2009. Beds of blue mussels and Pacific oysters. Thematic Report No. 11. In: Marencic, H. & Vlas, J. de (Eds.), 2009. Quality Status Report 2009. Waddenzee</p>			

PI 2.1.3	<p>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</p>	
	<p>Ecosystem No. 25. Common Waddenzee Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany.</p> <p>Smaal, A., Keus, B. and Rex, S. 2011. Public Certification Report Marine Stewardship Council Main Assessment Dutch Blue Shell Mussel Fishery</p> <p>Smaal, A. C. and L. Lucas. 2000. Regulation and monitoring of marine aquaculture in the Netherlands. <i>Journal of Applied Ichthyology</i> 16:187-191.</p> <p>Stralen, M. R. van, 2008. Inventarisatie van het wilde mosselbestand in de westelijke Waddenzee in september 2008. <i>Marinx-rapp.</i>, 2007.77. Scharendijke.</p> <p>Stralen, M.R. van, 2008. Passende beoordeling voor de mosselzaadvisserij in het sublitoraal van de westelijke Waddenzee in het najaar van 2008. <i>Marinx-notitie</i> 2008.77 en <i>Marinx-notitie</i> 2008.77.2 (aanvulling), Scharendijke.</p> <p>Vorberg, R., F. Fey, and J. Jansen. 2009. Subtidal habitats. Thematic Report No. 13. <i>in</i> H. Marencic and J. d. Vlas, editors. Quality Status Report 200*. Waddenzee Ecosystem No 25. . Common Waddenzee Secretariat, Trilateral Monitoring and Assessment Group, Wilhelmshaven, Germany. .</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 2.2.1

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?	(Y/N)	(Y/N)	(Y/N)
	Justification	RBF used, see Appendix 1.2.1.		
b	Guidepost	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?	(Y/N)	(Y/N)	
	Justification	RBF used, see Appendix 1.2.1.		
c	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 bycatch species to be outside biologically based limits or hindering recovery.		
	Met?	(Y/N)		

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	
	Justification	RBF used, see Appendix 1.2.1.	
References			
OVERALL PERFORMANCE INDICATOR SCORE:			100
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 2.2.2

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	Guidepost	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 minimizing bycatch.
	Met?	Y	Y	Y
	Justification	<p>While there are no minor retained species related with this fishery CB3.3.2 requires scoring of this PI irrespective of the outcome score (for 2.2.1). The regulations and conditions within the OHV Cockle Fishing Plan 2016-2017 that are relevant for managing any potential impact to bycatch species are considered sufficient to form a strategy for managing the impact of the fishery on this component. These include:</p> <ul style="list-style-type: none"> • Minimum mesh size of 2.2 cm between knots; • Weekly catch reports declared to the Mussel office; • A network of closed areas including total exclusions, partial exclusions (effort restricted to three vessels per area) and seasonal closures (seal haul out areas); • The operational procedure of only targeting and collecting cockles; • No hand raking permitted less than 40 m from mussel banks; and • License condition whereby bycatch must be less than 5% of catch. <p>The restriction in relation to mussel beds works to directly manage impact of interaction with any by-caught species associated with this important habitat. While the minimum mesh size is designed to ensure MLS of cockles it also works directly to limit the level of bycatch taken and the size of by-caught species.</p>		

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		
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	<p>The EVA II project (Ens <i>et al.</i>, 2004) undertook research into the environmental impact of cockle suction dredging in the Waddenzee, leading to the exclusion of all suction dredgers from this area. The EVA II project did not study the effects of hand raking cockles, assuming them to be small in comparison with the effects of the mechanical fishery.</p> <p>However, the EVA II project (Ens <i>et al.</i>, 2004) provides evidence of mussel bed recovery that is directly attributable to newly recruited mussel beds being protected from cockle and mussel fishing practices. This provides evidence to support the assumption that fishery restrictions close to, and within, mussel beds will work to maintain/enhance mussel stock, and this evidence is applicable to hand raking.</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	Y
	Justification	<p>The strategy is being implemented successfully.</p> <p>Enforcement is undertaken by Directie Regionale Zaken Noord (DRZ Noord) through at sea vessel patrols and NVWA through factory and landings inspections.</p> <p>One incident of non-compliance was recorded in 2003 for activity within a closed area, however no other fines or sanctions have been issued since.</p> <p>The fishermen interviewed were well informed about all restrictions in place including the partial closed areas that are updated annually.</p>		
d	Guidepost			There is some evidence that the strategy is achieving its overall objective.
	Met?			Y

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	
	Justification	<p>The low level of bycatch species, as evident within the Lenger Seafoods quality report (2011), provides confirmation that the OHV Cockle Fishing Plan 2016-2017 provides for minimal impact to bycatch species.</p> <p>The total catch is landed to factory for processing which allows recording of all bycatch species and quantities. Anything discarded at sea will have a high rate of survivability owing to the nature of the fishing gear.</p>	
References		<p>Lenger Seafoods, 2011. Quality Report of foreign bodies within cockle landings from August to October 2011.</p> <p>Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effects of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch shellfish fishery policy (EVA II). Wageningen, Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz. 100 figs.; 10 tables; 242 refs.</p>	
OVERALL PERFORMANCE INDICATOR SCORE:			100
CONDITION NUMBER (if relevant):			

Evaluation Table for PI 2.2.3

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	Guidepost	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	Y	N
	Justification	Qualitative and quantitative data has been provided to allow determination of whether and to what extent (kg, % of catch) bycatch species are taken by the hand raked cockle fishery (Lenger Seafoods, 2011). SG 60 and SG80 are therefore met. Information is accurate, but not verifiable since no cross-checking mechanisms exist for bycatch species and formal recording of these species is not required and therefore SG100 is not met.		
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?	Not relevant	Not relevant	Not relevant
	Justification	Scoring issue not scored as RBF used to score PI 2.1.1		
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	N

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	
	Justification	<p>Information is sufficient to inform the strategy in place as part of the Fishing Plan 2016-2017, including spatial distribution of mussel beds ((Lenger Seafoods, 2011; Agonus Fisheries Consultancy, 2016).; SG 60 and SG80 are therefore met.</p> <p>However, evaluation to a high degree of certainty does not exist for the hand raked fishery. This is partly due to the low level of bycatch species making evaluation, to such a high degree, unnecessary. Nevertheless, it is not possible to meet SG100 based on current evidence.</p>	
d	Guidepost	<p>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).</p>	<p>Monitoring of bycatch data is conducted in sufficient detail to assess ongoing mortalities to all bycatch species.</p>
	Met?	Y	N
	Justification	<p>Information is sufficient to determine that the risk of hand raked fishing to bycatch species is very low (Lenger Seafoods, 2011 and Agonus Fisheries Consultancy, 2016) and will continue to provide evidence of any increase in risk level e.g. by monitoring the scale of the fishery (through trends in cockles landings and mapping of fishing locations monitored through stock assessments and Appropriate Assessments (Agonus Fisheries Consultancy, 2016). However, factory quality reports are not undertaken on a regular basis within this fishery.</p> <p>Any increase in risk to bycatch species can be determined through monitoring the effort of the fishery (number of licences), its location (informed by Appropriate Assessments (Agonus Fisheries Consultancy, 2016)) and trends in landings of cockles (via fisheries statistics and stock assessments). Therefore SG 80 is met.</p> <p>Unlike retained species, there is no requirement for bycatch species to be reported and therefore direct monitoring of bycatch species is not undertaken on an ongoing basis. While the impact to bycatch species is considered to be low, regular monitoring is not in place to assess all ongoing mortalities and therefore SG100 is not met.</p>	
References	<p>Lenger Seafoods, 2011. Quality Report of foreign bodies within cockle landings from August to October 2011.</p> <p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p>		

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
OVERALL PERFORMANCE INDICATOR SCORE:	80
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 2.3.1

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
	Justification	<p>The Netherlands is party to a number of international agreements, conventions and treaties, in particular,</p> <ul style="list-style-type: none"> • the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), • the Convention on Biological Diversity (CBD), • the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention) also covering the Agreement on the Conservation of Seals in the Waddenzee (Seal Agreement), • the Agreement on the Conservation of African- Eurasian Waterbirds (AEWA) • the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS), • the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) • the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention) and • the EU Habitats (Council Directive 92/43/EEC) and Birds (Council Directive 79/409/EEC) Directives. <p>Of key significance to the management of fisheries within the Waddenzee and Oosterschelde with respect to ETP species are the EU Habitats and Birds Directives.</p> <p>The Dutch Waddenzee is designated as a Special Area of Conservation (SAC: NL1000001) under the Habitats Directive and a Special Protected Area (SPA: NL9801001) under the Birds Directive. The Oosterschelde is designated a SAC (NL1000018) and SPA (NL3009016). Through the Nature Conservation Act (Wet natuurbescherming), SACs and SPAs are protected as nature reserves.</p>		

<p>PI 2.3.1</p>	<p>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</p>
	<p>The harbour (common) seal <i>Phoca vitulina</i> (species type H1365) and the grey seal <i>Halichoerus grypus</i> (H1364) are listed as Annex II species for the Waddenzee SAC. The harbour seal is listed as Annex II species for the Oosterschelde SAC. In addition the harbour seal is protected through the Trilateral Seal Agreement under the Bonn Convention on the Conservation of Migratory Species of Wild Animals (UNEP/CMS) from 1990. The harbour porpoise <i>Phocoena phocoena</i> is protected according to the Agreement on the Conservation of Small Cetaceans of the Baltic and the North Seas (ASCOBANS; UNEP/CMS, 1990).</p> <p>The short-beaked common dolphin <i>Delphinus delphinus</i>, Atlantic white-sided dolphin <i>Lagenorhynchus acutus</i>, white-beaked dolphin <i>Lagenorhynchus albirostris</i> and the bottlenose dolphin <i>Tursiops truncatus</i> are listed as other important species within the SAC.</p> <p>Eighteen species of birds are listed on Annex I of the Waddenzee SPA and 32 are listed as regularly occurring migratory birds. Fourteen species of birds are listed on Annex I of the Oosterschelde SPA and 27 are listed as regularly occurring migratory birds.</p> <p>The potential effects the hand raking cockle fishery can have on ETP species is limited to disturbance to seals and birds (due to vessel noise and presence of humans; which is considered a direct effect) and removal of food resource which may otherwise be consumed by birds.</p> <p>In terms of limits for protection of ETP species an Appropriate Assessment is required to be undertaken for any plans or projects being carried out within an SAC and SPA. The plan or project can only be undertaken if it is found not to adversely affect the designated conservation features. These provisions are legally enforceable by the European Court of Justice.</p> <p>The cockle fishery is considered to be a plan or a project and Appropriate Assessments have been undertaken for the Waddenzee and Oosterschelde SACs and SPAs.</p> <p>A comprehensive strategy to manage all potential impacts of the hand raked fishery exists within the Waddenzee and the Oosterschelde (see 2.3.2) which ensures that the fishery is well within limits of protection for these ETP species.</p> <p>Within the Waddenzee hand raked cockle fishery is allowed to harvest 2.5% of the total harvestable cockle biomass which calculated based on annual surveys whereby harvestable stock equates to >50 cockles per m². It is interesting to note that the calculation of 2.5% is within error bars for the estimation of the total harvestable stock.</p> <p>In reality the fleet land approximately 1.85% of the harvestable cockle stock based on an average from 2007-2015.</p>

<p>PI 2.3.1</p>	<p>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</p>
	<p>The Waddenzee Appropriate Assessment was updated in 2016 (Agonus, 2016). A summary of the findings for ETP elements is provided below:</p> <p><u>Oystercatcher</u></p> <p>The conservation objective of the Wadden Sea SPA in relation to oystercatchers <i>Haematopus ostralegus</i> is to “Maintain the extent and improve quality of habitat with the capacity for a 140000-160000 population of birds (seasonal average).”</p> <p>After a decline in 1996, the current seasonal average numbers of oystercatchers has remained stable at approximately 125,000.</p> <p>The appropriate assessment describes in depth the different modelling undertaken to explore the potential carrying capacity of the Wadden Sea for oystercatchers. It considered a precautionary stance that removal of 1.75% of available cockles could lead to a 1.75% reduction in oystercatcher numbers. However, it recognises that the current quality of habitat is sufficient to accommodate the listed numbers of oystercatchers in the conservation objective (should they exist). This, together with the availability of alternative food sources, lead to the conclusion that the scale and intensity of the cockle hand raked fishery has no significant effect on the carrying capacity of the Wadden Sea for oystercatchers.</p> <p><u>Common eider duck</u></p> <p>The key food source for eider ducks is mussels, with cockles forming a secondary, albeit important, prey item. The 2016 appropriate assessment notes that the distribution of mussel beds in the Wadden Sea is currently below average. However, given the scale of the hand raked cockle fishery (exploitation of up to 1.8% of the harvestable cockle beds), it is concluded that there is no significant impact on the food supply for eiders.</p> <p><u>Red Knot</u></p> <p>Knots predominately feed on small clams, while the fishery targets large cockles. Therefore, there is no large direct food competition between the hand raked cockle fishery. Again, given the scale of the fishery, it is concluded that there is no significant impact on the food supply for knots.</p> <p><u>Common and grey seals</u></p> <p>The appropriate assessment (Agonus, 2016) concludes negligible disruption to seal populations due to the nature of the fishery which requires water to be covering sand, meaning that haul-out areas will not overlap active fishing. In addition a permit condition requires fishermen to maintain at least 1.5 km distance from resting seals.</p>

<p>PI 2.3.1</p>	<p>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</p>
	<p><u>Disturbance to other bird species</u> There is a maximum of 31 fishermen operating in the fishery, that currently use a total of 14 vessels. The fishermen anchor their larger vessel and wade from there to fish, loading their catch onto dinghies (without motor) which are pulled by hand back to the larger vessel to transfer the catch. Again, fishing occurs when there is sufficient water covering the plains, and when tidal plains are dry (and fishing is prohibited) fishermen will rest on board the larger vessel. Therefore fishermen are generally not active at times when birds forage on the tidal plains. There is very limited disturbance when birds are foraging and therefore this effect is considered not significant.</p> <p><u>Oosterschelde</u> Within the Oosterschelde an Appropriate Assessment under taken in 2005 determined that 5,000 tonnes of cockle biomass was required to support birds protected in the area (based on an ecological requirement of 150kg per bird and annual bird counts). Harvestable stock above this 5,000 tonnes threshold would be available to the cockle fishery, split by 6% to hand rakers and 94% to suction dredgers. The cockle stock has only reached necessary levels in 2006 to allow a fishery and has remained closed since 2007. The fishery is closed to maintain cockles for bird populations.</p> <p>The level at which the hand raked cockle fisheries in the Waddenzee and Oosterschelde operate are highly unlikely to cause any significant indirect effects to bird populations. Furthermore, evidence provided by detailed modelling of hand-picking and hand-raking on the Exe estuary (south west England) and Burry Inlet (south Wales), respectively, has shown that these fishing efforts have no impact on the mortality or body condition of oystercatchers (Stillman <i>et al.</i>, 2001).</p> <p>The other form of potential impact to ETP species relates to disturbance. A series of closed areas are in place within the Waddenzee and Oosterschelde specifically to protect seal haul out areas and breeding grounds. Vessels are prohibited from steaming through such areas (when tide state would allow) on a seasonal basis.</p> <p>The effects of the hand raked cockle fishery are assessed to be well within the limits for national and international protection of ETP species and this assessment is made with a high degree of certainty. This is true for all the ETP elements assessed for the Waddenzee and Oosterschelde UoCs.</p>

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		
b	Guidepost	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
	Justification	There are no direct incidental captures of any ETP species within the hand raked cockle fishery. The only direct effect relates to potential disturbance due to vessel noise. The comprehensive management system in place consisting of a network of closed areas ensures that such disturbance effects are not significantly detrimental to any ETP species.		
c	Guidepost		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	Y
	Justification	The cockle fisheries in the Waddenzee and Oosterschelde are principally managed to ensure indirect effects to bird populations do not occur. It is assessed with a very high degree of confidence that the hand raking fisheries have no significant detrimental effects to any of the ETP species protected within the SPA and SAC designations.		
References		<p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p> <p>Council of Europe, 1979. Convention on the Conservation of European Wildlife and Natural Habitats, or Bern Convention. http://www.coe.int/en/web/bern-convention/</p> <p>EC, 1979. Council Directive 79/409/EEC on the conservation of wild birds.</p> <p>EC, 1992. Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.</p> <p>Stillman, R.A., Goss-Custard, J.D., West, A.D., Le V. Dit Durell, S.E.A., McGrorty, S., Caldow, R.W.G., Norris, K.J., Johnstone, I.G., Ens, B.J., Van Der Meer, J. & Triplet, P., 2001. Predicting shorebird mortality and population size under different regimes of shellfishery management. <i>Journal of Applied Ecology</i>, 38, 857-868.</p> <p>The Bonn Convention, 1979. the Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention). http://www.cms.int/sites/default/files/instrument/CMS-text.en_.PDF</p> <p>The OSPAR Convention, 1992. the Convention for the Protection of the Marine Environment of the North-East Atlantic.</p>		

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
	<p>http://www.ospar.org/site/assets/files/1290/ospar_convention_e_updated_text_in_2007_no_revs.pdf</p> <p>United Nations Educational, Scientific and Cultural Organisation, 1971. Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971. Ramsar, 2 February 1971 - Protocol, Paris, 3 December 1982 and Amendments of 28 May 1987. http://www.ramsar.org/sites/default/files/documents/library/scan_certified_e.pdf</p> <p>United Nations Environment Programme (UNEP), As amended 2015. Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) https://web.archive.org/web/20080926045553/http://www.unep-aewa.org/documents/agreement_text/eng/agree/agree_text.htm</p> <p>United Nations Environment Programme, 1991, extended in February 2008. The Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS). http://www.ascobans.org/es/documents/agreement-text</p> <p>United Nations, 1992. the Convention on Biological Diversity. https://www.cbd.int/doc/legal/cbd-en.pdf</p>
OVERALL PERFORMANCE INDICATOR SCORE:	
	100
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 2.3.2

PI 2.3.2		<p>The fishery has in place precautionary management strategies designed to:</p> <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. 		
		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	Y
	Justification	<p>The principle strategies in place to manage any effects on ETP species are: limited catch of cockles and network of closed areas.</p> <p>Cockle fishing is subject to binding agreements laid down on an annual fishing plan. Each spring IMARES performs inventories of the shellfish stocks. Based on these inventories, the Ministry of Agriculture, Nature and Food Quality decides whether to permit cockle fishing in the Oosterschelde that year. If stocks fall short of the agreed minimum reserved for birds, no fishing is permitted. The Oosterschelde was closed to fishing from 1997 to 2000 inclusive, again in 2002 and has been closed since 2008.</p> <p>The Waddenzee is subject to the same monitoring procedures. However the quota management system changed in 2005 when dredge fisheries were prohibited from operating within the area. Since 2005 hand rakers have been permitted to land 5% of the harvestable cockle stock. In 2011 it was agreed in the long-term agreement that this percentage would be 2.5 % (as described under 2.3.1).</p> <p>The Waddenzee is subject to a comprehensive nature protection scheme on national and regional levels as well as to extensive protection and management arrangements between the countries in the framework of the Trilateral Waddenzee Cooperation (The Netherlands, Germany and Denmark).</p> <p>The network of SACs and SPAs in the Waddenzee and Oosterschelde include closed areas for birds, habitats (including seagrass), and seals.</p>		

PI 2.3.2		<p>The fishery has in place precautionary management strategies designed to:</p> <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. 		
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	Y
	Justification	<p>The strategy is principally based on information directly about the cockle fishery and ETP species for which management measures are in place. Quantitative analysis is based on annual bird counts and annual cockle stock assessment. There is a high level of confidence that the strategy is working including the fact that this strategy has led to the closure of the cockle fishery in the Oosterschelde, in most years.</p> <p>Analysis of areas closed for seal protection is reviewed annually to ensure seasonal variations are accounted for.</p> <p>The 2016 Appropriate Assessment for the Waddenzee provides information directly about the fishery and summarises the modeling that has been undertaken to assess carrying capacity of the Waddenzee in relation to oystercatcher populations. This provides high confidence that the strategy to limit the proportion of cockles available for harvest is working, and that sufficient food source remains to support oystercatchers at levels required to meet the conservation objectives of the site.</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

<p>PI 2.3.2</p>	<p>The fishery has in place precautionary management strategies designed to:</p> <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. 		
	<p>Justification</p>	<p>There is evidence that the strategy is being implemented and enforced successfully. The fishermen interviewed during the site visit were well informed about all measures in place.</p> <p>Enforcement is undertaken by Directie Regionale Zaken Noord (DRZ Noord) through at sea vessel patrols and NWWA through factory and landings inspections.</p> <p>One incident of non-compliance was recorded by an inspection vessel in 2013 where a vessel steamed through an area closed for seals. The vessel was fined.</p>	
<p>d</p>	<p>Guidepost</p>		<p>There is evidence that the strategy is achieving its objective.</p>
	<p>Met?</p>		<p>Y</p>
	<p>Justification</p>	<p>Based on the scale of the hand raked fishery it is very difficult to assess that strategies to protect ETP species are achieving their objectives. For example bird populations fluctuate naturally and attributing any change in numbers to the hand rake fishery is near impossible for both positive and negative effects.</p> <p>The 2016 Appropriate Assessment for the Waddenzee provides evidence that the strategy is achieving its objectives.</p> <p>The fact that the Oosterschelde fishery remains closed provides evidence that the strategy is achieving its objective.</p>	
<p>References</p>	<p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p> <p>EC, 1992. Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora.</p> <p>EC, 1979. Council Directive 79/409/EEC on the conservation of wild birds.</p> <p>OHV Fishing Plan 2016-2017.</p>		
<p>OVERALL PERFORMANCE INDICATOR SCORE:</p>			<p>100</p>
<p>CONDITION NUMBER (if relevant):</p>			

Evaluation Table for PI 2.3.3

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	Y
	Justification	The status of ETP species within the Waddenzee and Oosterschelde is well understood based on quantitative assessments of outcome status for their populations. Annual bird and seal counts are undertaken and, for the Waddenzee are synchronised between the Netherlands, Germany and Denmark. Annual reporting of population counts and status are undertaken and publically available (Blew and Südbeck, 2005; Ens et al, 2009; Laursen et al, 2011; Marencic et al, 2010; Reineking and Südbeck, 2007; Trilateral Seal Expert Group, 2002, 2006, 2011 and 2011).		
b	Guidepost	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	Y
	Justification	It is known that there are no mortalities or injuries to ETP species as a direct result of the hand raking fisheries. Accurate and verifiable information is available on the indirect impacts of the fishery based on detailed bird counts and population. Modelling for birds undertaken on an annual basis combined with annual cockle stock assessments.		
c	Guidepost	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.

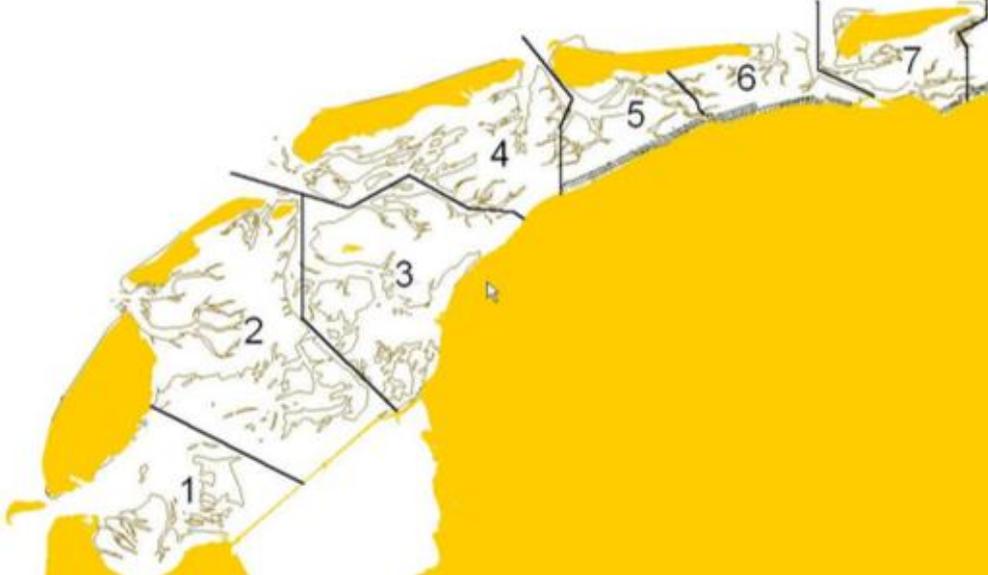
PI 2.3.3		<p>Relevant information is collected to support the management of fishery impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 		
	Met?	Y	Y	N
	Justification	<p>The Appropriate Assessments for the Waddenzee (Agonus Fisheries Consultancy, 2016) and Oosterschelde (2005) provide sufficient information to support strategies to manage ETP species. Information is collated annually on bird numbers and models are evolving to assess carrying capacity with the SACs and SPAs. There remains some uncertainty in relation to calibration of oystercatcher modeling and therefore a high degree of certainty can not be achieved and SG100 is not met.</p>		
References		<p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p> <p>Blew, J. and Südbeck, P. (Eds.). 2005. Migratory Waterbirds in the Waddenzee 1980- 2000. Waddenzee Ecosystem No. 20</p> <p>Ens, B. J., Blew, J., Roomen van, M.W.J., Turnhout van, C.A.M., 2009. Exploring Contrasting Trends of Migratory Waterbirds in the Waddenzee Report of the Joint Monitoring Group of Migratory Birds in the Waddenzee (JMMB) Waddenzee Ecosystem No. 27.</p> <p>Laursen, K., Jan Blew, Kai Eskildsen, Klaus Günther, Bernd Hälterlein, Romke Kleefstra, Gerold Luerßen, Petra Potel, Stefan Schrader. 2011. Migratory Waterbirds in the Waddenzee 1987- 2008. Trend, Phenology, Distribution and Climate Aspects Waddenzee Ecosystem No. 30. Common Waddenzee Secretariat, Wilhelmshaven, Germany.</p> <p>Marencic, H., Eskildsen, K., Farke, H. and Hedtkamp, S., (Eds.), 2010. Science for Nature Conservation and Management: the Waddenzee Ecosystem and EU Directives. Proceedings of the 12th International Scientific Waddenzee Symposium in Wilhelmshaven, Germany, 30 March - 3 April 2009. Waddenzee Ecosystem No. 26</p> <p>Natura 2000 - Standard Data Form http://natura2000.eea.europa.eu/Natura2000/SDFPublic.aspx?site=NL9801001</p> <p>Reineking B. and Südbeck, P. (Eds.) 2007. Seriously Declining Trends in Migratory Waterbirds: Causes - Concerns – Consequences. Proceedings of the International Workshop on 31 August 2006 in Wilhelmshaven, Germany. Waddenzee Ecosystem No. 23</p> <p>Trilateral Seal Expert Group 2002. Common and Grey Seals in the Waddenzee TSEG-plus Report March/June 2001. Waddenzee Ecosystem No. 15</p> <p>Trilateral Seal Expert Group, 2011. Aerial Surveys of Harbour Seals in the Waddenzee in 2011: Solid increases in total number as well as pups.</p> <p>Trilateral Seal Expert Group, 2006. Conservation and Management Plan for the Waddenzee Seal Population 2007- 2010</p>		

<p>PI 2.3.3</p>	<p>Relevant information is collected to support the management of fishery impacts on ETP species, including:</p> <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. 	
	<p>Trilateral Seal Expert Group, 2011. Conservation and Management Plan for the Waddenzee Seal Population 2012-16</p>	
<p>OVERALL PERFORMANCE INDICATOR SCORE:</p>		<p>95</p>
<p>CONDITION NUMBER (if relevant):</p>		

Evaluation Table for PI 2.4.1

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	Y	UoC 1 Y UoC 2 N
	Justification	<p>The recovery rates of benthic habitats and associated fauna is highly variable depending on the sediment type, local environmental conditions and the frequency of harvesting.</p> <p>Research undertaken by Kaiser <i>et al</i> (2001) studied the disturbance of cockle hand raking on intertidal soft-sediment benthic communities by examining communities within small and large raked plots over time. The benthic communities in both small and large plots were found to show community changes relative to control plots 14 days after initial disturbance. The small raked plots had recovered 56 days after initial disturbance whereas the large raked plots remained in an altered state. Sampling a year after the initial disturbance found small-scale variations in habitat heterogeneity (Kaiser <i>et al</i>, 2001).</p> <p>Beukema (1995) studied the re-colonisation of benthic communities in areas of the Waddenzee harvest by commercial lugworm dredgers and found that the majority of the infaunal community had recovered six months after harvesting. Although the biomass of the population of large bivalve <i>Mya arenaria</i> remained lower than pre-harvesting levels two years after cessation of lugworm harvesting.</p> <p>Kaiser <i>et al</i> (2006) reviewed 101 studies into recovery of habitats after fishing for a range of gears including 6 studies for hand raking, including bait digging (Cryer <i>et al</i>, 1987; Heiligenberg van, 1987; Kaiser <i>et al</i>, 2001; McLusky <i>et al.</i>, 1983; Spencer <i>et al</i>, 1998; and Wynberg and Branch, 1994). Intertidal hand raking in sandy sediments was found to have a mean recovery rate of 44 days to -20% recovery and 127 days to -10% recovery.</p> <p>The mussel seed beds are part of the habitat type of sub littoral sand banks (Habitat type H1110). Blue mussels have an influence on both the regeneration of nutrients and the primary productivity within coastal systems (Prins & Smaal 1994). They are efficient filter feeders, removing large amounts of phytoplankton and dense aggregations can influence near-bed hydrodynamics, causing increased levels of biodeposition and mineralization of biodeposited particles (Cesar and Frid, 2009), and resulting in increased levels of nutrient regeneration within mussel beds (Prins & Smaal 1994).</p>		
		<p><i>Mytilus</i> aggregates are important habitats that provide refugia for other fauna, increasing biodiversity and influencing energy flow through the system (Ragnarsson and Raffaelli 1999). Assessments of mussel seed locations are undertaken annually and culture plots and rewatering areas in</p>		

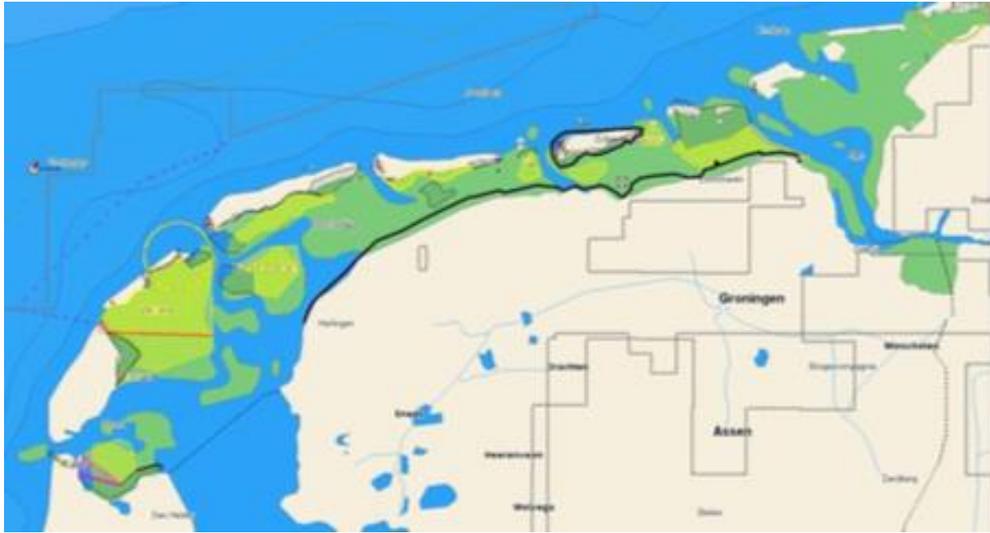
PI 2.4.1	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function
	<p>the Waddenzee and Oosterschelde are clearly defined. Hand raking does not occur within 40 m of mussel beds and therefore poses a low risk to this habitat component. Two studies on the effects of fishing within European Marine Sites conclude that cockle hand raking is overall of low concern.</p> <p>Sewell and Hiscock (2005) conclude that hand gathering of shellfish (including use of rakes but not spades or forks) on open sediment shores or mixed substratum shores involves little substratum disturbance so that the main impact is on target species. Although it was also recognised that holes and tailing may be left on the intertidal visible for months in stable sediments and a tidal cycle for mobile sediments and that sediment layers may be altered causing erosion to cockle beds.</p> <p>McLaughlin <i>et al.</i> (2007) study whether cockle hand raking can be accommodated within Strangford Lough SAC. In relation to habitats, significant reductions in <i>Zostera</i> biomass were found when fishing was carried out within this biotope feature. The authors concluded that hand raking could be accommodated within Stangford Lough SAC if <i>Zostera</i> beds were avoided. Another study found high recovery rates of eelgrass beds with no differences recorded in plant biomass after two weeks between reference and experimental plots (Boese, 2002). Furthermore overlap of the fishery with sub littoral eelgrass beds is unlikely due to intertidal areas targeted by hand rakers.</p> <p>Given the scale of the OHV cockle hand raking fishery, the network of closed areas in place due to SAC designations and informed by the available evidence it is assessed highly unlikely that cockle hand raking would reduce habitat structure to a point where there would be serious or irreversible harm.</p> <p>The 2016 Waddenzee Appropriate Assessment provides further evidence as follows:</p> <p>The appropriate assessment describes the trends in fishing locations from 2008 to 2015 in the Wadden Sea. The Wadden Sea has eight specified fishing areas (areas 1-8); from 2008 to 2010 the majority of catches were taken from eastern areas (areas 5-8), in 2011 a clear shift is seen in fishing areas, with an increase in catch from area 2, while effort continues in eastern areas (areas 6-8). Since then, effort in 2014 and 2015 has almost entirely been focused in area 2 (98.6% of total catches were taken from area 2 in 2014 and 99.6% in 2015).</p>

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
	 <p>In addition to areas 1-8, the Wadden Sea is also divided into zones A, B, C and D, so that each of the areas (1-8) contain all of the zones (A-D). Zone A is generally located close to shore, recognised as areas more important to birds, and therefore closed to fishing. Zone B relates to areas close to islands and major high water refuge areas for birds. Before 2013, Zone B has only open to fishing during cockle rich years (>21 million kg of cockle meat). Since 2013, Zone B has been changed to Zone A, resulting in higher surface areas closed to fishing (and Zone B areas no longer in existence).</p> <p>Zone C relates to areas that are important to birds, but also indispensable for fisheries. In cockle rich years (>22 million kg of meat) Zone C can be fished by up to 3 vessels at any time; during cockle poor years, it can be fished by 2 vessels.</p> <p>The additional aerial management provided by this zonal approach ensures that habitat and food are preserved for birds within each of the areas 1-8, which mitigates impacts should effort be focused on only one area (as has been the case in 2014 and 2015).</p> <p>The cockle Fishing Plan (2016-2017) and license condition prohibit hand raking within mussel beds and therefore the fishery has no effect to mussel beds.</p> <p>Similarly, the Fishing Plan (2016-2017) prohibits hand raking within seagrass beds plus 40m radius from seagrass beds. Furthermore, seagrass is currently located within A-Zones and therefore there is no risk that the fishery will impact this habitat.</p> <p>The Wadden Sea has two habitat qualifying features: H1110 shallow sandbanks and H1140 intertidal mudflats and sand flats. The fishery only occurs at low tide on tidal flats and therefore has no effect on the sublittoral habitat H1110.</p> <p>As described in the Appropriate Assessment, the fishery will cover a maximum surface area of 350 hectares. The total area of H1140 habitat within the Wadden Sea is 124,500 hectares, equating to a potential overlap with the fishery of up to 0.28%. This is considered insignificant and highly</p>

<p>PI 2.4.1</p>	<p>The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function</p>
	<p>unlikely to effect the conservation status of the intertidal mudflats and sand flats.</p> <p><u>Conclusion</u></p> <p>It is considered that this is evidence in the form of the regular Appropriate Assessments undertaken for the Waddenzee that confirm the fishery is highly unlikely to reduce the structure and function to a point where there would be serious or irreversible harm. Therefore SG100 is met for the Waddenzee UoC.</p> <p>However comparable evidence is not available for the Oosterschelde and therefore the SG100 is not met for this UoC.</p>
<p>References</p>	<p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p> <p>Beukema, J.J. 1995. Long-term effects of mechanical harvesting of lugworms <i>Arenicola marina</i> on the zoobenthic community of a tidal flat in the Waddenzee. Netherlands Journal of Sea Research 33: 219-227</p> <p>Boese, B.L., 2002. Effects of recreational clam harvesting on eelgrass (<i>Zostera marina</i>) and associated infaunal invertebrates: in situ manipulative experiments. Aquatic Botany, 73, 63-74.</p> <p>Cesar, C.P. and Frid, C.L.J. Effects of experimental small-scale cockle (<i>Cerastoderma edule</i> L.) fishing on ecosystem function. Marine Ecology 30 (Suppl. 1) (2009) 123–137</p> <p>Cryer M, Whittle GN, Williams R. 1987. The impact of bait collection by anglers on marine intertidal invertebrates. Biol Conserv 42:83–93</p> <p>Heiligenberg van D, T. 1987. Effects of mechanical and manual harvesting of lugworms, <i>Arenicola marina</i>, on the benthic fauna of tidal flats in the Dutch Waddenzee. Biol Conserv 39:165–177</p> <p>Kaiser, M.J., Broad, G., and Hall S.J. 2001. Disturbance of intertidal soft-sediment benthic communities by cockle hand raking. Journal of Sea Research 45: 119-130</p> <p>Kaiser, M.J., K. R. Clarke, H. Hinz, M. C. V. Austen, P. J. Somerfield, I. Karakassis. 2006. Global analysis of response and recovery of benthic biota to fishing Marine Ecology Progress Series 311:1–14</p> <p>McLaughlin, E., Portig, A., and Johnson, M. P. 2007. Can traditional harvesting methods for cockles be accommodated in a Special Area of Conservation? – ICES Journal of Marine Science, 64: 309–317</p> <p>McLusky DS, Anderson FE, Wolfe-Murphy S. 1983. Distribution and population recovery of <i>Arenicola marina</i> and other benthic fauna after bait digging. Mar Ecol Prog Ser 11:173–179</p> <p>Prins T.C., Smaal A.C. (1994) The role of the blue mussel <i>Mytilus edulis</i> in the cycling of nutrients in the Oosterschelde estuary (The Netherlands). Hydrobiologia, 282–283, 413–429.</p>

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
	<p>Ragnarsson S.A., Raffaelli D. (1999) Effects of the mussel <i>Mytilus edulis</i> L. on the invertebrate fauna of sediments. <i>Journal of Experimental Marine Biology and Ecology</i>, 241, 31–43.</p> <p>Philippart, C. and Dijkema, K.S. 1994. Wax and wane of <i>Zosters noliti</i> Hornem in Dutch Waddenzee. <i>Aquatic Botany</i> 49 Issue 4: 255-268.</p> <p>Sewell, J. & Hiscock, K., 2005. Effects of fishing within UK European Marine Sites: guidance for nature conservation agencies. Report to the Countryside Council for Wales, English Nature and Scottish Natural Heritage from the Marine Biological Association. Plymouth: Marine Biological Association. CCW Contract FC 73-03-214A. 195 pp.</p> <p>Spencer BE, Kaiser MJ, Edwards DB. 1998. Intertidal clam harvesting: benthic community change and recovery. <i>Aquac Res</i> 29:429–437</p> <p>Wynberg RP, Branch GM. 1994. Disturbance associated with bait-collection for sandprawns (<i>Callinassa kraussi</i>) and Mudprawns (<i>Upogebia africana</i>)—long term effects on the biota of intertidal sandflats. <i>J Mar Res</i> 52: 523–558</p>
OVERALL PERFORMANCE INDICATOR SCORE:	
	UoC 1 100 UoC 2 80
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 2.4.2

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	Y	Y
	Justification	<p>The Waddenzee SAC is designated for the following habitat features: sandbanks which are slightly covered by seawater all the time (habitat type H1110) and mudflats and sandflats not covered by seawater at low tide (H1140). The Oosterschelde SAC is predominately designated for its habitat feature of large shallow inlets and bays (habitat type H1160) which cover 96% of the designation, but also for presence of Salicornia and other annuals colonizing mud and sand (H1310), spartina swards (<i>Spartinion maritimae</i>) (H1320), Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (H1330), and transition mires and quaking bogs (H7140).</p> <p>As discussed throughout the P2 justification tables, a network of closed areas are in place in both the Waddenzee and Oosterschelde. These closed areas are considered to form a strategy to mitigate any potential impacts to sensitive habitats that are present within the closed areas.</p> <p>An example of the closed areas in operation within the Waddenzee is shown in Figure below.</p>  <p>Other management measures in place to protect habitats include exclusion from within 40m of mussel beds and exclusion from eelgrass beds (Fishing Plan 2016-2017).</p>		

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		
b	Guidepost	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	Y	N
	Justification	There is an objective basis for confidence that closed areas will work to protect the areas they encompass (Agonus Fisheries Consultancy, 2016). In addition Zone B areas have been strengthened to Zone A areas (closed) demonstrating additional protection to habitats important to birds.		
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	UoC 1 Y UoC 2 N
	Justification	There is evidence that the strategy is being implemented and enforced successfully. The fishermen interviewed during the site visit were well informed about all measures in place. Enforcement is undertaken by Directie Regionale Zaken Noord (DRZ Noord) through at sea vessel patrols and NVWA through factory and landings inspections. One incident of non-compliance was recorded in 2013 where a vessel steamed through an area closed for seals. The vessel was fined. There is clear evidence that the strategy is being implemented within the Waddenzee. This is based on confidential maps provided to the assessment team indicating areas fished. Comparable evidence is not available for the Oosterschelde UoC as this fishery remains closed. Therefore UoC 2 does not met SG100, while UoC 1 does.		
d	Guidepost			There is some evidence that the strategy is achieving its objective.
	Met?			N
	Justification	The 2016 Appropriate Assessment for the Waddenzee provides evidence that the strategy is meeting its objectives for oystercatchers and other bird species, but does not provide sufficient evidence in relation to habitats. Notably, the extent of fishing effort is not routinely monitored or mapped against habitat type.		

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	
References	<p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p> <p>Waddenzee SAC Standard Data Form. http://natura2000.eea.europa.eu/Natura2000/SDFPublic.aspx?site=NL9801001</p> <p>Oosterschelde SAC Standard Data Form. http://eunis.eea.europa.eu/sites/NL1000018/habitats</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		UoC 1 90 UoC 2 85
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 2.4.3

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	Y	Y
	Justification	Extensive research has been carried out to map the distribution of habitats, including vulnerable habitats (as designated under SACs), within the Waddenzee and Oosterschelde allowing changes over time compared to control areas to be monitored. Projects of note include the EVA II project (Ens <i>et al.</i> , 2004) and the research project on sustainable shellfish culture (PRODUS), as well as aerial surveys for monitoring mussel and oyster beds (Fey <i>et al.</i> , 2008). Monitoring of closed areas is also undertaken on a regular basis. Additionally monitoring of mussels is undertaken in significant detail including monitoring of mussel seed harvest (by Fish Product Board), monitoring of intertidal mussel beds by aerial survey and ground observations (Smaal and Lucas, 2000) and annual assessment of mussel biomass (by IMARES).		
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 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	Y	N
	Justification	Information on the spatial extent of interaction, timing and location of use of the fishing gear has been provided in the form of confidential effort maps, provided during the second surveillance audit of the initial certification period. The physical impacts of the gear are well understood, but have not been fully quantified specifically for the fisheries within the Waddenzee and Oosterschelde and therefore SG100 is not met.		

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		
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	N
	Justification	The cockle stock assessments, together with landing declarations allow any increase in risk posed by the hand raked fishery to be detected. Evidence of changes in habitat distributions over time for all habitat elements have not been provided and therefore SG100 is not met for UoC1 or 2.		
References		<p>Beukema, J.J. 1995. Long-term effects of mechanical harvesting of lugworms <i>Arenicola marina</i> on the zoobenthic community of a tidal flat in the Waddenzee. Netherlands Journal of Sea Research 33: 219-227</p> <p>Boese, B.L., 2002. Effects of recreational clam harvesting on eelgrass (<i>Zostera marina</i>) and associated infaunal invertebrates: in situ manipulative experiments. Aquatic Botany, 73, 63-74.</p> <p>Cryer M, Whittle GN, Williams R. 1987. The impact of bait collection by anglers on marine intertidal invertebrates. Biol Conserv 42:83–93</p> <p>Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effects of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch shellfish fishery policy (EVA II). Wageningen, Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz. 100 figs.; 10 tables; 242 refs.</p> <p>Fey, F., J. Cremer, E. Dijkman, J. Jansen, L. Roupioz, A. Schmidt, and N. Dankers. 2009. Development of analysis techniques for the use of aerial photography in the monitoring of intertidal mussel beds and oyster beds. Report C004/09, Wageningen IMARES, Texel.</p> <p>Heiligenberg van D, T. 1987. Effects of mechanical and manual harvesting of lugworms, <i>Arenicola marina</i>, on the benthic fauna of tidal flats in the Dutch Waddenzee. Biol Conserv 39:165–177</p> <p>Kaiser, M.J., Broad, G., and Hall S.J. 2001. Disturbance of intertidal soft-sediment benthic communities by cockle hand raking. Journal of Sea Research 45: 119-130</p> <p>Kaiser, M.J., K. R. Clarke, H. Hinz, M. C. V. Austen, P. J. Somerfield, I. Karakassis. 2006. Global analysis of response and recovery of benthic biota to fishing Marine Ecology Progress Series 311:1–14</p>		

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	
	<p>McLaughlin, E., Portig, A., and Johnson, M. P. 2007. Can traditional harvesting methods for cockles be accommodated in a Special Area of Conservation? – ICES Journal of Marine Science, 64: 309–317</p> <p>McLusky DS, Anderson FE, Wolfe-Murphy S. 1983. Distribution and population recovery of <i>Arenicola marina</i> and other benthic fauna after bait digging. Mar Ecol Prog Ser 11:173–179</p> <p>Philippart, C. and Dijkema, K.S. 1994. Wax and wane of <i>Zosters noliti</i> Hornem in Dutch Waddenzee. Aquatic Botany 49 Issue 4: 255-268.</p> <p>PRODUS Project, http://www.imares.wur.nl/UK/research/aquaculture/projects/Produs/</p> <p>Sewell, J. & Hiscock, K., 2005. Effects of fishing within UK European Marine Sites: guidance for nature conservation agencies. Report to the Countryside Council for Wales, English Nature and Scottish Natural Heritage from the Marine Biological Association. Plymouth: Marine Biological Association. CCW Contract FC 73-03-214A. 195 pp.</p> <p>Smaal, A. C. and L. Lucas. 2000. Regulation and monitoring of marine aquaculture in the Netherlands. Journal of Applied Ichthyology 16:187-191.</p> <p>Spencer BE, Kaiser MJ, Edwards DB. 1998. Intertidal clam harvesting: benthic community change and recovery. Aquac Res 29:429–437</p> <p>Wynberg RP, Branch GM. 1994. Disturbance associated with bait-collection for sandprawns (<i>Callinassa kraussi</i>) and Mudprawns (<i>Upogebia africana</i>)—long term effects on the biota of intertidal sandflats. J Mar Res 52: 523–558</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		85
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 2.5.1

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	Partial

Justification	<p>The function and structure of the Waddenzee and Oosterschelde ecosystems are well known, as is the role of cockles within these ecosystems. Both the Waddenzee and the Oosterschelde are characterized by a muddy to sandy substrate and relatively large tidal amplitude; resulting in turbulent and well-mixed water bodies (Smaal and Van Stralen 1990, Troost 2009).</p> <p>The effect of fishing on the ecosystem function of cockles was explored by Cesar and Frid (2009) via experimental plots on two north-West English Bays. The research explored impacts on the function of the ecosystems through direct measuring of benthic primary production, organic matter content and sediment granulometry, and by indirect analyses using Biological Traits Analysis.</p> <p>Cesar and Frid (2009) found that the removal of large <i>C. edule</i> had no significant impact on the measured ecological functions relating to the biological productivity (as indexed by organic matter content and primary producer biomass) within the benthos. Removal of adult cockles led to significant changes in faunal assemblage composition and in the distribution of biological traits, with increased biodiversity and an increased prevalence of traits relating to opportunistic taxa observed following the removal of cockles. Cesar and Frid (2009) agree with findings by Kendrick et al. (1996) that subtle and/or small-scale changes in ecological processes (such as those potentially caused by hand raked fisheries) are likely to be masked by the substantial natural variability over small scales and larger-scale processes occurring within the habitat and wider ecosystem.</p> <p>Research undertaken by Flach (2008) and Leeuwe (2008) details benthic fauna associated with cockle beds including:</p> <ul style="list-style-type: none"> • Shellfish: macoma <i>Balthica macoma</i>, sand gaper <i>Mya arenaria</i>, <i>Tellina tenuis</i>, razor shell <i>Ensis directus</i>. • Worms: wire worm <i>Heteromastus filiformus</i>, arm worm <i>Scoloplos armiger</i>, zandzager <i>Nephtys hombergii</i>, yellow worm <i>Eteone longa</i>, sand tube worm <i>Lanice conchilega</i>, sand pipe <i>Pygospio elegans</i>. • Arthropod: mud shrimp <i>Corophium volutator</i> <p>Flach (2008) found a high presence of cockles reduces the rate of breeding and therefore density of these benthic fauna. High recoverability of benthic fauna post fishing, together with the positive effect of removing cockles leads to the effect of the fishery being negligible to these assemblages.</p> <p>The 2016 appropriate assessment (Agonus, 2016) concludes that the hand raking fishery has negligible effects on fish and other mobile animals, as they readily avoid the raking rig. It is noted that the act of hand raking mobilises benthic fauna which may then be consumed by fish. However, due to the extent of the fishery (0.28% of Wadden Sea and 1.8% of cockle beds) this is expected to have a negligible effect on fish and benthic fauna communities.</p> <p>Based on the available research it is considered highly unlikely that the scale of the hand raked fishery would disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. The 2016 Appropriate Assessment and EVA II project (Ens et al, 2004) provides some evidence that the hand raking fisheries in the Waddenzee and Oosterschelde are not disrupting key elements of ecosystem function. However, evidence specific to the benthic fauna described above are not available for the UoCs under investigation and therefore SG100 is considered to only be partially met.</p>
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PI 2.5.1	The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function
References	<p>Agonus Fisheries Consultancy, 2016. Habitattoets handmatige kokkelvisserij Waddenzee</p> <p>Cesar, C.P. and Frid, C.L.J. Effects of experimental small-scale cockle (<i>Cerastoderma edule</i> L.) fishing on ecosystem function. <i>Marine Ecology</i> 30 (Suppl. 1) (2009) 123–137</p> <p>Dare P.J., Bell M.C., Walker P., Bannister R.C.A. (2004) Historical and Current Status of Cockle and Mussel Stocks in the Wash. CEFAS, Lowestoft: 85 pp.</p> <p>Drinnan R.E. (1957) The winter feeding of the oystercatcher (<i>Haematopus ostralegus</i>) on the edible cockle (<i>Cardium edule</i>). <i>Journal of Animal Ecology</i>, 26, 441–469.</p> <p>Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effects of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch shellfish fishery policy (EVA II). Wageningen, Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz. 100 figs.; 10 tables; 242 refs.</p> <p>Flach E.C. (1996) The influence of the cockle, <i>Cerastoderma edule</i>, on the macrozoobenthic community of tidal flats in the Waddenzee. <i>Marine Ecology</i>, 17, 87–98.</p> <p>Giles H., Pilditch C.A. (2006) Effects of mussel (<i>Perna canaliculus</i>) biodeposit decomposition on benthic respiration and nutrient fluxes. <i>Marine Biology</i>, 150, 261–271.</p> <p>Hempel C. (1957) U"ber den Ro'hrenbau und die Nahrungsaufnahme einiger Spioniden (<i>Polychaeta sedentaria</i>) der deutschen Ku"sten. <i>Helgoland Marine Research</i>, 6, 100–135.</p> <p>Kamermans P. (1993) Food limitation in cockles (<i>Cerastoderma edule</i> (L.)): influences of location on tidal flat and of nearby presence of mussel beds. <i>Netherlands Journal of Sea Research</i>, 31, 71–81.</p> <p>Kamermans P. (1994) Similarity in food source and timing of feeding in deposit- and suspension-feeding bivalves. <i>Marine Ecology Progress Series</i>, 104, 63–75</p> <p>Kendrick G.A., Jacoby C.A., Heinemann D. (1996) Benthic microalgae: comparisons of chlorophyll a in mesocosms and field sites. <i>Hydrobiologia</i>, 326-327, 283–289.</p> <p>Pihl L. (1985) Food selection and consumption of mobile epibenthic fauna in shallow marine areas. <i>Marine Ecology Progress Series</i>, 22, 169– 179.</p> <p>Sauriau P.G., Kang C.K. (2000) Stable isotope evidence of benthic microalgae-based growth and secondary production in the suspension feeder <i>Cerastoderma edule</i> (Mollusca, Bivalvia) in the Marennes-Ole ron Bay. <i>Hydrobiologia</i>, 440, 317– 329.</p> <p>Swanberg I.L. (1991) The influence of the filter-feeding bivalve <i>Cerastoderma edule</i> L. on microphytobenthos: a laboratory study. <i>Journal of Experimental Marine Biology and Ecology</i>, 151, 93–111.</p>

PI 2.5.1	The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function
OVERALL PERFORMANCE INDICATOR SCORE:	90
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 2.5.2

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	Guidepost	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>The hand raked cockle fishery in the Waddenzee and Oosterschelde is principally managed with regard to ecosystem components. Appropriate Assessments in the Waddenzee and Oosterschelde have set limits for cockle removal based on ecological food reservations.</p> <p>The fishery is managed via the OHV Fishing Plan and annual conditions set by national permit and provincial licence, as well as a long-term agreement in the Waddenzee.</p> <p>The limit in the Waddenzee is 2.5% of harvestable cockle stock (with an average of 1.83% taken across 5-year period). The limit in Oosterschelde ensures a minimum level of food resource (5,000 tonnes of cockle meat) is available for birds before the fishery is opened. A level of harvestable cockles above this threshold is available for cockle rakers (6%) and suction dredgers (94%). Annual counts of birds ensure the 5,000 tonnes limit (set within an Appropriate Assessment, 2005) remains appropriate.</p>		
b	Guidepost	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.	<p>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.</p> <p>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.</p>
	Met?	Y	Y	Y

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		
	Justification	The Plan is principally designed around ecosystem components to ensure acceptable levels of cockles are removed, well within the ecological requirement for birds. Networks of closed areas exist in the Waddenzee and Oosterschelde to provide protection to birds, seals and habitats including consideration of direct and indirect interactions. Appropriate Assessments are reviewed annually to ensure the fishery continues to pose to risk to all ecosystem functions.		
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	The measures are considered likely to work. The 2.5% limit in the Waddenzee is considered to be precautionary. The 5,000 tonnes (cockle meat) limit within the Oosterschelde means that the fishery has been closed on many occasions, as is currently the case.		
d	Guidepost		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	There is evidence that the strategy is being implemented and enforced successfully. The fishermen interviewed during the site visit were well informed about all measures in place. Enforcement is undertaken by Directie Regionale Zaken Noord (DRZ Noord) through at sea vessel patrols and NWWA through factory and landings inspections. One incident of non-compliance was recorded in 2013 where a vessel steamed through an area closed for seals. The vessel was fined.		
References		Min. EL&I (2010) Allocation of hand raking cockle fishing permits in the Waddenzee Ministry of Economic Affairs, Agriculture and Innovation, letter 4th November, 2010.		

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	
	PNRW (2011) Long Term Plan for Waddenzee Handraked Cockles, 2011. Programme for a Sustainable Wadden Sea (Programma Naar een Rijke Waddenzee)	
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 2.5.3

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	The key elements of the Waddenzee and Oosterschelde ecosystems are well understood. There is extensive research carried out on the Waddenzee and Oosterschelde ecosystems by several research institutes in the Netherlands (and Germany). Extensive ecosystem modelling has been undertaken for the Waddenzee (Engelen, 2000; Engelen <i>et al</i> , 2003; Engelen, 2004; Brinkman <i>et al</i> , 2001) and Oosterschelde (Kleeper <i>et al</i> , 1991; Kleeper <i>et al</i> , 1994; Troost <i>et al</i> , 2010).		
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 in detail.
	Met?	Y	Y	N
	Justification	<p>The main impacts of hand dredging on key ecosystem elements are understood. The key elements are considered to be direct impacts to habitats (eelgrass, mussel beds), direct disturbance to ETP species (seals and birds) of steaming vessels including transport ship and smaller fishing RIBs and removal of food source for birds (oystercatcher and common eider).</p> <p>The impact to birds with regard to ecological food requirements have been investigated in detail and are the principle consideration in the management of the fishery.</p> <p>The main interactions can be inferred based on significant data from the Waddenzee, Oosterschelde and elsewhere (UK). However, with the exception of oystercatchers, these main interactions have not been investigated within the ecosystems under assessment and therefore this issue is not met.</p>		

PI 2.5.3		There is adequate knowledge of the impacts of the fishery on the ecosystem		
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 are identified and the main functions of these Components in the ecosystem are understood.
	Met?		Y	Y
	Justification	The impacts of the cockle hand raked fishery on retained species (no impact), bycatch species (forming ~0.3% of total catch) and ETP species (birds and seals) have been explicitly identified and the main functions are understood. Regular Appropriate Assessments, stock assessments and annual species counts ensure that the identified impacts are understood and any increases in risk can be identified.		
d	Guidepost		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.	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.
	Met?		Y	Y
	Justification	The main consequences of the impacts of the hand raked cockle fishery on all ecosystem components and elements are understood and can be inferred either from information directly about the Waddenzee and Oosterschelde fishery and ecosystem (Kamermans, 1993, Flach, 1996, Ens <i>et al.</i> , 2004) or from studies undertaken elsewhere (Cesar and Frid, 2009; Swanberg, 1991; Kamermans, 1994).		
e	Guidepost		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	Y

PI 2.5.3	There is adequate knowledge of the impacts of the fishery on the ecosystem
Justification	<p>Data is routinely collected on an ongoing basis to allow for the detection of any change or increase in risk level to the main ecosystem components. These data have been and continue to be crucial in the development of strategies in place to manage the fishery. These data determine whether and to what extent the fishery is open in its entirety (for Oosterschelde) and in specific areas (in both Waddenzee and Oosterschelde) in relation to annual variances within Appropriate Assessments e.g. location of seal haul out/breeding areas, bird feeding/breeding/overwintering and eelgrass & mussel reef habitat locations.</p> <p>Key data collected include landings data, spatial data in relation to habitats and species distributions and annual bird counts.</p>
References	<p>Brinkman AG , Baptist M , Drent J , Janssen-Stelder BM , Tol MWW van der , Ens BJ , Vonk M , Kersting K. 2001. Modelling the impact of climate change on the Waddenzee ecosystem. Dutch National Research Programme on Global Air Pollution and Climate Change. Report no.: 410 200 066</p> <p>Cesar, C.P. and Frid, C.L.J. Effects of experimental small-scale cockle (<i>Cerastoderma edule</i> L.) fishing on ecosystem function. <i>Marine Ecology</i> 30 (Suppl. 1) (2009) 123–137</p> <p>Dare P.J., Bell M.C., Walker P., Bannister R.C.A. (2004) Historical and Current Status of Cockle and Mussel Stocks in the Wash. CEFAS, Lowestoft: 85 pp.</p> <p>Drinnan R.E. (1957) The winter feeding of the oystercatcher (<i>Haematopus ostralegus</i>) on the edible cockle (<i>Cardium edule</i>). <i>Journal of Animal Ecology</i>, 26, 441–469.</p> <p>Engelen, G. 2000. The development of the WadBOS Decision Support System: A bridge between knowledge and policy in the Waddenzee, pages 38 National Institute for Coastal and Marine Management (RIKZ), Directorate-General of Public Works and Water Management, Ministry of Transport, Public Works and Water Management, The Hague, The Netherlands</p> <p>Engelen, G., I. Uljee, and K. van de Ven. 2003. WadBOS: Integrating knowledge to support Policy-making in the Dutch Waddenzee, in: <i>Planning Support Systems in Practice</i>, edited by: S. Geertman and J. Stillwell, p.513-537</p> <p>Engelen G 2004. Models in policy formulation and assessment: The WadBOS Decision Support System. In: <i>Environmental Modelling: Finding simplicity in complexity</i>, J Wainwright and M Mulligan (Eds). John Wiley and Sons Ltd, West Sussex, England. pp.257 – 271.</p> <p>Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effects of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch shellfish fishery policy (EVA II). Wageningen, Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz. 100 figs.; 10 tables; 242 refs.</p>

PI 2.5.3	There is adequate knowledge of the impacts of the fishery on the ecosystem	
	<p>Flach E.C. (1996) The influence of the cockle, <i>Cerastoderma edule</i>, on the macrozoobenthic community of tidal flats in the Waddenzee. <i>Marine Ecology</i>, 17, 87–98.</p> <p>Giles H., Pilditch C.A. (2006) Effects of mussel (<i>Perna canaliculus</i>) biodeposit decomposition on benthic respiration and nutrient fluxes. <i>Marine Biology</i>, 150, 261–271.</p> <p>Hempel C. (1957) U̇ber den Rȯhrenbau und die Nahrungsaufnahme einiger Spioniden (Polychaeta sedentaria) der deutschen Ku̇sten. <i>Helgoland Marine Research</i>, 6, 100–135.</p> <p>Kamermans P. (1993) Food limitation in cockles (<i>Cerastoderma edule</i> (L.)): influences of location on tidal flat and of nearby presence of mussel beds. <i>Netherlands Journal of Sea Research</i>, 31, 71–81.</p> <p>Kamermans P. (1994) Similarity in food source and timing of feeding in deposit- and suspension-feeding bivalves. <i>Marine Ecology Progress Series</i>, 104, 63–75</p> <p>Kendrick G.A., Jacoby C.A., Heinemann D. (1996) Benthic microalgae: comparisons of chlorophyll a in mesocosms and field sites. <i>Hydrobiologia</i>, 326-327, 283–289.</p> <p>Klepper, O., H. Scholten, J. P. G. De Van Kamer. 1991. Prediction uncertainty in an ecological model of the oosterschelde estuary. <i>Journal of Forecasting</i> Volume 10, Issue 1-2, pages 191–209, January 1991.</p> <p>Klepper, O., Tol, M.W.M., H. Scholten, Herman, P.M.J. 1994. SMOES: a simulation model for the Oosterschelde ecosystem. <i>Hydrobiologia</i> Volume 282-283, Number 1, 437-451.</p> <p>Pihl L. (1985) Food selection and consumption of mobile epibenthic fauna in shallow marine areas. <i>Marine Ecology Progress Series</i>, 22, 169–179.</p> <p>Sauriau P.G., Kang C.K. (2000) Stable isotope evidence of benthic microalgae-based growth and secondary production in the suspension feeder <i>Cerastoderma edule</i> (Mollusca, Bivalvia) in the Marennes-Ole ron Bay. <i>Hydrobiologia</i>, 440, 317– 329.</p> <p>Swanberg I.L. (1991) The influence of the filter-feeding bivalve <i>Cerastoderma edule</i> L. on microphytobenthos: a laboratory study. <i>Journal of Experimental Marine Biology and Ecology</i>, 151, 93–111.</p> <p>Troost, T. A., J. W. M. Wijsman, S. Saraiva and V. Freitas 2010. Modelling shellfish growth with dynamic energy budget models: an application for cockles and mussels in the Oosterschelde (southwest Netherlands). <i>Phil. Trans. R. Soc. B</i> 2010 365, 3567-3577.</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		95
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 3.1.1

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 <u>a framework for 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>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>The Water Act (“Waterwet”) came into force on 22 December 2009. The Water Act combines the various acts relating to water management and facilitates and facilitates the implementation of EC directives.</p> <p>The Fisheries Act, 1963 states that a permit is required to undertake cockle fishing in the Netherlands. It also sets technical measures such as the size of net, minimum landing size and maximum bycatch percentage of other species.</p> <p>Cockle fishing licenses are administered nationally by MinEZ. Cockle fishing permits are administered by the provincial authorities (Friesland for Waddenzee and Zeeland for Oosterschelde).</p> <p>In the Netherlands, governmental responsibility for environmental management under the Nature Conservation Act (<i>Wet natuurbescherming</i>) is decentralized and management of National Parks, including the Waddenzee National Park has been allocated to Naaturremonumenten.</p> <p>The long-term agreement illustrates binding procedures governing co-operation with other parties and SG100 is met.</p>		
b	Guidepost	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	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.	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.

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. 		
	Met?	Y	Y	N
	Justification	<p>When an application for a permit under the Nature Conservation Act is filed, the competent authorities are required to involve the public and interested parties, by making the draft decisions and the underlying documents available for inspection. The competent authority must notify the public by means of, for example, a (local) newspaper A decision not to grant an environmental permit can be appealed. (Koolhaas & de Rooy, 2010). The provincial license conditions include: "Person with direct interests may appeal against the decision within six (6) weeks after the dispatch of a notice of objection to the Provincial Executive. There is a transparent mechanism of application, decision-making and opportunity for appeal. SG80 is met. The management system in the Waddenzee was tested with infraction proceedings in 2004 and found to be in breach of Natura 2000 requirements as implemented by the Dutch state. Consequently, mechanical dredging was banned from the Waddenzee and hand-raking only permitted under the management system currently in place. This is assumed to be effective. There is no evidence that the management system has been tested and proven to be effective since the infraction proceedings. SG100 is not met.</p>		
d	Guidepost	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	N

<p>PI 3.1.1</p>	<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. 	
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Justification</p>	<p>The long-term management agreement for cockles in the Waddenzee was developed by a multi-stakeholder group involving fishers local and national management authorities and the Coalition Natural Wadden al (Coalitie Wadden Natuurlijk, CWN).</p> <p>The fisheries are within national parks, the management of which involves consultative bodies. Fisheries management decisions by Min EZ and the Provinces are made under the Nature Conservation Act (Wet natuurbescherming) and involve consultation with the National Park and interested parties.</p> <p>The allocation of additional handraking licenses to crewmen of mechanical dredgers affected by the ban in the Waddenzee illustrates that the state will attempt to maintain fisher livelihoods. However, a formal commitment to legal rights established for people dependent on fishing for livelihood is not given by the Dutch state. SG100 is not met.</p>	
<p>References</p>	<p>Koolhaas & de Rooy (2010) The International Comparative Legal Guide to: Environmental Law. A practical cross-border insight into environment law. Chapter 32, Netherlands authors Bart Koolhaas and Petra de Rooy. Pub. Global Legal Group.</p> <p>Min. EL&I (2010) Allocation of hand raking cockle fishing permits in the Wadden Zee Ministry of Economic Affairs, Agriculture and Innovation, letter 4th November, 2010.</p> <p>Min. LNV (2005) Nature Conservation in the Netherlands. Ministry of Agriculture, Nature and Food Quality (LNV), 2005</p>	
<p>OVERALL PERFORMANCE INDICATOR SCORE:</p>		<p>85</p>
<p>CONDITION NUMBER (if relevant):</p>		

Evaluation Table for PI 3.1.2

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	Y
	Justification	<p>There have been a number of changes in the organisations and the personnel involved since the original assessment.</p> <p>There has been a re-structuring of Dutch ministries resulting in the Ministry of Economic Affairs having overall responsibility for fisheries management. As part of this re-structuring, the original fisheries control agency is now the NVWA, operating under the food safety agency. During the first certification period, management of the national park areas has been devolved to Natuurmonumenten, an Environmental NGO that ensures active management and conservation of the areas under its management. https://www.natuurmonumenten.nl</p> <p>IMARES, the scientific agency that advises government and undertakes the annual cockle survey has been re-branded Wageningen Marine Research. However all participants are well aware of the functions and responsibilities for all areas, which are explicitly defined. SG100 is 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

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		
	Justification	The Dutch fisheries management system is based on co-management with industry, requiring extensive consultation between parties in the development and implementation of policy. Evidence of this consultative approach in the original assessment came from the development of zonation including closed areas, seasonal closures, etc. The fishery management system bases its decisions on the IMARES (now Wageningen Marine Research) survey. The results of the survey are reported to the industry and this is the basis for decisions, but there is no evidence of how it takes information into consideration or not and SG100 is not met.		
c	Guidepost		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	Y
	Justification	The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement. Annual review of fishing opportunities takes place involving all interested parties as stated in the long-term agreement, "The parties agreed to discuss annually the content of the next license in the first half of July." SG100 is met.		
References		Multiannual agreement on hand raked cockle fisheries in the Waddenzee", 2011, Programme for a Sustainable Wadden (Programma Naar een Rijke Wadden) Plan van Aanpak Evaluatie Meerjarenakkoord Handkokkelvisserij 2016-2018 – concept. Paddy Walker – Programma Naar een Rijke Waddenzee – Oktober 2016 https://www.natuurmonumenten.nl		
OVERALL PERFORMANCE INDICATOR SCORE:				95
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.1.3

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 National shellfish policy document (Min LNV, 2004), 'Space for marine harvest' (Ruimte voor een zilte oogst) sets shellfish fishery policy up to 2020</p> <p>The objective of national shellfish policy for the shellfish is: An economically sound production industry that respects and where possible enhances nature. The new shellfish policy is based on the applicable principles of corporate social responsibility. This means the that shellfish industry that:</p> <ul style="list-style-type: none"> - is Economically profitable, - Eco operates and - Have broad public acceptance. <p>The national shellfish policy requires that the above principles are required within specific fisheries policy. The shellfisheries policy formulation and the development of the policy may not conflict with European conservation obligations (BHD AND KRWproof.) (Min LNV, 2004)</p> <p>Appropriate assessments are required and are to be updated at regular intervals to inform the management of the Natura 2000 sites within which the fisheries operate (e.g. Agonus, 2016).</p> <p>The precautionary approach is explicit in and required by these management policies and therefore SG100 is met.</p>		
References		<p>Min LNV, 2004 'Space for marine harvest' (Ruimte voor een zilte oogst)</p> <p>Agonus, 2016. Habitattoets handmatige kokkelvisserij Waddenzee.</p>		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.1.4

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	Guidepost	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
	Justification	<p>The management system is based on conservation objectives, allocating precautionary amounts of quota to fishing activities, with bird requirements taking precedence. Fishers recognise that activities deemed to be non-sustainable will be stopped and this is a positive incentive to continue fishing in a sustainable manner.</p> <p>The management system's use of national permits and provincial licenses, which have associated conditions and can be removed by the authorities, ensures no perverse incentives arise. SG80 is met.</p> <p>The management system is regularly reviewed (e.g. review of licence conditions), but incentives are not explicitly considered. Therefore SG100 is not met.</p>		
References		Long Term Agreement for Waddenzee Handraked Cockles, 2011. Programme for a Sustainable Wadden Sea (Programma Naar een Rijke Waddenzee)		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.1

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	UoC1 – Y UoC2 - N
	Justification	<p>Fishery specific management continues to be based on the long-term agreement signed in 2011 (PNRW, 2011)</p> <p>Both the annual conditions set by permit and license, and the long-term agreements are consistent with MSC principles and explicit within these documents. This annual management system would also be applied were the Oosterschelde to re-open, but at present there are short term objectives relating to food availability and long term conservation objectives.</p> <p>The short-term objectives are measureable as they relate to a defined amount that can be fished on an annual basis that leaves sufficient for bird requirements (Waddenzee quota of 2.5% of the total available meat weight in areas with densities higher than 50 per m². And the Oosterschelde fishery only opens if above 5,000t).</p> <p>The long-term objectives relate to maintaining food reserves for bird species and are measureable; "In bad years with little cockles from the viewpoint of nature (birds) most valuable areas closed, and in other limited areas fished. In a year rich in the most valuable fishing controlled zones permitted and may be more boats to fish in other areas" (PNRW, 2011). The boundary between poor and rich years is put at 21 million kg of cockle meat in densities greater than 50 per m² (meat weight) at 1 September. This limit is based on earlier research into food reservation of oystercatchers.</p> <p>This indicates that well-defined and measurable objectives to achieve both P1 and P2 outcomes are explicit within the management system for both UoCs (as the Oosterschelde remains closed because the food reserve objectives are not met) and SG80 is met for both.</p> <p>The Waddenzee agreement illustrates objectives that are demonstrably consistent with P1 and P2 objectives and so SG100 is met for UoC1. The original assessment considered that as the Oosterschelde fishery was closed, there was no long-term agreement in place for the fishery. As there is no such agreement in place, SG100 is not met for UoC2 despite the understanding is that the fishery would operate on the same basis and an agreement be in place prior to the fishery being opened.</p>		
References		PNRW (2011) Long Term Agreement for Waddenzee Handraked Cockles, 2011. Programme for a Sustainable Wadden Sea (Programma Naar een Rijke Waddenzee)		
OVERALL PERFORMANCE INDICATOR SCORE:				UoC 1: 100

PI 3.2.1	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2
	UoC 2: 80
CONDITION NUMBER (if relevant):	

Evaluation Table for PI 3.2.2

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	Decision-making processes include appropriate assessment, permit, license and the OHV fishing plan, each is applied on an annual basis to achieve fishery-specific objectives. These have been established for several years and are found to operate effectively. 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	N
	Justification	The annual quota and OHV fishery plan respond to the survey results. These clearly respond to serious issues in a timely and responsive manner. As management is conservation-focused the focus is on maintaining the status of the interest features (birds and habitats). The overall availability of cockles as a food source and habitat indicator is regularly assessed and decision-making processes respond to this, but all fishery issues may not be identified or responded to by management. For example the identification of fishing effort intensities in particular areas is an emerging issue still to be addressed by management. SG100 not met.		

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.		
c	Guidepost		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		Y	
	Justification	Management of the fishery is highly precautionary, utilizing 2.5% of available meat at specific densities, while initially 5% was identified as being sufficiently precautionary. In the Oosterschelde the closure until above 5,000t biomass (cockle meat) is indicative of the precautionary approach. Overall management of the areas within which the fisheries operate is subject to Natura 2000 site monitoring requirements ensuring decision-making is based on the best available information, e.g. Appropriate Assessment. 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	Y
	Justification	Annual survey, appropriate assessment, permit, license and fishing plan documents are provided to interested stakeholders. These set out the various requirements and conditions, which do respond to emerging research and information.		

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.		
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	The management system complies with judicial decisions in a timely fashion through the amendment of license numbers and/or conditions. The establishment of the hand-raking only condition in the Waddenzee resulted from the legal challenge on the management of the Natura 2000 site. However judicial decisions relating to the fishery are now proactively avoided through the multi-stakeholder group that agreed the long-term agreement and through the consultation groups associated with the National Parks. SG100 is met.		
References		<p>OHV (2016) Fishing Plan of the Association of Handraked cockle fishers</p> <p>PNRW (2011) Long Term Agreement for Waddenzee Handraked Cockles, 2011. Programme for a Sustainable Wadden Sea (Programma Naar een Rijke Waddenzee)</p> <p>Agonus, 2016. Habitattoets handmatige kokkelvisserij Waddenzee.</p>		
OVERALL PERFORMANCE INDICATOR SCORE:				95
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.3

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	The Wadden Unit of the MinEZ undertakes inspection of fishing activities, generally via vessel patrols. There are 12 inspectors using 4 patrol boats. AIS and helicopter surveillance is also used to ensure fishers observe closed areas. A similarly comprehensive MCS system is in place for the Oosterschelde and would be implemented were the fishery open. SG100 is therefore met.		
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	In 2015 a formal warning was issued regarding non-named fishers operating on behalf of licensed fishers and in 2016 a 2,000 euro fine was imposed. These are the only recent incidents reported where action has escalated to some form of sanction. This represents demonstrably effective deterrence and SG100 is met.		
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.

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with		
	Met?	Y	Y	Y
	Justification	The small number of licenses means that MCS agencies in the Waddenzee can maintain a close surveillance of operators. There is also a high level of self-policing as fellow fishers will immediately address perceived non-compliance through the OHV. This provides a high degree of confidence that fishers comply with the management system. SG100 is met.		
d	Guided		There is no evidence of systematic non-compliance.	
	Met?		Y	
	Justification	The control authority reports no systematic non-compliance in the Waddenzee and full compliance with the fishery closure in Oosterschelde (N. Laros NVWA, Wadden Unit pers. comm.) SG80 is met		
References				
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

Evaluation Table for PI 3.2.4

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	N
	Justification	<p>The annual cockle survey forms part of the Trilateral Monitoring and Assessment Program (TMAP) is the common monitoring program for the Waddenzee carried out by The Netherlands, Germany and Denmark in the framework of the Trilateral Waddenzee Cooperation. These activities are generally part of existing activities and requirements under EC directives, but ensure a coordinated approach across the Member States Progress on implementing the trilateral policies and management in the Waddenzee Plan will be evaluated every 6 years (CWSS, 2010). The next Quality Status Report is to be published in 2017 (CWSS, 2017).</p> <p>There are also commitments within the long-term agreement to explore issues as and when they arise in relation to both P1 and P2. SG80 is therefore met.</p> <p>A research plan is expected to form part of the Management Plan for the Waddenzee N2000 and the Oosterschelde N2000 sites. As cockles are a critical element of the ecosystem, research involving cockles may be expected to be included, but these are yet to be finalized (despite being draft form since 2012). The research plan cannot therefore be considered comprehensive at this stage and SG100 is not met.</p>		
b	Guidepost	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	Y
	Justification	Annual survey results are the basis of management decisions and are therefore required to be timely. These are published on the Wageningen Marine Research website, along with the WMR annual research plans & reports. SG100 is met		

PI 3.2.4	The fishery has a research plan that addresses the information needs of management	
References	<p>CWSS (2010) Eleventh Trilateral Governmental Conference on the Protection of the Waddenzee Westerland/Sylt, 18 March 2010. Common Waddenzee Secretariat.</p> <p>CWSS (2017) http://www.waddensea-secretariat.org/news-and-service/news/16-07-1118th-meeting-of-the-wadden-sea-board-in-wilhelmshaven-germany</p> <p>PNRW (2011) Long Term Agreement for Waddenzee Handraked Cockles, 2011. Programme for a Sustainable Wadden Sea (Programma Naar een Rijke Waddenzee)</p> <p>Het kokkelbestand in de Nederlandse kustwateren in 2016 M. van Asch, K. Troost, A. Blanco-Garcia, E.B.M. Brummelhuis, D. van den Ende en C. van Zweeden. Rapport C080.16 (Cockle stock survey 2016 by IMARES/Wageningen Marine Research)</p>	
OVERALL PERFORMANCE INDICATOR SCORE:		90
CONDITION NUMBER (if relevant):		

Evaluation Table for PI 3.2.5

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	Y
	Justification	The annually-allocated cockle permit is subject to regular review, which enables consideration of all parts of the management system.		
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	The 10 additional licenses expired in August 2016. There was an internal review by MinEZ before the granting of another 6 years (MinEZ, 2016). The long-term agreement has been the subject of regular discussion between parties during meetings, but it contains a requirement for formal evaluation by 2018 at the latest. This illustrates occasional external review and SG80 is met, but not SG100.		
References		MinEZ, 2016 Letter to OHV regarding the issuing of the additional 10 licences.		
OVERALL PERFORMANCE INDICATOR SCORE:				90
CONDITION NUMBER (if relevant):				

Appendix 1.2 Risk Based Framework (RBF) Outputs

For the hand-raked cockle fishery in the Waddenzee and Oosterschelde, it is not possible to determine the status of the cockle stock relative to biologically-based limits for sustainability because there are no stock status reference points available, derived either from analytical stock assessment or using empirical approaches. The Risk Based Framework (RBF) has therefore been used to assess stock status for cockles and to score Performance Indicator 1.1.1. In addition, for bycatch species there are no stock status reference points available, derived either from analytical stock assessment or using empirical approaches, and so the RBF has been used to score bycatch species outcome (Performance Indicator 2.2.1). The results of the Scale Intensity Consequence Analysis (SICA) and Productivity-Susceptibility Analysis (PSA) are set out in this section.

On 6 October 2016, an announcement was made on the MSC website that the RBF would be used for Performance Indicators 1.1.1 and 2.2.1 for the re-assessment of the OHV Dutch Waddenzee and Oosterschelde hand-raked fishery. Stakeholders were requested to respond by 25 October 2016 if they wished to participate in stakeholder-driven SICA workshops and were advised that the stakeholder comment period on the proposal to use the RBF would close on 5 November 2016. At the same time, all known stakeholders in the fishery were contacted and advised of the proposal to use the RBF for PIs 1.1.1 and 2.2.1. No responses were received from stakeholders concerning the proposal to use the RBF and no requests were received to attend a SICA Workshop during the proposed site visit of the assessment team during the week beginning 7 November 2016. In addition, the various stakeholders that were available and had agreed to meet the assessment team during the site visit - IMARES (Wageningen Marine Research), the Waddenzee fisheries officer, Natuurmonumenten, an environmental NGO and the client (OHV represented by Bert Keus) - were not able to meet simultaneously, which precluded the organisation of a formal SICA Workshop. However, the assessment team noted that the RBF had been used for PIs 1.1.1 and 2.2.1 during the initial certification assessment fishery. The assessment team therefore used the output from the SICA Workshop conducted during the initial certification assessment as a starting point for discussion on the RBF during all stakeholder meetings. The key issue was whether the stakeholders considered that the scale and intensity of the OHV Dutch Waddenzee and Oosterschelde fishery had changed since the original assessment conducted in 2011 and stakeholders were given the opportunity to provide any new information that might change the outcome of the analysis. For Principle 1, the assessment must take into account the whole stock and all fishing gears that might be used in the fishery, and so for the Oosterschelde both the hand rake fishery and the hydraulic dredged fishery were taken into consideration. The results of the discussions with stakeholders and the assessment team's evaluation of the various scoring issues in the RBF are set out below in Tables 1.2.1a and 1.2.1b for PI 1.1.1 and Table 1.2.1c for PI 2.2.1.

A Productivity Susceptibility Analysis (PSA) was subsequently conducted for PI 1.1.1 during the assessment of the hand raked fishery in the Waddenzee and the hand raked and hydraulic dredge fishery in the Oosterschelde, the results of which are set out in Tables 1.2.2a to 1.2.2d.

Appendix 1.2.1 Scale Intensity Consequence Analysis (SICA)

Table 1.2.1.a: Principle 1 SICA Scoring Template Target Species – UoC 1 Waddenzee

The feedback from meetings with IMARES (Wageningen Marine Research), the Waddenzee fisheries officer, Natuurmonumenten and the Client has been used by the assessment team to carry out a Scale Intensity Consequence Analysis for the fishery. The results of this SICA are shown in the table below.

Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
Target species outcome UoC 1 Waddenzee	Fishing activities from all fisheries including: <ul style="list-style-type: none"> • <u>Direct capture</u> • Unobserved mortality (e.g. gear loss) • Capture as bycatch in other fisheries • Other identified risk-causing activities (please specify) 	2	4	3	Population size	1	100
					Reproductive capacity		
					Age/size/sex structure		
					Geographic range		
Rationale for selecting worst plausible case scenario:	All stakeholders agreed that direct capture of cockles was the main risk-causing activity associated with the fishery, and the assessment team concurred with the view of the stakeholders.						

Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
Rationale for Spatial scale of activity:	<p>At the time of the original certification assessment, the management regulations permitted a maximum harvest rate of 5% of the fishable stock, defined as areas in which cockles are found at densities greater than 50 per m². The maximum harvest rate has since been reduced to 2.5%. To calculate the percentage area of the total fishable stock in which fishing occurs, the original assessment team made the assumption that hand-raking occurs only in areas where the density is greater than 600 per m², and that the overall harvestable fishing ground is defined as areas in which cockles are found at densities greater than 50 per m². Using information from (a) IMARES annual surveys on the extent of cockle beds with densities greater than 50 per m² and greater than 600 per m² and (b) annual landings information, the original assessment team estimated that the proportion of area fished from the overall harvestable fishing ground ranged from 0.4% to 2.9% from 2005 to 2011. Landings of cockles in recent years have been much higher than during the period 2005 to 2011, but even in 2014 and 2015 when landings and estimated exploitation rates were at the highest in recent years, the corresponding calculation of the proportion of the area fished was 1.4% and 1.6% in 2014 and 2015 respectively. All the available information provides evidence that the spatial scale of fishing activity is within the range 1-15% of the total cockle stock, and that a score of 2 for spatial scale of activity is warranted.</p>						
Rationale for Temporal scale of activity:	<p>The cockle fishery operates for around 11 months of the year with fishing occurring on 4 days per week. This equates to a maximum of around 170 days per year, and so a score of 4 is given for the temporal scale of activity.</p>						
Rationale for Intensity of activity:	<p>Cockle fishing activity affects a very limited area of the Wadden Sea, but the activity occurs reasonably often and is detectable. The assessment team concluded that there was “moderate detection of activity at broader spatial scale, or obvious but local detection” and therefore a scale of 3 was appropriate for intensity of activity.</p>						
Rationale for choosing most vulnerable sub-component:	<p>All stakeholders and the assessment team concluded that population size was the most vulnerable sub-component to assess the risk that the fishery poses to the productivity of the cockle population. The limited spatial extent of the fishery and the low exploitation rate suggest that the fishery is highly unlikely to affect the reproductive capacity, the age / size / sex structure or the geographic range of the cockle population.</p>						

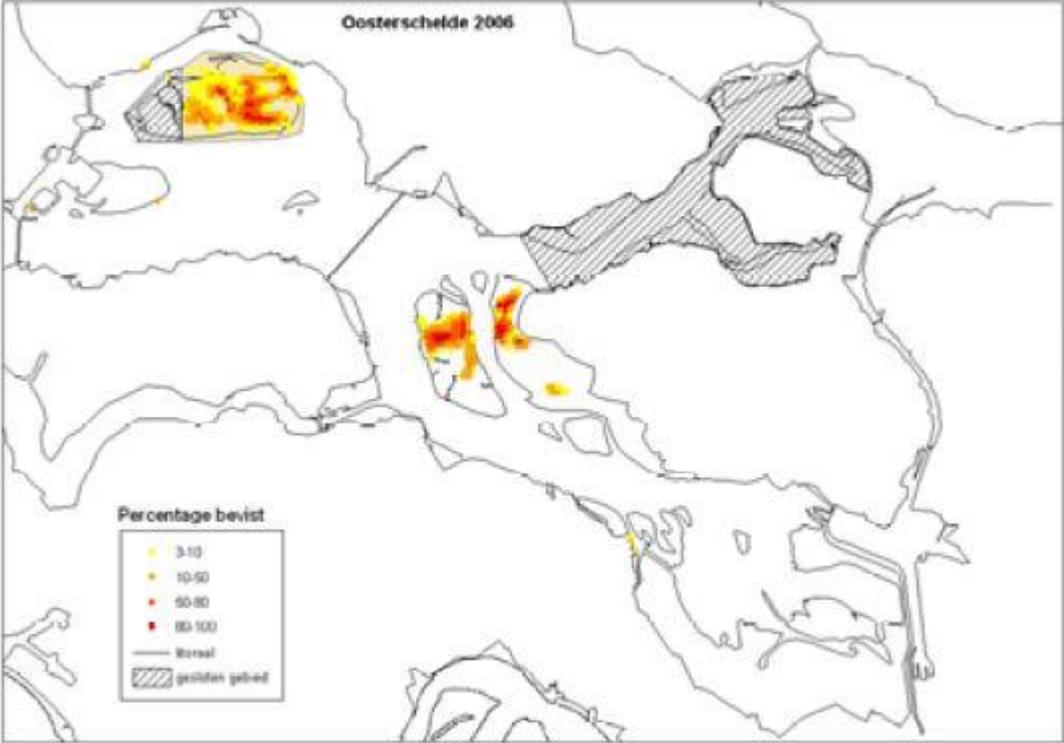
Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
Rationale for Consequence score:	The exploitation rate in the cockle fishery is limited to 2.5% of the total harvestable stock, and annual estimates of the proportion of the total stock that is fished range from 0.4% to 2.9% in recent years. In addition, fishing mortality is low in comparison with natural mortality, and recruitment of cockle stocks is driven primarily by environmental factors rather than fishing activity. On the basis of all the available evidence, the assessment team concluded that the risk to the cockle population from fishing was low and that a consequence score of 1 was appropriate (i.e. possible detectable change in size/growth rate (r) but minimal impact on population size and none on dynamics).						

Table 1.2.1.b: Principle 1 SICA Scoring Template Target Species – UoC 2 Oosterschelde

The feedback from meetings with IMARES (Wageningen Marine Research), the Waddenzee fisheries officer, Natuurmonumenten and the Client has been used by the assessment team to carry out a Scale Intensity Consequence Analysis for the fishery. The results of this SICA are shown in the table below.

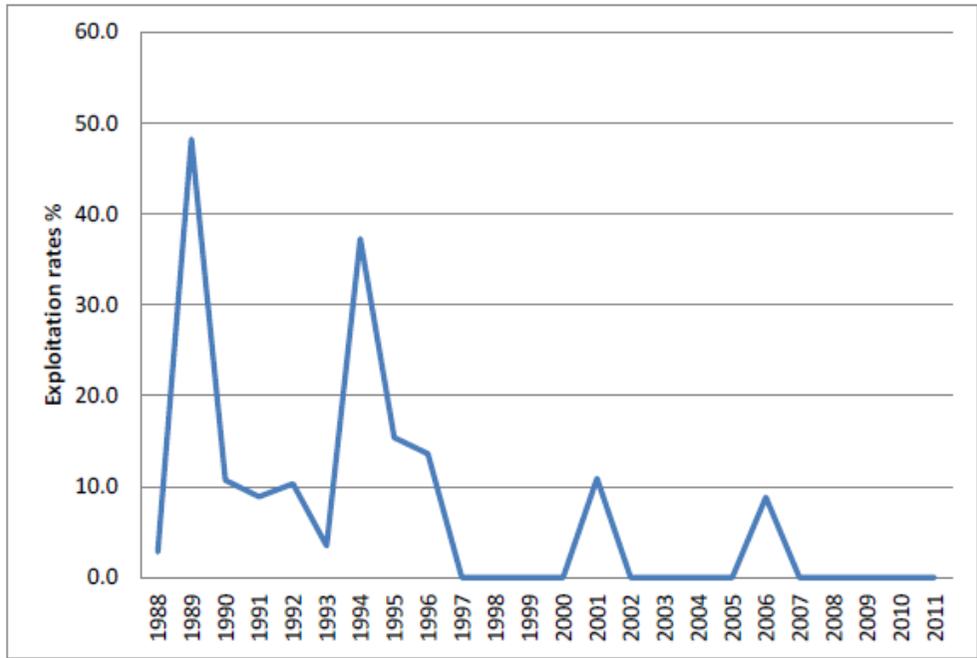
Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
Target species outcome UoC 2 Oosterschelde	Fishing activities from all fisheries including: <ul style="list-style-type: none"> • <u>Direct capture</u> • Unobserved mortality (e.g. gear loss) • Capture as bycatch in other fisheries • Other identified risk-causing activities (please specify) 	3	6	3	Population size	2	80
					Reproductive capacity		
					Age/size/sex structure		
					Geographic range		
Rationale for selecting worst plausible case scenario:	All stakeholders agreed that direct capture of cockles was the main risk-causing activity associated with the hand raked and hydraulic dredge fisheries, and the assessment team concurred with the view of the stakeholders.						

Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
<p>Rationale for Spatial scale of activity:</p>	<p>For the Oosterschelde cockle stock there is an ecological reservation of 5000 tonnes of cockles to safeguard the food requirements of birds. Since 2006, annual stock surveys have shown that the stock biomass has been below the threshold of 5000 tonnes and the fishery has therefore remained closed. If the fishery is re-opened, then the exploitation rate will depend on the biomass available to fishing but as historically stock biomass has rarely been above the ecological food reservation, it can be assumed that exploitation rates are likely to be low if the fishery opens. In 2006, the most recent year when the fishery was open, the exploitation rate was estimated at 8.8%. In years when the fishery is open the spatial scale of the fishery is restricted to the open areas, and currently 23 % of the Oosterschelde intertidal area is permanently closed to fishing. Within the open areas, the fishery occurs only in a limited area due to the reservation of 5000 tonnes. Fishing effort distribution (hand raked and hydraulic dredge fisheries) compared to the cockle stock distribution is shown in the figure below suggesting that fishing may occur in a significant proportion of the area of overall harvestable fishing ground.</p> <p>The assessment team concluded that the spatial scale of fishing activity is within the range 15-30% of the total cockle stock, and that a score of 3 for spatial scale of activity is warranted.</p>						

Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
							
Rationale for Temporal scale of activity:	When open, the cockle fishery can operate all year round. A score of 6 is given for the temporal scale of activity.						
Rationale for Intensity of activity:	Based on the exploitation rates and proportion of area fished, the intensity of cockle fishing activity using both hand rakes and hydraulic dredges is considered as moderate. The assessment team concluded that there was “moderate detection of activity at broader spatial scale, or obvious but local detection” and therefore a scale of 3 was appropriate for intensity of activity.						

Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
Rationale for choosing most vulnerable sub-component:	All stakeholders and the assessment team concluded that population size was the most vulnerable sub-component to assess the risk that the hand raked and hydraulic dredge fisheries poses to the productivity of the cockle population. The limited spatial extent of the fishery and the low exploitation rate suggest that the fishery is highly unlikely to affect the reproductive capacity, the age / size / sex structure or the geographic range of the cockle population.						
Rationale for Consequence score:	The Oosterschelde has been closed to fishing since 2006 due to the stock biomass being below the ecological food requirement for eider and oystercatchers of 5000 tonnes. Historical trends in stock biomass indicate that when the fishery has been opened, exploitation rates average around 20% on average (see figure below). In the two most recent years when the fishery was opened, exploitation rates were estimated at 10.9% and 8.8% in 2001 and 2006 respectively. The proportion of area fished from the overall harvestable fishing ground was 17 % in 2006, the last year when the fishery took place. Calculations were based on fishing in areas with densities greater than 50 cockles per m ² .						

Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score



The assessment team concluded that exploitation rates and proportion of area fished indicate that the fishery does not pose a risk to the productivity of the stock. In addition, fishing mortality is low in comparison with natural mortality, and recruitment of cockle stocks is driven primarily by environmental factors rather than fishing activity. However fishing could have an effect on recruitment due to high exploitation rates (Ens, et al., 2004) or due to the negative impact of dredging on settlement of cockles (Piersma, et al., 2001). However under current exploitation rates and proportion of area fished in the Oosterschelde during the last decade the risk of impact is low. On the basis of all the available evidence, the assessment team concluded that the risk to the cockle population from fishing was relatively low and that a consequence score of 2 was appropriate (i.e. insignificant change to population size/growth rate, and unlikely to be detectable against background variability for this population.)

References:

Performance Indicator	Risk-causing activities	Spatial scale of activity	Temporal scale of activity	Intensity of activity	Relevant subcomponents	Consequence score	MSC Score
	<p>Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effect of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch Shellfish fishery policy (EVAII). Wageningen Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz.</p> <p>Piersma, T., Koolhaas, A., Dekinga, A., Beukema, J.J., Dekker, R. and Essink, K. 2001. Long-term indirect effects of mechanical cockle-dredging on intertidal bivalve stocks in the Waddenzee. Ecology 38, 976-990.</p>						

Table 1.2.1.c Scoring Template for PI 2.2.1 Bycatch Species (Reference: CR Table CC5)

Performance Indicator	Risk-causing activities from fishery under assessment	Spatial scale of activity	Temporal scale of activity	Intensity of activities	Relevant subcomponents	Consequence score	MSC Score
PRINCIPLE TWO: Bycatch Species Outcome	<ul style="list-style-type: none"> Fishing 	2	4	3	Population size	1	100
					Reproductive capacity		
					Age/size/sex structure		
					Geographic range		
Rationale for selecting worst plausible case scenario:	The act of fishing is considered to pose the highest risk to the bycatch species caught in association with the hand raked fishery. Gear loss is very rare, as gear is hand operated; no bait collection occurs as part of the fishery and no other risk causing activity is identified.						
Rationale for Spatial scale of activity:	Based on current catch of 2.5% of cockle stock and that cockle beds are defined as having >50 cockles per m2 current fishing practice within the Waddenzee will cover a maximum of 200 ha area (assuming 50 cockles per m2). The cockle beds throughout the Waddenzee are estimated to cover 10,000-15,000 ha. On this basis the spatial scale of the hand raking fleet is estimated at 2% of the total cockle beds. A score of 2 on the SICA spatial scale (1-15%) is therefore appropriate. The Oosterschelde fishery (when open) is expected to be of a similar spatial scale as the Waddenzee fishery and therefore a score of 2 is appropriate, as per the rationale above.						
Rationale for Temporal scale of activity:	The fishermen operate for 11 months of the year working 4 days per week. This equates to around 176 days of fishing per year per fisherman. On this basis a score of 4 on the SICA temporal scale (100-200 days) is appropriate. The Oosterschelde fishery (when open) is expected to be of a similar temporal scale as the Waddenzee fishery and therefore a score of 4 is appropriate, as per the rationale above.						

Rationale for Intensity of activity:	Given the scale of the fishery, (2% of the total cockle beds) a moderate intensity (score of 3) is considered appropriate i.e. the level of fishing activity is detectable at broader spatial scale, or obvious but local detection. The Oosterschelde fishery (when open) is expected to be of a similar intensity scale as the Waddenzee fishery and therefore a score of 3 is appropriate, as per rationale above.
Rationale for choosing most vulnerable sub-component:	<p>Species considered as bycatch include surf clam <i>Spisula subtruncata</i>, periwinkle <i>Littorina littorea</i>, Baltic clam <i>Macoma balthica</i>, Pacific oyster <i>Crassostrea gigas</i>, common shore crab <i>Carcinus maenas</i>, spionid worm <i>Pygospio elegans</i>. Blue mussel <i>Mytilus edulis</i> beds are assessed under the Principle 2 habitat component and are not assessed as part of this RBF of bycatch species. Consultation with a range of stakeholders (including IMARES, Ministry EL&I, Fisheries Directorate and North Sea Foundation) during the site visit did not raise concern for the bycatch species and did not determine one species to be of more concern over any other. The scoring elements are considered to have a similar level of vulnerability. This SICA is applicable to all of the above species.</p> <p>Based on the ecological importance of the Waddenzee and Oosterschelde as a food resource for many wintering and migratory bird populations, the population size of the bycatch species is considered the most relevant subcomponent of the consequence assessment.</p>
Rationale for Consequence score:	<p>The team assess that the effect of the hand raked cockle fishery on changes in population size/growth rate for all bycatch species is highly likely to be insignificant and extremely unlikely to be detectable against background variability for these populations. This assessment has been made based on the follow:</p> <ul style="list-style-type: none"> • The bycatch species being assessed are widely and commonly distributed throughout the North East Atlantic; • The spatial overlap of the fishery is low (2% of cockle grounds and significantly less than 1% of bycatch species distribution), • Any species removed/discarded at sea will have high survivability (fishermen note that crabs can walk out of the catch back into the sea); and • Low levels of 'foreign bodies' were recorded within the factory quality report (99.7% of catch was cockles), including

	<p>empty shells.</p> <p>A SICA consequence score of 1 is awarded, with a MSC equivalent score of 100. As per CR v1.3 paragraph CC2.3.6.7, since the SICA scored 1, a PSA has not been undertaken.</p>
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Appendix 1.2.2 Productivity-Susceptibility Analysis (PSA)

Table 1.2.2.a PSA Principle 1 Rationale Table UoC 1 Waddenzee

PI number	1.1.1	Stock status	
Productivity	Rationale	Score	
Average age at maturity.	Between 1 and 2 years (Dare et al., 2004; www.marlin.co.uk)	1	
Average maximum age	Dare et al. (2004) state that longevity is 5-8 years, www.marlin.ac.uk gives an average life-span of 2-4 years, but states that cockles may live for 9 years or more. Dabouineau & Ponsero (2009) state that cockles generally live for 2-5 years on average, but they can exceptionally reach 10 years old/ All evidence suggests that the average maximum age is < 10 years.	1	
Fecundity	Egg production is usually in the range 200,000 to 700,000 per annum but a maximum of 1.7 million has been reported (Honkoop and van der Meer, 1998). Dare et al. (2004) state that large individuals produce more than 1 million eggs.	1	
Average maximum size	26-54 mm depending on region (Dabouineau & Ponsero (2009) Cockles of 50mm would be considered very large (Tebble, 1966).	1	
Average size at maturity	15-20mm (www.marlin.ac.uk)	1	
Reproductive strategy	<i>Cerastoderma edule</i> is a broadcast spawner	1	
Trophic level	Suspension feeder, trophic level is < 2.75.	1	
<p>References:</p> <p>Dare, P.J., Bell, M.C., Walker, P. and Bannister, R.C.A., 2004. Historical and current status of cockle and mussel stocks in The Wash. CEFAS Lowestoft, 85pp.</p> <p>Dabouineau, L. & Ponsero, A., 2009. Synthesis on biology of Common European Cockle <i>Cerastoderma edule</i>. Second edition Université Catholique de l'Ouest - Réserve Naturelle Nationale Baie de St-Brieuc, 23 pages.</p> <p>Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effect of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch Shellfish fishery policy (EVAll). Wageningen Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz.</p> <p>Honkoop, P.J.C. and van der Meer, J. 1998. Experimentally induced effects of water temperature and immersion time on reproductive output of bivalves in the Waddan Sea. Journal of Experimental Marine Biology and Ecology, 220: 227-246.</p> <p>Piersma, T., Koolhaas, A., Dekinga, A., Beukema, J.J., Dekker, R. and Essink, K., 2001. Long-term indirect effects of mechanical cockle-dredging on intertidal bivalve stocks in the Waddenzee. Ecology 38: 976-990</p> <p>Tebble, N. 1966. <i>British Bivalve Seashells</i>. The British Museum (Natural History), London, 212 pp.</p>			

Fishery	Cockle, <i>Cerastoderma edule</i> , using hand rake.	
Susceptibility	Rationale	Score
Areal Overlap	Assuming that hand-raking occurs only in areas where the density is greater than 600 per m ² , and using information from (a) IMARES annual surveys on the extent of cockle beds with densities greater than 50 per m ² and greater than 600 per m ² and (b) annual landings information, the estimated proportion of area fished from the overall harvestable fishing ground ranged from 0.4% to 2.9% from 2005 to 2015.	1
Vertical Overlap	Cockles are a benthic species and although they exhibit burrowing behavior, the assessment team considered that there was a high vertical overlap between cockles and the hand rake which scours the surface of the seabed.	3
Selectivity	The average size at maturity for cockles is 15-20mm (although this may vary regionally), so many individuals may be over 20mm when they reach maturity. The minimum landing size in the Dutch fishery is 21mm, so it is likely that individuals less than the size at maturity are frequently caught in the fishery.	3
Post capture mortality	Cockles are the target species, so post-capture mortality has a default score of 3.	3

The scores awarded in Table 1.2.2.a above are used to determine an MSC score for Performance Indicator 1.1.1 using a spreadsheet provided by the MSC. This spreadsheet uses an algorithm that has been developed by the MSC to determine a “Productivity” and a “Susceptibility” score for the fishery, and then to allocate a corresponding MSC score. A copy of the spreadsheet that is used to perform this calculation is shown in Table 1.2.2.b below. For interested readers the algorithms used to calculate the overall productivity, susceptibility and PSA scores, and the corresponding MSC scores are given below the table.

Table 1.2.2.b Results of Productivity Susceptibility Analysis (PSA) for *Cerastoderma edule* for PI 1.1.1 for UoC 1 Waddenzee

PI	Species	Productivity Scores [1-3]							Susceptibility Scores [1-3]					PSA scores (automatic)				
		Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level (fishbase)	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	MSC Score	Risk Category Name	MSC scoring guidepost
1.1.1	<i>Cerastoderma edule</i>	1	1	1	1	1	1	1	1.00	1	3	3	3	1.65	1.93	96.0	Low	>80

Algorithms used to calculate overall PSA and MSC scores:

Productivity: overall score for susceptibility is average of score for 7 attributes = 1

Susceptibility: overall score for productivity is multiple of 4 attribute scores re-scaled to [1 3] = 1.65

Overall PSA score is calculated as the Euclidean distance from the origin of the point on the PSA graph represented by the productivity and susceptibility scores, i.e. (1.0, 1.65).

$$= \sqrt{(1.0^2 + 1.65^2)} = 1.93$$

This overall PSA score converts to an MSC score using the following relationship:

$$\text{MSC score} = -11.965(\text{PSA})^2 + 32.28(\text{PSA}) + 78.259 = 96.0$$

Table 1.2.2.c PSA Principle 1 Rationale Table UoC 2 Oosterschelde

PI number	1.1.1	Stock status	
Productivity	Rationale	Score	
Average age at maturity.	Between 1 and 2 years (Dare et al., 2004; www.marlin.co.uk)	1	
Average maximum age	Dare et al. (2004) state that longevity is 5-8 years, www.marlin.ac.uk gives an average life-span of 2-4 years, but states that cockles may live for 9 years or more. Dabouineau & Ponsero (2009) state that cockles generally live for 2-5 years on average, but they can exceptionally reach 10 years old. All evidence suggests that the average maximum age is < 10 years.	1	
Fecundity	Egg production is usually in the range 200,000 to 700,000 per annum but a maximum of 1.7 million has been reported (Honkoop and van der Meer, 1998). Dare et al. (2004) state that large individuals produce more than 1 million eggs.	1	
Average maximum size	26-54 mm depending on region (Dabouineau & Ponsero (2009) Cockles of 50mm would be considered very large (Tebble, 1966).	1	
Average size at maturity	15-20mm (www.marlin.ac.uk)	1	
Reproductive strategy	<i>Cerastoderma edule</i> is a broadcast spawner	1	
Trophic level	Suspension feeder, trophic level is < 2.75.	1	
References:			
Dare, P.J., Bell, M.C., Walker, P. and Bannister, R.C.A., 2004. Historical and current status of cockle and mussel stocks in The Wash. CEFAS Lowestoft, 85pp.			
Dabouineau, L. & Ponsero, A., 2009. Synthesis on biology of Common European Cockle <i>Cerastoderma edule</i> . Second edition Université Catholique de l'Ouest - Réserve Naturelle Nationale Baie de St-Brieuc, 23 pages.			
Ens, B.J., A.C. Smaal & J. de Vlas, 2004. The effect of shellfish fishery on the ecosystems of the Dutch Waddenzee and Oosterschelde; Final report on the second phase of the scientific evaluation of the Dutch Shellfish fishery policy (EVAII). Wageningen Alterra, Alterra-rapport 1011, RIVO-rapport C056/04, RIKZ-rapport RKZ/2004.031, 212 blz.			
Honkoop, P.J.C. and van der Meer, J. 1998. Experimentally induced effects of water temperature and immersion time on reproductive output of bivalves in the Waddan Sea. Journal of Experimental Marine Biology and Ecology, 220 : 227-246.			
Piersma, T., Koolhaas, A. , Dekinga, A., Beukema, J.J., Dekker, R. and Essink, K., 2001. Long-term indirect effects of mechanical cockle-dredging on intertidal bivalve stocks in the Waddenzee. Ecology 38 : 976-990			
Tebble, N. 1966. <i>British Bivalve Seashells</i> . The British Museum (Natural History), London, 212 pp.			
Fishery	Cockle, <i>Cerastoderma edule</i> , using hand rake and hydraulic dredge.		

Susceptibility	Rationale	Score
Areal Overlap	Examination of total fishing effort distribution compared to the cockle stock distribution in years when the fishery was open suggests that the spatial scale of fishing activity is within the range 15-30% of the total cockle stock, leading to a susceptibility score of 2. However hand raking of cockles is likely to occur over a small fraction of the area covered by hydraulic dredging (only 1/17 of the quota is allocated to hand raking) and so the areal overlap is likely to be similar to that observed in the Waddenzee. The assessment team considered that the areal overlap of the hand rake fishery in the Oosterschelde is likely to be <10% resulting in a score of 1.	1 (Hand rake) 2 (hydraulic dredge)
Vertical Overlap	Cockles are a benthic species and although they exhibit burrowing behavior, the assessment team considered that there was a high vertical overlap between cockles and both hand rake, which scours the surface of the seabed, and hydraulic dredge.	3 (hand rake) 3 (hydraulic dredge)
Selectivity	The average size at maturity for cockles is 15-20mm (although this may vary regionally), so many individuals may be over 20mm when they reach maturity. The minimum landing size in the Dutch fishery is 21mm, so it is likely that individuals less than the size at maturity are frequently caught in both hand rake and hydraulic dredge fisheries.	3 (hand rake) 3 (hydraulic dredge)
Post capture mortality	Cockles are the target species, so post-capture mortality has a default score of 3.	3 (both gears)

The scores awarded in Table 1.2.2.c above are used to determine an MSC score for Performance Indicator 1.1.1 using a spreadsheet provided by the MSC. This spreadsheet uses an algorithm that has been developed by the MSC to determine a “Productivity” and a “Susceptibility” score for the fishery, and then to allocate a corresponding MSC score. A copy of the spreadsheet that is used to perform this calculation is shown in Table 1.2.2.d below. For interested readers the algorithms used to calculate the overall productivity, susceptibility and PSA scores, and the corresponding MSC scores are given below the table.

Table 1.2.2.d Results of Productivity Susceptibility Analysis (PSA) for *Cerastoderma edule* for PI 1.1.1 for UoC 2 Oosterschelde

PI	Species	Productivity Scores [1-3]							Susceptibility Scores [1-3]					PSA scores (automatic)				
		Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level (fishbase)	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	MSC Score	Risk Category Name	MSC scoring guidepost
1.1.1	<i>Cerastoderma edule</i> (hand rake)	1	1	1	1	1	1	1	1.00	1	3	3	3	1.65	1.93	96.0	Low	>80
1.1.1	<i>Cerastoderma edule</i> (hydraulic dredge)	1	1	1	1	1	1	1	1.00	2	3	3	3	2.33	2.54	83.1	Low	>80

Algorithms used to calculate overall PSA and MSC scores:

Productivity: overall score for susceptibility is average of score for 7 attributes = 1 (hand rake) and 1 (hydraulic dredge)

Susceptibility: overall score for productivity is multiple of 4 attribute scores re-scaled to [1 3] = 1.65 (hand rake) and 2.33 (hydraulic dredge)

Overall PSA score is calculated as the Euclidean distance from the origin of the point on the PSA graph represented by the productivity and susceptibility scores, i.e. (1.0, 1.65) for hand rake and (1.0, 2.33) for hydraulic dredge.

$$= \sqrt{(1.0^2 + 1.65^2)} = 1.93 \text{ (hand rake)}$$

$$= \sqrt{(1.0^2 + 2.33^2)} = 2.54 \text{ (hydraulic dredge)}$$

There have been no recent landings in the Oosterschelde as the fishery has been closed since 2006, so it is not possible to weight the PSA scores for the different gears using landings data. However if the fishery were to reopen, the quota is split 1/17 to hand raking and 16/17 to hydraulic dredging, so the assessment team weighted the PSA scores according to the split in the quota between the two gears.

Overall PSA score for the two gears is therefore 2.50.

This overall PSA score converts to an MSC score using the following relationship:

$$\text{MSC score} = -11.965(\text{PSA})^2 + 32.28(\text{PSA}) + 78.259 = 84.2 \text{ (both gears)}$$

Appendix 1.3 Conditions

No conditions are raised at this re-assessment

Appendix 2. Peer Review Reports

Summary of Peer Reviewer Opinion

Has the assessment team arrived at an appropriate conclusion based on the evidence presented in the assessment report?	Yes	CAB Response
<u>Justification:</u> The conclusion reached is entirely appropriate for the nature and intensity of this fishery. There are some points where the scoring appears a little high and many more where it appears a little low, the latter may be different interpretation between myself and the team but certainly no PIs would merit a score below 80.		<u>As the PR points out, scoring discrepancies do not result in different outcomes, such as conditions being raised. However, responses are provided where these occur.</u>

Do you think the condition(s) raised are appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCR 7.11.1 and sub-clauses]	NA	CAB Response
<u>Justification:</u> There are no conditions.		

If included:

Do you think the client action plan is sufficient to close the conditions raised? [Reference FCR 7.11.2-7.11.3 and sub-clauses]	NA	CAB Response
<u>Justification:</u> Not applicable		

Performance Indicator Review.

Table 1 For reports using one of the default assessment trees:

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.1.1	Yes	Yes	NA	See RBF Section below	
1.1.2	Yes	Yes	NA	Default RBF score	
1.1.3	NA	NA			
1.2.1	Yes	Yes	NA	For both UoAs. Given the precautionary approach to stock management, and that objectives are tied to waterfowl feeding resources, the scoring may be rather harsh, but this would not affect the outcome.	Given that the harvest strategy was developed primarily to protect the nature conservation interests of both the Waddenzee and the Oosterschelde, and not specifically to achieve stock management objectives, and that there is no evidence that the harvest strategy has been fully evaluated through, for example, a Management Strategy Evaluation (MSE), the assessment team considers that a score of 85 is appropriate.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
1.2.2	Yes	Yes	NA	Scoring seems entirely appropriate, although Slb again holds the fishery to a very high standard – the precaution shown should compensate for most uncertainties, but this would not affect the outcome.	The assessment team agrees with the peer reviewer that whilst the harvest control rules in both UoCs do not take into account <u>all</u> uncertainties, they are highly precautionary and they do take into account <u>a wide range of uncertainties</u> . The SG100 is met therefore for Slb. The overall score for PI 1.2.2 has therefore been increased from 90 to 100.
1.2.3	Yes	Yes	NA	Scoring seems appropriate, although Slb again holds the fishery to a very high standard – the uncertainties in information will be low for a largely intertidal fishery, but this would not affect the outcome.	The assessment team found no evidence that there is a good understanding of the inherent uncertainties in the data or that the assessment and management is robust to this uncertainty. The score of 80 for Slb is considered appropriate, as the SG100 is not met.
1.2.4	Yes	Yes	NA	Default RBF score	

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.1.1	Yes	Yes	NA	While the first two paragraphs are contradictory, it is accepted that the fishery will not have an impact on this component, and so a score of 100 is justified (under CB3.2.1).	
2.1.2	No	No	NA	CB3.3.2 requires scoring of this PI irrespective of the outcome score. The measures described do not relate to retained species and so cannot really constitute a strategy. An operational partial strategy of only collecting cockles is probably more relevant. This would suggest a score of 80	Disagree with the peer reviewer. Mussels have the potential to be a retained species within this fishery. Management measures within the Fishing Plan ensure that mussel beds are avoided. This is a direct measure for managing interactions with mussels, so is considered a strategy. Have edited as follows "While there are no minor retained species related with this fishery CB3.3.2 requires scoring of this PI irrespective of the outcome score (for 2.1.1). Have added following to list of measures "The operational procedure of only targeting and collecting cockles;" No change to the score of 100.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.1.3	No	Yes	NA	See the general comment on scoring of UoAs – the rationale refers only the Waddenzee, while (for example) pacific oyster is an equal problem in the Oosterschelde. A score of 80+ is justified, however. Reference to the MSC assessment reports for the Oosterschelde oyster fishery may be relevant.	Agreed. Document source noted. Following text added to justification “Similarly, in the Oosterschelde, Pacific oyster has been introduced as an enhanced fishery in significant quantities since 1964, where its broader environmental tolerances have been exploited over the native oyster <i>Ostrea edulis</i> . However, it is recognized as a ‘universal ecosystem transformer, taking over vast areas of suitable substrate and constructing reef structures” (Hough <i>et al.</i> , 2013). Wageningen Marine Research (formally IMARES), undertake Pacific oyster stock assessments in intertidal areas of the Oosterschelde (but not the subtidal or enhanced fishery/cultivated plots).” Reference to MSC assessment added.
2.2.1	Yes	Yes	NA	See RBF section	

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.2.2	No	No	NA	CB3.3.2 requires scoring of this PI irrespective of the outcome score. The measures described do not relate to bycatch species and so cannot really constitute a strategy. An operational partial strategy of only collecting cockles is probably more relevant. This would suggest a score of 80	Disagree with peer reviewer. The following measure included within the justification is considered a direct bycatch measure: "License condition whereby bycatch must be less than 5% of catch." Have edited as follows "While there are no minor retained species related with this fishery CB3.3.2 requires scoring of this PI irrespective of the outcome score (for 2.2.1). Have added following to list of measures "The operational procedure of only targeting and collecting cockles;" No change to the score of 100.

2.2.3	Yes	Yes	NA	<p>The scoring here is more appropriate than for 2.1.3. Is the appropriate assessment relevant for both PIs?</p>	<p>Agree the information in 2.2.3 is also relevant to 2.1.3, so have added the following to 2.1.3: “Information is sufficient to determine that the risk of hand raked fishing to retained species is very low (Lenger Seafoods, 2011 and Agonus Fisheries Consultancy, 2016) and will continue to provide evidence of any increase in risk level e.g. by monitoring the scale of the fishery (through trends in cockles landings and mapping of fishing locations monitored through stock assessments and Appropriate Assessments (Agonus Fisheries Consultancy, 2016). However, factory quality reports are not undertaken on a regular basis within this fishery. Any increase in risk to retained species can be determined through monitoring the effort of the fishery (number of licences), its location (informed by Appropriate Assessments (Agonus Fisheries Consultancy, 2016) and trends in landings of cockles (via fisheries statistics and stock assessments). Therefore SG 80 is met.”</p>
2.3.1	Yes	Yes	NA	<p>This issue is comprehensively addressed, although disturbance would presumably be an indirect effect.</p>	<p>Noted. Disturbance is considered to be a direct effect, while removal of food source (i.e. cockles) due to fishing is considered an indirect effect.</p>

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.3.2	Yes	Yes	NA	This issue is well addressed	Noted.
2.3.3	Yes	Yes	NA	The scoring is not unreasonable, but In relation to global fisheries, it is hard to see why this does not score 100.	Disagree that a score of 100 is warranted due to uncertainty in relation to calibration of oystercatcher modeling – this issue was specifically raised during consultation and is therefore important to address within the assessment.
2.4.1	Yes	No	NA	Given the MSC definitions of serious or irreversible harm (GCB3.14.2), it is hard to see why this PI does not score 100.	Noted and agree for the Waddenzee UoC. Therefore, increased score for Waddenzee to 100. Score for Oosterschelde remains 80.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.2	No	Yes	NA	Should the strategy include the banning of suction dredging and restriction to hand-raking? If an area is closed, how much testing is required to show that this is effective? Should a fishery be scored down because it has been completely closed (the ultimate habitat protection)?	The fact that the Appropriate Assessment concludes that the current scale of hand raking does not affect the qualifying features of the habitat designations is important for scoring 2.4.1. The banning of suction dredging would be applicable to a dredging UoC. It is understood that such a measure is important for the overall structure and function of the habitats, but this is independent of hand raking and cannot be considered as a management measure for the hand raking UoCs under assessment. The Oosterschelde fishery remains closed due to cockle biomass levels – which is an ETP management measure, not a habitat measure. Evidence of habitat management is not available, so it is not possible to award SG 100 for Oosterschelde. No changes to the scores have been made.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.4.3	No	Yes	NA	References have been made in 2.4.1 to time for recovery of habitats from hand raking – is this not quantification (Slb)? Also, the references suggest mapping of habitat features over time (Slc)?	Slb: Recovery times are understood for hand raking based on studies undertaken elsewhere. As these are not specific to the UoCs being assessed it is not possible to award SG100. Scores are unchanged and text updated as follows: “The physical impacts of the gear are well understood, but have not been fully quantified specifically for the fisheries within the Waddenzee and Oosterschelde and therefore SG100 is not met.” Slc: Mapping of habitat features over time have not been made available to inform the assessment and therefore SG100 is not met. No change to score. Added text “for all habitat elements” to justification.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
2.5.1	Yes	No	NA	It is not clear from the commentary, or MSC definitions of serious or irreversible harm, why this does not score 100.	To provide further justification, the following text is added/edited "The 2016 Appropriate Assessment and EVA II project (Ens et al, 2004) provides some evidence that the hand raking fisheries in the Waddenzee and Oosterschelde are not disrupting key elements of ecosystem function. However, evidence specific to the benthic fauna described above are not available for the UoCs under investigation and therefore SG100 is considered to only be partially met. " The score remains unchanged.
2.5.2	Yes	Yes	NA	Scoring is well justified	Noted
2.5.3	Yes	Yes	NA	Scoring is generally appropriate, although a good argument could be made for a 100 score.	Noted, however a score of 95 is considered appropriate. This is due to the fact that with the exception of oystercatchers, there is scope for other main interactions between the fisheries and ecosystem to be more fully investigated.

Performance Indicator	Has all available relevant information 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response
3.1.1	Yes	Yes	NA	The outcome is appropriate, if scored low. It is assumed that scoring is commensurate with other dutch fisheries, operating under the same legal system.	Scoring is commensurate with other Dutch fisheries where appropriate (being a single jurisdiction fishery).
3.1.2	Yes	Yes	NA	Scoring is justified	
3.1.3	Yes	Yes	NA	Scoring is justified	
3.1.4	Yes	Yes	NA	Scoring is justified	
3.2.1	Yes	Yes	NA	Scoring is justified	
3.2.2	Yes	Yes	NA	Scoring is justified	
3.2.3	Yes	Yes	NA	Scoring is justified	
3.2.4	Yes	Yes	NA	Scoring is justified	
3.2.5	Yes	Yes	NA	Scoring is justified	

Table 2 For reports using the Risk-Based Framework:

Performance Indicator	Does the report clearly explain how the process(es) applied to determine risk using the RBF has 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. Note: Justification to support your answers is only required where answers given are 'No'.	CAB Response:
1.1.1	Waddenzee – Yes Oosterschelde - No	Yes No	This is appropriate for the Waddenzee UoA. For the Oosterschelde, the PSA is carried out for both hand-raked and suction-dredged cockles; this is not really explained in the preamble, nor in the SICA evaluation. It does appear in the PSA, but there should also be a weighted PSA score across both gears; it appears that the lowest score (suction dredged) is used instead. On a philosophical point, if the Oosterschelde has been closed for several years, it could be said that spatial and temporal scales and intensity is fairly low. The assessment of a typical open fishery seems appropriate, however. Any changes would not, however, be expected to change the outcome.	Additional information has been added to the preamble and to the SICA to clarify that both the hand raked and hydraulic dredge fisheries have been considered for the Oosterschelde. A weighted PSA score across both gears has now been used for the overall score for the Oosterschelde fishery. The Oosterschelde fishery has indeed been closed since 2006, but the assessment team based their assessment of a typical open fishery seen in previous years.
2.1.1	NA	NA		
2.2.1	Yes	No	The most vulnerable species should be selected, CC2.3.1.1 d applies otherwise. Much of the SICA justification seems to be carried out for the Waddenzee only?	As explained in the justification, the team did not determine one species to be of more concern over any other. The following text is added “The scoring elements are considered to have a similar

			Any changes would not, however, be expected to change the outcome.	level of vulnerability. This SICA is applicable to all of the above species.” Noted and added text for the Oosterschelde (e.g. “The Oosterschelde fishery (when open) is expected to be of a similar spatial scale as the Waddenzee fishery and therefore a score of 2 is appropriate, as per the rationale above.”) No change to the SICA outcome.
2.3.1	NA	NA		
2.4.1	NA	NA		
2.5.1	NA	NA		

Table 3 For reports assessing enhanced fisheries:

<p><i>Does the report clearly evaluate any additional impacts that might arise from enhancement activities?</i></p> <p>Note: Justification to support your answers is only required where answers given are 'No'.</p>	<p>NA</p>	<p>CAB Response:</p>
<p><u>Justification:</u></p>		

Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary) can be added below and on additional pages

Scoring is inconsistent in dealing with the two UoAs – sometimes scores are separated, sometimes only one score is given and for PI 1.2.1 there are two separate scoring tables. It should be clear that scores apply to both UoAs, and comments really need to reflect this.

It may be helpful to note in Section 3.2.3 that it is the FCR v1.3 version of the RBF that is being used.

In section 4.2 Table 4, the reference to processing activities is a little confusing – presumably there is no processing prior to the point of first sale and so start of CoC?

Section 4.3 is also a little confusing – should CoC begin at the first point of sale rather than point of landing (or is product landed directly to the processor)?

I noticed Hough 2010 and others cited in the scoring table, but not included in the reference list.

CAB response: Above points addressed through edit or additional clarification in text.

Appendix 3. Stakeholder submissions

English summary of 2016 cockle surveys (van Asch et al, 2016)

IMARES carried out cockle (*Cerastoderma edule*) stock assessments in the Dutch coastal waters. This is an annual inventory that takes place by order of the Ministry of Economic Affairs.

IMARES started cockle stock assessments in the Dutch part of the Wadden Sea and Oosterschelde bay in 1990 and in the Westerschelde estuary in 1992. Based on these inventories, the Ministry of EZ determines quota permits each year. Furthermore, the survey results are also necessary for the evaluation of effects of fisheries and nature management, and for impact studies e.g. within the framework of Natura 2000.

This report presents the results of the cockle stock inventory carried out in spring 2016 in the intertidal of the Dutch Wadden Sea, Oosterschelde bay and Westerschelde estuary. From this inventory, the expected total cockle stocks, and cockle stock in harvestable densities in September 2016 are calculated by extrapolation. In addition, the inventory in the Wadden Sea was extended to a few subtidal areas that are historically known to potentially harbour cockles.

In the intertidal areas of the Dutch Wadden Sea the total cockle stock was estimated at 364.3 million kg (95% CI 328.8 – 402.2 million kg) fresh weight. Calculated biomass in autumn (September 1st) 2016 is 391.9 million kg freshweight. Of this, 58.8 million kg is cockle flesh (assuming an average flesh weight of 15%). An additional 7.6 million kg freshweight cockles was found in the sampled subtidal areas.

In the Oosterschelde bay total cockle stock in spring 2016 was estimated at 16.7 million kg (95% CI 14.6 – 18.8 million kg) fresh weight. Calculated biomass in autumn is 22.7 million kg fresh weight. Of this, 3.4 million kg is cockle flesh.

In the Westerschelde estuary, the estimated total cockle stock was 1.2 million kg (95% CI 1.0 – 1.5 million kg) fresh weight. Calculated biomass in autumn 2016 is 1.5 million kg fresh weight. Of this, 0.2 million kg is cockle flesh.

The harvestable stock is calculated for all three areas as the biomass present at densities of more than 50 cockles per m². Harvestable stock estimates are 38.0, 1.7 and 0.1 million kg cockle flesh in autumn, for the Wadden Sea, Oosterschelde bay and Westerschelde estuary, respectively.

In the Wadden Sea the cockle stock as measured in spring 2016 has decreased by 12% compared to the previous year but remains relatively high. In the Oosterschelde bay the cockle stock increased by 56% compared to spring 2015. In the Westerschelde estuary the cockle stock is still as low as in the previous two years.

A3.1 Stakeholder comments following PCDR stage.

MSC Technical Oversight

MainID	SubID	Page Reference	Grade	Requirement Version	OversightDescription	Pi	CABComment
22301	27045	22	Guidance	FCR-7.12.1.5c v2.0	On p22 under section 4.3 it says "Chain of Custody should commence following the first point of sale". Please clarify why it wasn't decided that Chain of Custody is required at first point of sale. Does this correspond to the listed eligible landing sites		This is an error which, while small, implies quite a difference. It has been corrected to read "at first point of sale".
22301	27046	21-22	Minor	FCR-7.12.1.5 v2.0	Per 7.12.1.5 (b), please state the point of intended change of ownership of product.		Changes have been made in section 4.3

Appendix 4. Surveillance Frequency

There are no conditions at this re-certification assessment and the level of information provided has consistently been sufficient to inform remote surveillance.

A surveillance level of 1 is therefore proposed as per the Certification requirements:

7.23.4.3 The surveillance level for the fishery shall be determined on the basis of the confidence of the CAB in its ability to verify information, and progress towards meeting conditions, remotely.

a. Surveillance level 1 may only be chosen if, following an assessment or surveillance audit, the fishery has no outstanding conditions.

Table 4.1: Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
1	1 on-site surveillance audit 1 off-site surveillance audit 2 review of information	<i>e.g. 1 auditor for off-site and review of information.</i> <i>1 auditor on-site with support from 1 auditor remotely for on-site surveillance</i>	<i>No conditions and fishery updates can be provided remotely.</i> <i>The CAB proposes to have an on-site audit at year 4 with 1 auditor on-site with remote support – this to ensure that all information is collected and in combination with re-assessment.</i>

Table 4.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
<i>e.g. 1</i>	<i>e.g. 30 October 2017</i>	<i>e.g. 30th October 2018</i>	<i>Annual scientific advice to be released by September of each year.</i>

Table 4.3: Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
<i>Level 1</i>	<i>e.g. Review of information</i>	<i>e.g. Off-site surveillance</i>	<i>e.g. Review of information</i>	<i>e.g. On-site surveillance audit & re-certification site visit</i>