



Public Comment Draft Report

Marine Stewardship Council
Main Assessment
Dutch Blue Shell Mussel Fishery

Waddenzee and Zeeuwse Delta
Dredge and suspended seed mussel collectors,
Enhanced fishery: Catch and Grow

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MSC reference standards:

MSC Accreditation Manual Issue 5,

MSC Fisheries Certification Methodology (FCM) Version 6,

MSC Chain of Custody Certification Methodology (CoCCM) Version 7.

MSC Fisheries Assessment Methodology and Guidance to Certification Bodies Version 2,

MSC TAB Directives (all)

Policy Advisories (all)

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SUMMARY

This report contains the assessment of the Dutch Blue Shell Mussel Fishery within the Waddenzee and Zeeuwse Delta, Netherlands, covering the dredged and suspended seed mussel collectors, culture, catch and grow, against the Marine Stewardship Council's (MSC) Principles and Criteria for sustainable Fishing.

The assessment was carried out by a team of three assessors: Mr. Bert Keus, Prof. Aad Smaal, with Mr Steve Rex as the Lead assessor.

Peer Review was undertaken by Per Dolmer and Jens Kjerulf Petersen.

The evaluation of the fishery against the MSC Principles and Criteria was undertaken following a site visit to the fishery in Yerseke, Zeeland. Meetings were also undertaken with relevant stakeholders in The Hague and Yerseke.

Information gathered during this site visit was then used in conjunction with other available literature to produce a draft report and score the fishery against the MSC Performance Indicators. The draft report and scores of the fishery were then supplied to the client for review before being submitted for peer review.

The report was then made available on the MSC website for stakeholder comment for a period of 30 days prior to being published as a final report on the MSC website in March 2011.

The main strength of mussel bottom culture is the extensive use of the natural environment. Cultured mussels are part of the natural food chain and play their role in nutrient cycling, as bird feed and as a habitat. The main strengths of the mussel seed fishery are the use of a renewable fast growing stock in combination with specific spatial limitations imposed upon the fishery in terms of open and closed areas, within which the fishery can operate. The dependence of natural bottom recruitment as seed resource in combination with occasional recruitment failure has initiated the development of alternative seed sources, such as import, hatchery produced seed, and seed mussel collectors. Competing claims in the western Wadden Sea of mussel seed fishery and nature conservation of mussel bed habitats has resulted in a transition process to gradually reduce the bottom fishery as a function of alternative seed resource exploitation. There is good management within the seed fishery including seed fishery plans that focus on the exploitation of unstable seed beds in the autumn, in order to retain mussels during the winter.

The main present weaknesses of this fishery are the dependence of natural bottom recruitment for seed supply, the uncertainty about the impacts of the mussel seed fishery upon the natural (bottom) habitat, the availability of genetic information, the availability of information on the size of the suspended mussel seed stocks and the monitoring of mussels from different origin on the watering plots.

SGS has determined that this fishery should be certified in accordance to the MSC principles and criteria subject to four conditions which are summarised as follows:

Condition	Principle	Component	PI No.	Performance Indicator (PI)	Score UoC1+2	Score UoC3	Score UoC4
C1	P1	Management	1.2.3	Information & monitoring	75	75	75
			1.2.4	Assessment of stock status	70	70	70
C2	P1	Management	1.2.6	Genetic information	70	70	70
C3	P2	Habitat	2.4.1	Status	90	60	80
C4	P2	Ecosystem	2.5.3	Information	75	85	75
C5	P3	Fishery specific management system	3.2.3	Compliance and enforcement	85	85	70

Condition 1: Harvest strategy.

Condition	Principle	Component	PI No.	Performance Indicator (PI)	Score UoC1+2	Score UoC3	Score UoC4
C1	P1	Management	1.2.3 1.2.4	Information & monitoring Assessment of Stock status	75 70	75 70	75 70

Rationale (1.2.3): Information about suspended seed mussel collectors (standing stock, harvested amounts) is available at the farm level. Annual harvest data is collected from the farmers that are members within the Producers Organisation. Farm level book keeping includes the amount of seed harvested from seed collectors and used for grow out. There is sufficient relevant information available related to seed harvest to support the harvest strategy. However, there are no protocols for the procedure and validation of independent data collection.

Rationale (1.2.4): The stocks of bottom seed mussels and the mussels on the culture plots are regularly assessed. This assessment is appropriate for the stock as a whole and for the harvest control rule, and is evaluating stock status relative to reference points. Concerning the size of the suspended mussel culture (stock) and the influence of this practice on the total mussel stock some uncertainties remain. The major sources of this uncertainty are identified. . The stock of collector seed is assessed at the moment of harvest by the farmers. Data is collected and reported annually for the total amount of seed and checked by fishery inspectors. However there are no protocols for the measurements and there is no independent (peer) review of these data.

Condition: Protocols for the procedure and validation of independent data collection must be written and implemented. An independent and ongoing monitoring program should be in place to determine the size of stock and harvest of suspended mussel seed in order to estimate the effects of the harvesting strategy on the wild stocks.

Timescale: By first surveillance audit: written evidence of the development towards an independent data collection system. By second surveillance audit: written evidence of the implementation of an ongoing monitoring program to determine the stock and harvest in this fishery.

Condition 2: Genetic information.

Condition	Principle	Component	PI No.	Performance Indicator (PI)	Score UoC1-4
C2	P1	Management	1.2.6	Information	75

Information on the genetic characteristics of the mussel population is available on the basis of a synoptic survey.

Rationale: Currently no monitoring is carried out on the development of the native mussel populations and their genetic characteristics that may be affected by imported mussels.

Condition: A survey program for genetic profiling of the mussel population should be in place that is able to detect possible changes over a period time with a 5 year interval.

Timescale: By first surveillance audit: provision of data and information encouraging the development of a survey program for genetic profiling for this fishery. By third surveillance audit: written evidence of implementation of a genetic survey program.

Condition 3: Changes to habitat.

Condition	Principle	Component	PI No.	Performance Indicator (PI)	Score UoC1+2	Score UoC3	Score UoC4
C3	P2	Habitat	2.4.1	Status	90	60	80

The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. This conclusion is based on the best available scientific research and expert judgement of the assessment team members. However to reach to the unconditional score of 80 the assessment should conclude that it is highly unlikely that the fishery reduces habitat structure and function. Therefore additional research is needed and the results of this research should be evaluated by the team by the second surveillance visit.

Rationale: Results of the ongoing research are required in order to reach a score at an unconditional level.

Condition: Results of impact studies need to be taken into account to evaluate the effects of the seed fishery on the long term development of stable mussel beds.

Timescale: By second surveillance audit.

Condition 4: Fishery impact on the ecosystem.

Condition	Principle	Component	PI No.	Performance Indicator (PI)	Score UoC1+2	Score UoC3	Score UoC4
C4	P2	Ecosystem	2.5.3	Information	75	85	75

Continuous and sufficient data needs 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).

Rationale: Carrying capacity studies and spat fall seed collection data are needed before up scaling of the seed net collectors can take place.

Condition: Quantitative information on the effects of increase in the seed mussel collectors on the carrying capacity and effect on the ecosystem needs to be available and applied. Independent data collection of stock and harvest size needs to be in place.

Timescale: By second surveillance audit.

Condition 5: Fishery specific management systems.

Condition	Principle	Component	PI No.	Performance Indicator (PI)	Score UoC1+2+3	Score UoC4
C4	P3	Fishery specific management	3.2.3	Compliance and enforcement	85	70

		system				
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The current management systems cannot guarantee the separation of the local wild fishery mussels from the imported foreign mussel seed and fully grown mussels which are grown on within the mussel fishery being certified.

Rationale: At present the requirements for a monitoring, control and surveillance system that has demonstrated an ability to enforce relevant management measures, strategies and/or rules has not been met.

Condition: To develop and implement a control, monitoring and enforcement system which provides sufficient guarantees that foreign mussel seed and mussels are kept separated from the locally produced mussels in all stages of the production and purification processes.

Timescale: Within 6 months after MSC fishery certification

1 INTRODUCTION

One of the Netherlands most typical seafood products are “Zeeuwse mosselen”, mussels from the Dutch province of Zeeland. These mussels are produced in the Waddenzee and Oosterschelde. The Wadden Sea is a tidal area in the North of the Netherlands and the country’s largest nature reserve. The Oosterschelde is a large bay in the South of the Netherlands. Both areas are MPA’s.

For nearly two decades the mussel fishery in the Wadden Sea has been the subject of an ongoing discussion between the industry, nature conservation organisations and the Dutch government about the possible impact of this fishery on nature conservation goals. .

In 2008 a breakthrough in this discussion was reached and an agreement (covenant) was signed between the sector, the Dutch Ministry of Agriculture, Nature and Food Quality (LNV) and all major nature conservation organizations. The basis of the agreement is to maintain mussel culture by a phased reduction of the mussel seed bottom fishery and develop natural mussel beds by closing areas for the mussel fishery. Alternative mussel seed production techniques are being developed and the progress in the alternative production methods determines the phased closure of mussel fishery areas.

The report outlining the agreement also contained the advice “to study in detail the possibilities of the sector to obtain a sustainability label such as the MSC”.

This advice has been assessed by the sector and as a result the PO has asked SGS to conduct an MSC assessment of this fishery.

The Marine Stewardship Council (MSC) is an independent, global, non-profit organisation. In a bid to reverse the continued decline in the world’s fisheries, the MSC is seeking to harness consumer purchasing power to generate change and promote environmentally responsible stewardship of the world’s important renewable food sources.

The MSC has developed an environmental standard for sustainable and well-managed fisheries. Product labels reward environmentally responsible fishery management and practices. Consumers, concerned about over fishing and its environmental and social consequences, will increasingly be able to choose seafood products that have been independently assessed and certified against the MSC Standard. This will assure them that production of the product has not contributed to over fishing.

The MSC’s environmental standard for sustainable fishing, the Principles and Criteria for Sustainable Fishing, is based on the FAO Code of Conduct for Responsible Fisheries. The MSC Standard is constantly reviewed by an independent, international group of fisheries experts. Any fishery around the world can apply to be independently assessed against this standard. This report sets out the results of the assessment of the Dutch Blue Mussel Fishery, Waddenzee and Zeeuwse Delta, Netherlands covering the suspended seed mussel collection, culture, catch, grow out and dredging, against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing.

1.1 The Fishery Proposed for Certification

The MSC Guidelines to MSC certifiers states specifically that the unit of certification is “The fishery or fish stock (equalling the biologically distinct unit) combined with the fishing method / gear and practice (equalling vessels) pursuing the fish of that stock).”

The fishery proposed for MSC certification is therefore defined as:

Species:	Blue Mussel, <i>Mytilus edulis</i>
Geographical area:	ICES IVc: Southern North Sea, Waddenzee and Zeeuwse Delta, Netherlands
Method of capture:	Units of certification:
	UoC 1. Collection of mussel seed by suspended ropes
	UoC 2. Collection of mussel seed by suspended nets
	UoC 3. Collection of mussel seed by mussel dredging
	UoC 4. Collection of harvest size mussels from culture plots by dredging
Management system:	PO Mossel
Client group:	Members of the Producenten Organisatie van de Nederlandse Mosselcultuur UA.

The Mussel PO is the certificate holder: Only companies and vessels recognised within the group, and abiding by any controls applied to this Unit of Certification, are eligible to land MSC certified mussels under this certificate. Any changes of the group will be evaluated during ongoing surveillance audits.

During the fishery assessment the client group included 50 companies with a fleet of around 65 vessels.

The majority of the mussel vessels (40) have Yerseke as their harbour, whilst others come from Bruinisse (18), Zierikzee, Tholen, Wieringen and Hontenisse.

The companies possess mussel plots for grow-out and MZI (mussel spat collectors) in both the waters of Zeeland and in the Wadden Sea. All harvested consumption mussels are traded in the public auction at Yerseke and after the sale at the auction the mussels are transported to the rewatering plots, close to the auction where cleansing and storage of mussels takes place, before they are processed by the industry at Yerseke.¹

Only mussels grown in the Wadden Sea or the Oosterschelde from mussel seed fished or harvested from MZI's in the same waters including the Voordelta will be submitted for MSC certification, using vessels nominated by P O Mossel.

During the process for MSC certification it is possible that further companies and or / vessels may join the client group. This would be acceptable under the MSC's stated desire to allow fair and equitable access to the MSC certification.

¹ The process of rewatering and storage of mussels is included in UoC4.



Figure1a: Areal picture of the Wadden Sea

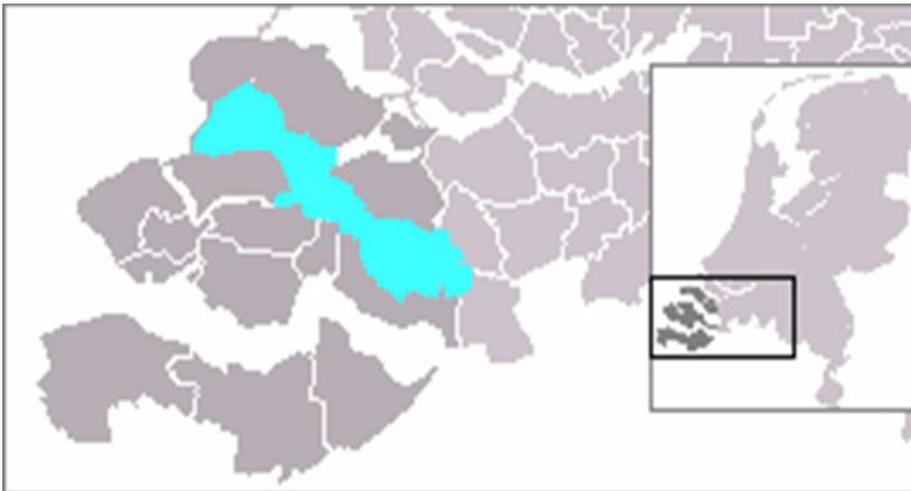


Fig 1b Oosterschelde estuary SW Netherlands

Enhanced Fisheries:

MSC recognizes in the *MSC Policy Advisory 10* (19 March 2009, Guidance on Scope Criteria for Enhanced Fisheries) three categories of enhanced fishery. One type of enhanced fishery is called “Catch and Grow Fisheries” (CAG). Often termed as Capture-Based Aquaculture, the MSC mentions that an example of this type of fishery is mussel farming based on wild spat collection. Another type of eligible enhanced fishery the MSC calls “Habitat Modified” (HM) Fisheries is for example mussel ropes.

Conditions for fisheries to be MSC eligible are that they do not require “routine and intensive inputs such as feed, chemical or medicinal treatments or control and manipulation of the brood stock are outside its scope”. Fisheries “may be considered in scope if their impacts on the ecosystem are reversible or potentially reversible”. The Dutch mussel industry is based on mussel seed captured in the wild. This can be either collection of spat fallen on natural substrates or on artificial substrates, the MZI’s.

Grow-out of mussels on the mussel plots is a CAG fishery, making use only of natural food and does not make use of adding any artificial feed, medicines or any other product to increase production.

The MZI ‘s are used only to collect spat are therefore classed as a HM fishery.

The MSC condition that such a fishery performs in such a way it “does not cause any significant modification to the habitat of the stock and does not cause serious or irreversible harm to the natural ecosystem’s structure and function” will be tested in Principle 2.

1.2 Report Structure and Assessment Process

The aims of the MSC Fishery assessment are to determine the degree of compliance of the fishery with the MSC Principles and Criteria for Sustainable Fishing, as set out in Section 6.

This report sets out:

- The background of the fishery under assessment and the context within which it operates, relative to the other areas where mussels are fished.
- The qualifications and experience of the team undertaking the assessment.
- The standard used for MSC Fishery Assessment (MSC Principles and Criteria.)
- The stakeholder consultation process as carried out. Stakeholders include all those parties with an interest in the management of the fishery and include fishers, management bodies, scientists and Environmental Non-Governmental Organizations (ENGO’s.)
- The methodology used to assess (‘score’) the fishery against the MSC Standard.
- A scoring table with the Scoring Indicators adopted by the assessment team and Scoring Guidelines which aid the assessment team in allocating scores to the fishery. The commentary in this table sets out the position of the fishery in relation to these Scoring Indicators.
- The intention of the first sections of the report is to provide background information to be able to interpret the scoring commentary in the correct context.

- From the final results of the scoring, the Certification Recommendation of the assessment team is presented, together with any conditions which may be attached to certification.
- In the draft form, this report has been subjected to critical review by appropriate, independent, scientists ('peer review'). The comments of these scientists are appended to this report. Responses are given in the peer review texts and where amendments are made to the report on the basis of peer review comments. These are also noted in the peer review text. Following the peer review, the report is then released for public scrutiny on the MSC website. (www.msc.org)
- The report, containing the recommendation of the assessment team, any further stakeholder comments and peer review comments has been considered by the SGS Governing Board (a body independent of the assessment team). The SGS Governing Board has made the final certification determination on behalf of SGS.
- It should be noted that, in response to comments by peer reviewers, stakeholders and the SGS Governing Board, some points of clarification may have been added to the final report.
- Finally, the complete report containing the SGS determination and all amendments was released for further stakeholder scrutiny.

1.3 The Assessment Team

Professor Aad Smaal

Prof A.C. Smaal is a senior scientist at the Delta Department of the Institute of Marine Resources and Ecosystem Studies (IMARES) in Yerseke, the Netherlands and he is chair in sustainable shellfish culture at Wageningen University.

Aad has been working in the field of bivalve culture and ecology for over 30 years and has published over 50 peer reviewed papers. Aad is particularly interested in the role of shellfish in the ecosystem and the various goods and services they deliver. Aad is involved in research that contributes to the development of sustainable bivalve aquaculture.

He is member of various advisory committees within ICES, and is a member of the global steering committee of the Bivalve Aquaculture Dialogue.

Mr. Steve Rex

Steve Rex is the managing director of Qualifish Ltd with responsibility for managing fisheries and aquaculture consultancy projects. He has over thirty two years of experience working in fisheries and aquaculture. Working on wild fisheries and aquaculture management, Environmental Statements, Environmental Impact Assessments, sea bed monitoring programmes, Quality Management Systems, writing and compiling the EUREPGAP (GLOBALGAP) integrated aquaculture standard and auditing for the BRC (Global Food Safety Standard) and Marine Stewardship Council (MSC) chain of custody audits.

Mr Bert Keus

Bert Keus is an independent consultant based in Leiden, the Netherlands. He holds degrees in biology and law, and has previously held the position of Head of the Environmental Division of the Dutch Fisheries Board

(Productschap Vis), and research fellow with the fisheries division of the Agricultural Economics Research Institute of Holland (LEI-DLO).

Over the years 2003 and 2004 he managed fishing and processing companies in the Gambia handling fish from industrial and artisan fisheries. Bert maintains contacts with the Gambian seafood industry. In addition, he has a long association with the shellfish fisheries in the Netherlands, and he has been involved in efforts to achieve MSC certification of the North Sea brown shrimp fishery – acting as technical advisor to this multi-stakeholder initiative. Through this work and several other MSC pre-assessments and certifications he has become particularly familiar with the MSC certification process. Between the years 1998 and 2003 he was a Member of the European Sustainable Use Specialist Group (ESUSG), Fisheries Working Group of IUCN.

1.4 Peer reviewers

Per Dolmer

Per is currently a Senior Adviser at Technical university of Denmark, National institute of Aquatic Resources and has been Senior adviser at the Danish Institute of Fisheries Research. His experience includes Studies on the impact of mussel dredging on benthos including field studies on the species composition of epifauna in areas with mussels dredging and in areas where mussel dredging is permanently banned. The studies focused on short- and long-term impact. Per has also participated in research on the impact of mussel dredging on the substrate and In situ mussel filtration and benthic-pelagic coupling. His research has focused on near-bottom algal concentration, particle depletion of the near-bottom water layers and how the mussels regulate their filtration at low algal-concentrations. Per has also coordinated various projects like national projects on use of mussel shells in maricultures of European flat oysters and blue mussels, national project on bottom cultures of mussels and national project on sustainable flat oyster fishery.

Jens Kjerulf Petersen

Jens Kjerulf Petersen (JKP), MSc in marine biology 1988 from University of Copenhagen, PhD in marine ecology in 1994 from University of Odense. From 1991 employed at National Environmental Research Institute, dept. of Marine Ecology, from 1994 as research scientist, from 1999 as senior scientist and from 2004 as head of benthic section. JKP has from 2008 acted as director of the Danish Shellfish Centre, an independent research facility that unites research and business in order to utilize the coastal resources in an environmental, economical and sustainable way. JKP is an experimental marine biologist and specialist in eco-physiology and population dynamics of benthic suspension feeders and benthic-pelagic coupling in coastal waters and for the last decade with focus on ecology and biology of mussel production. JKP has further experience in research and development of fish physiology and biology and fouling epibiosis on hard substrata. JKP has been responsible for benthic suspension-feeders in the Danish Marine Monitoring Program (NOVANA) and was task manager on environmental monitoring of common mussel in relation to the construction of the Øresund fixed link. JKP is author or co-author on approx. 40 international scientific publications in peer-reviewed journals or publications in press and numerous reports in Danish and English. JKP has working experience from Scandinavia, Europe, Greenland and Australia. JKP has been and is currently participating in several EU-projects and is or has been supervising master and Ph.D.-students. JKP is referee for a number of international journals including Marine Ecology Progress Series (member of permanent panel of referee's), Marine Biology, Ophelia, Aquatic Living Resources, Journal of Applied Ecology, Limnology & Oceanography and various conference proceedings.

1.5 Client Meetings and Stakeholder Consultation

Client Meetings

Name	Organisation	Date	Key Issues
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Name	Organisation	Date	Key Issues
Paula Huissen	PO Mossel	18-05-2010	• Control and enforcement
Hans van Geesbergen	PO Mossel	18-05-2010	• Control and enforcement
Jaap Holstein	Mussel Traders	18-05-2010	• Fishery Management
Management	Premier Mossel	18-05-2010	• Processing

1.6 Stakeholder Consultation

Stakeholder organisations and individuals having relevant interest in the fishery assessment were identified and consulted during this assessment. The interest of others not appearing on this list was solicited through the postings on the MSC website, and by advertising in the Dutch Visserijnieuws.

Initial approaches were made by email and followed up by phone conversations. Issues raised during correspondence were investigated during research and information gathering activities, and during interviews.

Written and verbal representations were provided to the assessment team expressing a range of views, opinions and concerns. The team is of the view that matters raised have been adequately debated and addressed as a part of the scoring process for this fishery, and that none of the issues raised, therefore, require separate attention beyond that represented in this report.

The following organisations have responded

- Waddenvereniging
- Zeeuwse Milieufederatie
- Vereniging Natuurmonumenten
- Vogelbescherming
- Stichting WAD
- WNF (WWF)
- Faunabescherming
- Greenpeace
- Stichting de Noordzee
- Dutch Fish Product Board

Meetings were held with stakeholders as follows. Some of the key issues discussed have been identified for each meeting.

Name	Organisation	Date	Key Issues
Wilbert Schermer-Voest	Ministerie van LNV	18-05-2010	• Regulations and management policy
Gijs van Zonneveld	Zeeuwse Milieufederatie	19-05-2010	• Genetic impacts, compliance with regulations

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1.8 Glossary of acronyms used in the report

Term	Meaning
By catch	Species that are caught by fishing operations and retained for sale
CFP	Common Fishery Policy
Discard	Species that are caught during fishing operations and returned to the sea including commercial species that are undersized or commercial species that are not sold due to lack of quota or lack of markets, or low value
ETP	Endangered, threatened and protected species
EU	European Union
LNV	Ministry for Agriculture, Nature, and Food Quality
MZI	Mosselzaad Invang Installatie (mussel seed collectors)
PI	Performance Indicator
PO	Producers Organisation
PSA	Productivity and Susceptibility Analysis
RBF	Risk Based Framework
SG	Scoring Guidelines
MZI	Seed mussel collectors (MZI)
SICA	Scale Intensity Consequence Analysis
TAC	Total Allowable Catch
UoC	Unit of certification. The unit of fishing effort that will be subject to MSC certification
VMS	Vessel Monitoring System
WFD	Water Framework Directive
ZMF	Zeeuwse Milieufederatie

2 THE ASSESSED FISHERY

2.1 Biology of the Target Species

The blue mussel, *Mytilus edulis* (Bivalvia: Mytilidae) is a sessile bivalve. It lives attached to a substratum of shells, shell fragments or pebbles by its byssus threads. Mussels may form banks on soft bottom substrates by attaching to shells or shell fragments and by forming attachment to other mussels. Blue mussels occur predominantly in estuaries which are usually characterized by large variation in turbidity, salinity and hydrodynamics. Consequently, mussels can withstand a wide variation in environmental conditions.

Mussels live in water with a salinity ranging from 15 to 38 gram/l but their optimal salinity is 28 gram/l (MARE project). Mussels occur in subtidal and intertidal areas, hence they are able to survive during emersion. Survival during prolonged emersion depends on the ambient temperature.

Dense concentrations of mussels may form a mussel bank, which is a solid construction of many interconnected mussels and dead mussel shells. Mussel banks form a special marine community or mussel matrix which supports a high biodiversity, composed of layers of mussels with accumulated sediments and debris providing numerous microhabitats and an organically enriched environment.

Mussels have separate sexes and a 1:1 ratio of males and females. If conditions are favourable, mussels may become sexually mature at a very young age (6 months in some cases). Mussel reproduction takes place in the spring and summer, mainly in April and May. Mussels release huge numbers of gametes (several million eggs per spawning period) into the water where fertilization takes place. The fertilized egg develops into a planktonic drifting larva which undergoes several metamorphoses before settlement (figure 2).

The planktonic life of *Mytilus edulis* is normally not longer than 2 to 4 weeks depending on temperature, food supply and availability of suitable settlement substratum. The maximum settlement period is in June – July, although cohorts of larvae and settlement are often observed till late summer.

The blue mussel *Mytilus edulis* is a filter-feeder foraging on micro-algae, debris and zooplankton (Maar et al 2008). The growth rate of mussels is largely dependent on food availability.

In the culture area of the Oosterschelde the target species *Mytilus edulis* is occurring together with hybrids of *Mytilus edulis* with *Mytilus galloprovincialis* and *Mytilus trossulus* (Kijewski et al, 2009). It is not known what factors have played a role in the introduction and development of these hybrid populations, the size of the different populations has not been quantified, and there is no insight in possible consequences for the culture and the ecosystem. It needs to be considered that suspended settlement and culture may stimulate the development of cohorts with specific characteristics and stimulate hybrids. It should be noticed that total hard substrate surface in the Oosterschelde is estimated to be 10 km² (Leewis et al, 1994). Seed collector surface is less than 1 km² (Kamermans & Smaal, 2009). Therefore the addition of new hard substrates to the existing hard substrate is considered of minor importance with regard to habitat availability for hard substrate preferring strains of the various *Mytilus* subspecies.

In addition to the occurrence of hybrids, the role of import of mussels from elsewhere that has been going on and may occur in the future, needs to be addressed. As there is a knowledge gap on these issues additional monitoring is advised.

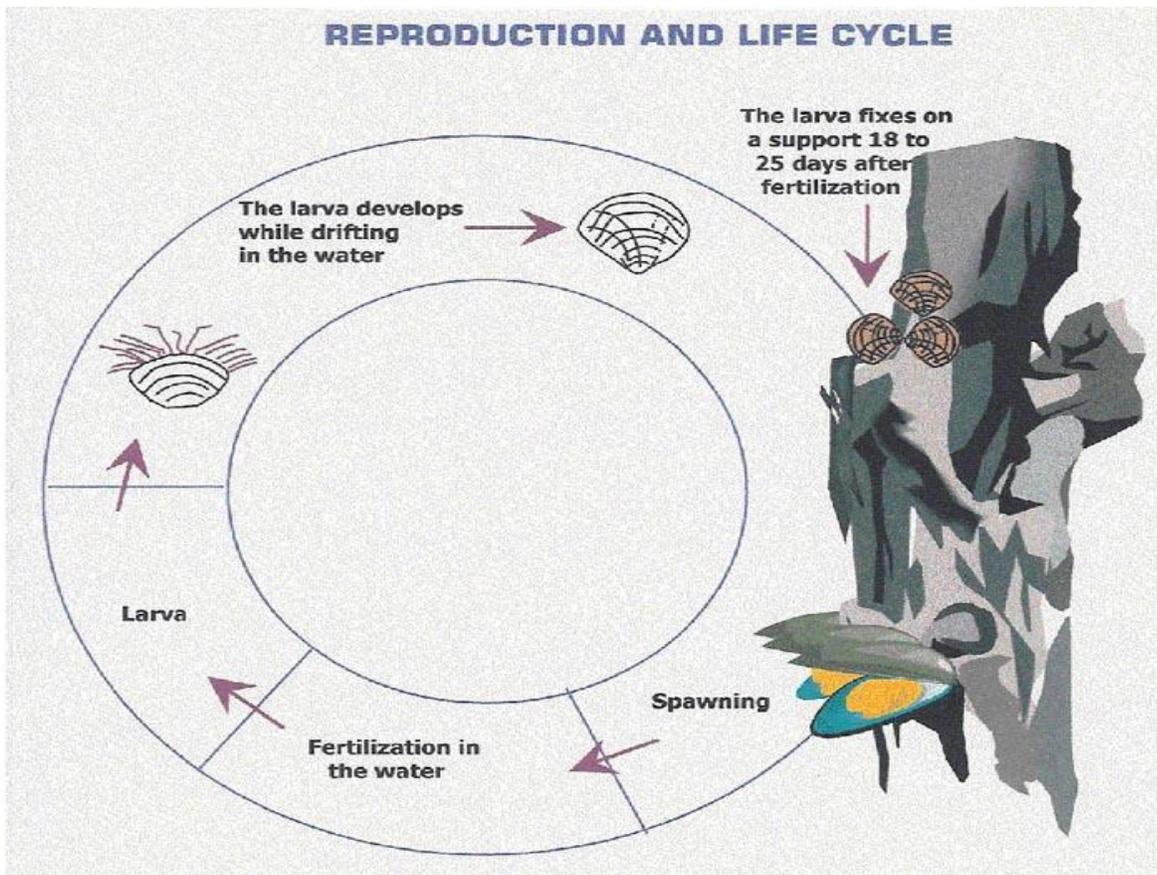


Figure 2 The Reproduction Cycle of the Blue Mussel

Suspended mussels are reported to grow up to 9% in dry weight a day, whereas the growth of mussels lying in a mussel bed is reported to be lower. Mussels grow from settlement to the minimum legal catch size of 4.5 cm during approximately 2.5 years. The weight of the mussel consists of between 10 and 40% as edible meat, which is measured as the ratio between the cooked weight of the meat and the total weight of the mussel. This percentage varies greatly throughout the fishery season. Mussels sold for human consumption at the auction of Yerseke have a minimum length of 4.5 cm and a minimum meat percentage of 18 %.

Mussels are the preferred prey of birds like the oystercatcher, *Haematopus ostralegus*, eiderduck, *Somateria mollissima* and the scaup, *Aythya marila*. Mussels are therefore a very important link in sustaining the coastal marine ecosystem. In the past two decades, studies have been done on the actual and potential impacts of the shellfish fishery on the ecosystem. The Eastern part of the Wadden Sea is closed for any shellfish fishery.

2.2 History and Overview of the Fishery

Historically, mussels have been caught and collected for human consumption in the Province of Zeeland. Mussels were collected near the coast on dry beds at low tides. In the 14th century it was discovered that mussels could be collected at sea and stored in water-basins closer to home. These wet storehouses soon turned into places to let mussels grow and improve their taste.

Mussel collection in the wild fishery was not regulated until 1825. In that year the “Bestuur der Visserijen op de Schelde en de Zeeuwse stromen” was founded, to manage the high demand for mussels and the increasing intensification of the fishery and disputes among the mussel fishermen. This fishery authority controlled the management of the mussel fishery and the first mussel plots “mosselpercelen” were allocated.

From 1870 onwards the owners of the mussel plots had to pay for the use of an allocated area of sea bed. In the early 19th century the first vessels were equipped with a dredge (“mosselkor”) to harvest mussels. Two hundred years later, the technique of mussel fishing has hardly changed, other than an increase in the size of the fishing gear, improved safety measures, modern navigation equipment, and mechanical cleaning of the mussels onboard the fishing boats.

In 1950 the first mussel plots were created in the Wadden Sea to allow a mussel fishery to develop away from the area of Zeeland, which was infected with the mussel parasite *Mytilicola intestinalis*. Although the mussels do grow very well in the north, the muddy sea bottom requires that all the mussels are rinsed before human consumption. Today, most bottom culture mussels are grown in the Wadden Sea and for a part as half-grown mussels transplanted to the Oosterschelde. All bottom culture mussels are traded in the Yerseke mussel auction and cleaned on the rewatering areas in the eastern part of the Oosterschelde, after the trade.

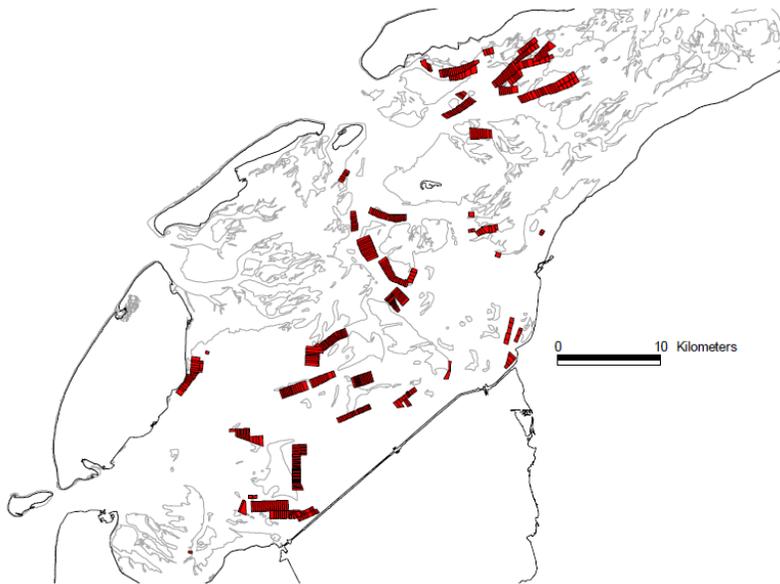


Figure 3a. Location of culture plots in the Waddenzee

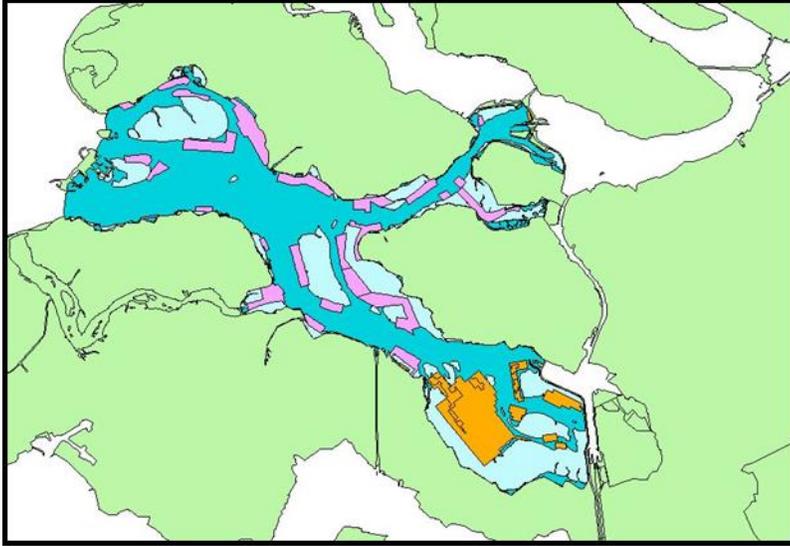


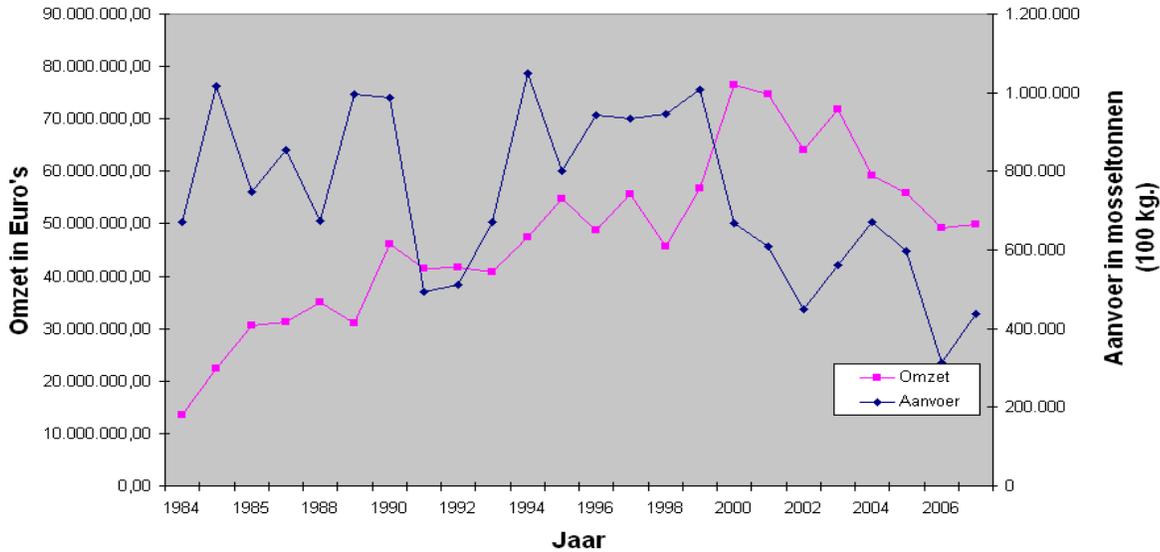
Figure 3b. Location of culture plots (purple) and rewatering areas (yellow) in the Oosterschelde

In total around 6000 hectares of mussel plots are found in the Oosterschelde and the Wadden Sea combined. For over a decade this production capacity has not been able to meet the mussel demand in the Netherlands and Belgium and consequently large volumes of mussels are imported into the area to satisfy the high demand.

The Dutch mussel fleet consists of \pm 65 vessels, varying in length between 30 and 45 meters. The depth of these boats is limited to around 50 cm as most of the time they operate in shallow waters. Around 40 mussel vessels use Yerseke as their harbor, whilst most other ships come from Bruinisse (18), Zierikzee, Tholen, Wieringen and Houtenisse. The vessels are owned by 50 companies and in total 170 people are employed on these boats.

In Holland the volume of mussels is expressed in “mosseltonnen”, with one (1) mosselton equalizing 100 kg. Except from the three figures below in the text of this document all volumes are expressed in metric tons (with one metric ton being 1000 kg).

Ontwikkeling van aanvoer en omzet in Euro's vanaf jaar 1984 t/m heden



Legend:

supply - **aanvoer** (in mosselton) = volume landed in 0.1 metric tons

sales - **omzet** in Euro's = turnover in €.

Table 1. Development of mussel supply and sales in euros for years 1984 to 2007

The annual volume of mussels landed in the Netherlands fluctuated in the past 20 years (1984 to 2007) between 25,000 and 100,000 metric tons with a value varying from €13 to €75 million.

In the years 2000 to 2007 landed volumes have been below average, fluctuating between 25,000 and 50,000 metric tons per year, whilst the annual turnover was maintained varying from €45 to €75 million.

Gemiddelde prijs in Euro's en aanvoer mosselen vanaf jaar 1984 t/m heden

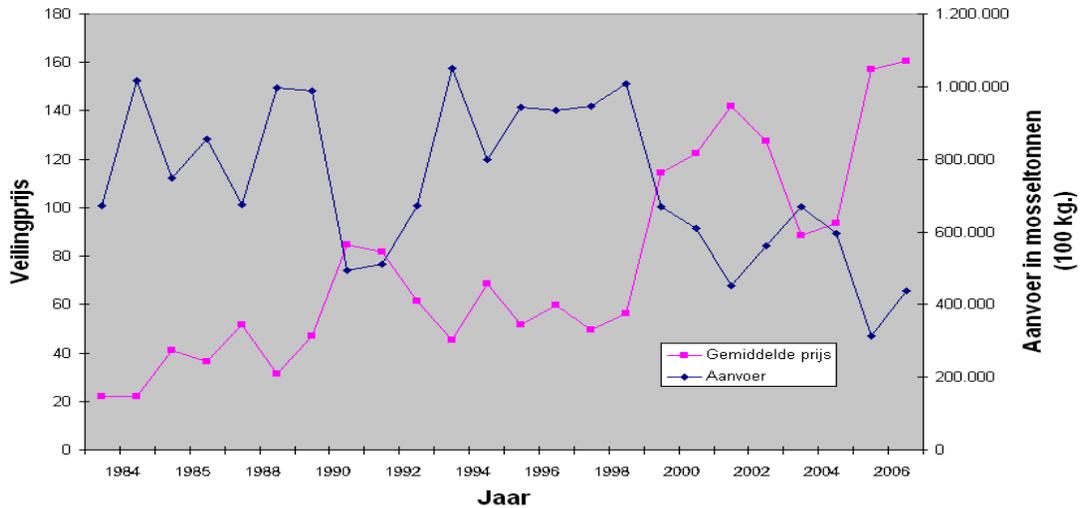


Table 2. The average price in euros and volumes landed for mussels from the years 1984 -2007

Mussel price per kg depends on the volume landed. The higher the landings, the lower the sales price. Fluctuations in volume tend to be larger than variations in turnover. Imports in the past have been very high, up to 50,000 metric tons in the 1983 – 1984 season. Since 2000 annual imports of mussels varied between 15,000 and 20,000 metric tons.

Importmosselen vanaf 1983/1984 t/m 2003/2004

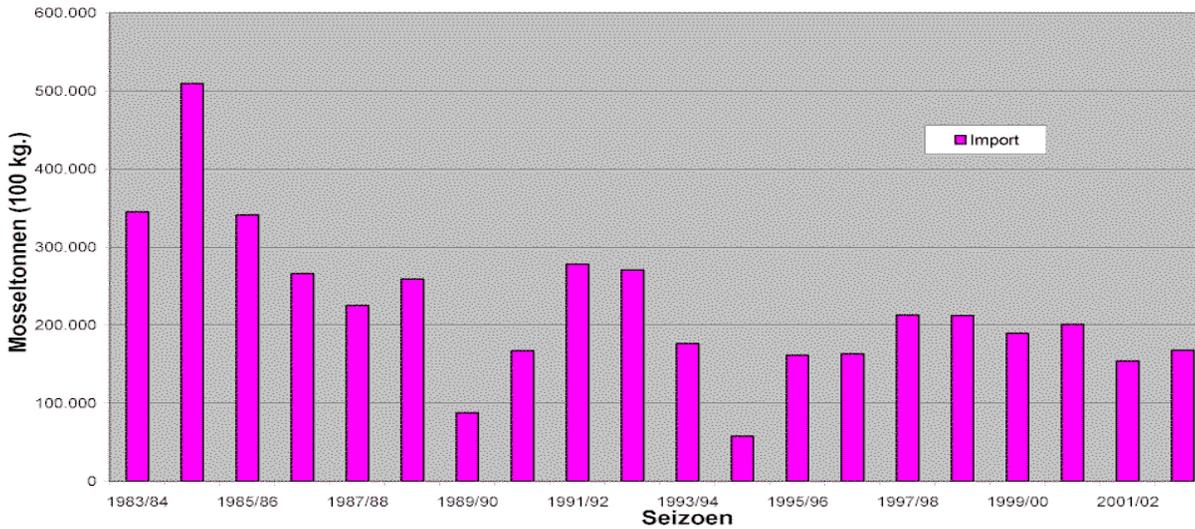


Table 3. Volumes of mussels imported into Holland from 1983 to 2004

Mussels are now available from all over around the world and the mussels imported into the Dutch area may originate from Norway, Wales, Scotland, Ireland and Canada. Until 1997 most of the mussels were imported from Ireland and the UK. Imports from the surrounding areas can be either mussel seed used for grow-out on the mosselpercelen, or nearly full-grown mussel which are kept for a limited time in the Oosterschelde waters and are subsequently packed and sold as “Zeeuwse mossel”. Imports from further away (Canada, Greece) are kept and processed separately.

Dutch Mussel Farming Practices

In the Netherlands the mussel industry has traditionally been based on the fishery of the wild mussel seed, collecting mussels of around 1 cm length in size. Grow out takes place on the mussel plots “mosselpercelen” which are areas of the sea bed which are rented by individual fishermen for the grow-out of mussels. The culture process is divided in a first grow-out phase in which the mussels grow to around 3 - 4 cm (half-grown) and a second grow-out phase at which the mussels reach a market size at least 4.5 cm. During the grow out phase half grown mussels are usually transplanted once to another culture plot. Both the fishery and grow out is carried out on the sub-littoral sea bed.

Mussel Seed Fishery

Mussels are caught with a mussel dredge (“mosselkor”). Vessels operate 2 or 4 dredges. The dredge (Figure 4.) consists of a metallic net that is supported by a steel bar frame. The net is usually 1.9 meter wide and a steel bar of 4 cm is dredged along the sea bottom. When the net is full it is emptied into the boat hold. The same gear is used for the seed fishery as for the fishery on the mussel plots. Transportation of the mussels from one plot to the other is necessary to provide the mussels with the best growing conditions. Fishing mussels for thinning out is required to sustain fast mussel growth on plots with a high mussel biomass. Exposed plots may provide mussels with plenty of food in the summer, but become too dangerous a place for the mussels to live during autumn and winter storms. Mussels from exposed sites may be transferred to safer plots before the autumn storms.



Figuur 4: mosselkor.

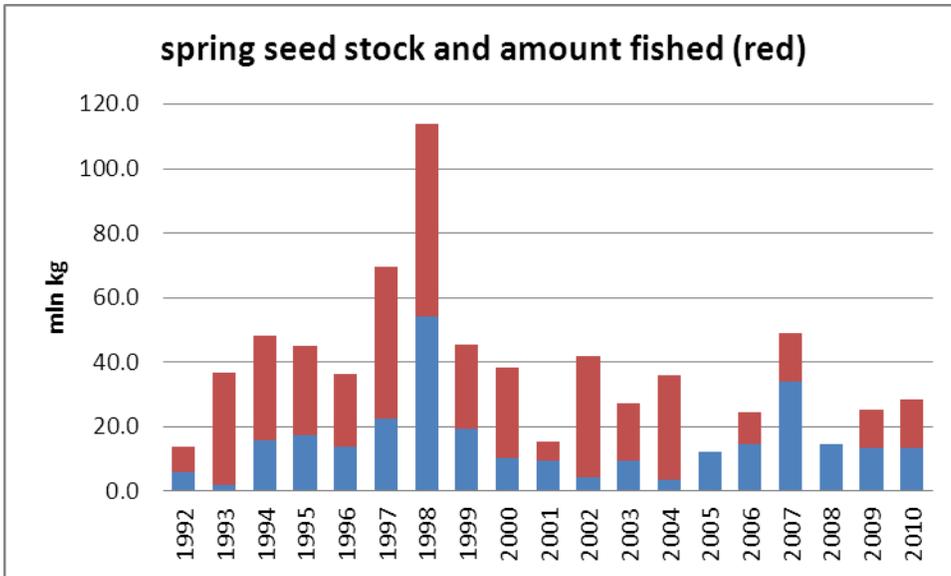


Fig 5b. Spring survey data of mussel seed stock in mln kg gross weight in the western Wadden Sea and the amount fished.

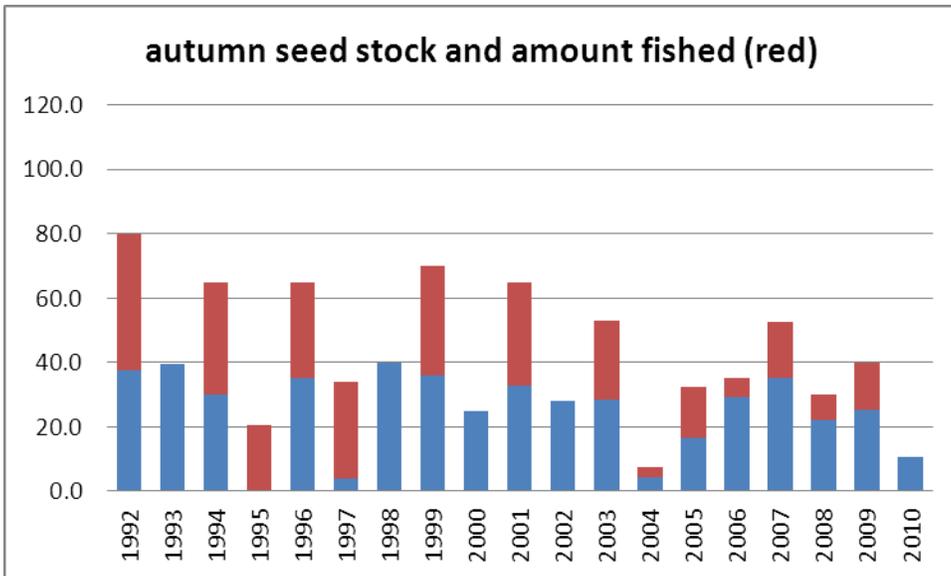


Fig 5c. Autumn survey data of mussel seed stock in mln kg gross weight in the western Wadden Sea and the amount fished.

Development of MZI's

Poor spat fall and closure of areas for mussel seed fishery has caused a limited availability of mussel seed in previous years. Mussel seed availability has become a limiting factor of the production of Dutch mussels. As an alternative, seed mussel collectors (SMC or MZI's, mosselzaadinstallaties) have been developed. The MZI's provide the mussel with a substrate, such as rope or netting in the water column.

Seed Mussel Collectors (MZI) using the suspended rope principle consists of lines of buoys (usually used polypropylene barrels) with lines attached to them. The length of these lines depends on the depth of the water at low tide, so that the bottom of the long lines never touches the sea bed. The lines are anchored to the seabed by concrete blocks, common anchors or iron poles which are forced into the seabed. Mussel larvae that float in the water find a substrate to settle on the ropes, for that reason the MZI's are located in areas where high settlement is expected. These are mainly tidal area's with currents up to 3 knots or more. A field has numerous lines and thousands of buoys, the void area between the lines allows the harvesting boats to navigate between the lines.

According to the actual regulation the installations are installed after March 1 and brought ashore prior to November 1. Specialised harvesting vessels lift the ropes and scrape or brush the spat from the ropes to be collected in hoppers on board. A small part of the harvested spat is used for suspended culture and the majority is used for bottom culture.

Seed Mussel Collectors (MZI's) using the suspended net principle use polypropylene tubes with nets attached to them. These nets never touch the sea bed. Because of the relative high surface area the nets are parallel to the currents. The nets have square mesh of 10 to 50 mm and because they foul quickly, they are placed parallel to the currents. With these mesh sizes there is no risk on by catch of fish, birds or sea mammals. The other characteristics of the MZI's using nets are identical to the MZI's using ropes.



Figure 6. MZI installation with buoys, ropes and lines.

Mussel spat prefers to fall on these MZI's, which provides them with higher food availability in the water current and the absence of some of its predators (e.g. bottom dwelling crabs will not come up in the water column). New competitors have appeared (e.g. the tunica *Styela clava*) and MZI's are presently only allowed at a few sites. In 2009, the total area with MZI's is around 205 hectares in the Wadden Sea, 110 hectares in the Oosterschelde and 12 ha in the Voordelta (and some small scale sites in Lake Grevelingen and Lake Veere).

The mussel fishery sector, the government fishery authorities and stakeholder NGO's have signed an agreement to gradually replace the seed fishery, by collection of mussel seed using MZI's. In the first stage of this agreement 20 % of subtidal mussel beds will be excluded from the fishery. When the mussel sector is able to compensate for this reduction by the production of seed on MZIs a second step of 20 % will be taken until the bottom fishery is phased out completely.

In the framework of the policy for MZI development currently areas of 500, 200 and 30 hectares are designated for MZI development in the Waddenzee, Oosterschelde and Voordelta respectively. The increasing amount of mussel seed produced by MZI's will be accompanied by a gradual decrease of the intensity of first the mussel seed fishery in the springtime. Finally, when the MZI's are expected to produce 40 million kilos of mussel seed

in 2020, the mussel seed fishery in the autumn will also be stopped. In 2014 there will be a mid-term evaluation.

The background of the agreement is the nature conservation goal in the Wadden Sea to allow the development of undisturbed littoral and sublittoral mussel beds. The mussel farmers have agreed to cooperate with the Ministry and the NGO's to achieve this goal under the condition that seed supply through other techniques would be maintained. Meanwhile impact studies should show what types of mussel seed beds are most vulnerable for fishery impacts and what mussel seed beds are unstable and would disappear anyway in the course of time.

International Policy Framework and regulations

Since 1978, the Government's of the Netherlands, Denmark and Germany have been working together on the protection and conservation of the Wadden Sea:

- [Minister of Agriculture, Nature and Food Quality, the Netherlands](#)
- [Federal Minister for the Environment, Nature Conservation and Nuclear Safety, Germany](#)
- [Minister of the Environment, Denmark.](#)

Trilateral Government Cooperation

Their activities cover management, monitoring and research, as well as political matters. [Trilateral Governmental Conferences](#) are held every 3 - 4 years and they are the highest decision making body in the framework of this collaboration. In the periods between the Governmental Conferences, the Trilateral Working Group (TWG) meets as a permanent working group on average 2-3 times a year. The TWG is composed of civil servants from relevant ministries as well as regional authorities. The [Common Wadden Sea Secretariat \(CWSS\)](#) was established in 1987 in Wilhelmshaven in Germany as the secretariat for the trilateral cooperation. Its primary task is to support, initiate, facilitate and coordinate the activities of the collaboration.

Habitat Directive

Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. All in all the directive protects over 1,000 animals and plant species and over 200 so called "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance.

Birds Directive

Council Directive 79/409/EEC² on the conservation of wild birds is the EU's oldest piece of nature legislation creating a comprehensive scheme of protection for all wild bird species naturally occurring in the Union. It was adopted unanimously by the Members States in 1979 as a response to increasing concern about the declines in Europe's wild bird populations. The directive recognizes that habitat loss and degradation are the most serious threats to the conservation of wild birds. It therefore places emphasis on the protection of habitats for endangered as well as migratory species (listed in Annex I), especially through the establishment of a coherent network of Special Protection Areas (SPA's) comprising all the most suitable territories for these species. Since 1994 all SPA's form an integral part of the NATURA 2000 ecological network.

Natura 2000

Natura 2000 is an EU wide network of nature protection areas established under the 1992 Habitat Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is comprised of Special Areas of Conservation (SAC) designated by Member States under the Habitats Directive, and also incorporates Special Protection Areas (SPA's) which they designate under the 1979 Birds Directive.

Water Framework Directive

² Now codified in Directive 2009/147/EC of the European Parliament and of the Council

The Water Framework Directive (WFD) is the most substantial piece of EC water legislation to date and is designed to improve and integrate the way water bodies are managed throughout Europe. In the UK, much of the implementation work will be undertaken by competent authorities. It came into force on 22 December 2000, and was put into UK law (transposed) in 2003. Member States must aim to reach good chemical and ecological status in inland and coastal waters by 2015. It is designed to: enhance the status and prevent further deterioration of aquatic ecosystems and associated wetlands, which depend on the aquatic ecosystems promote the sustainable use of water reduce pollution of water, especially by 'priority' and 'priority hazardous' substances (see Daughter Directives) ensure progressive reduction of groundwater pollution

Marine Strategy FrameworkThe Marine Strategy Framework Directive establishes European Marine Regions on the basis of geographical and environmental criteria. Each Member State - cooperating with other Member States and non-EU countries within a marine region - are required to develop strategies for their marine waters. The marine strategies to be developed by each Member State must contain a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes. Each Member State must draw up a programme of cost-effective measures. Prior to any new measure an impact assessment which contains a detailed cost-benefit analysis of the proposed measures is required. Where Member States cannot reach the environmental targets specific measures tailored to the particular context of the area and situation will be drawn up. The goal of the Marine Strategy Framework Directive is in line with the objectives of the 2000 Water Framework Directive 2000 which requires surface freshwater and ground water bodies - such as lakes, streams, rivers, estuaries, and coastal waters - to be ecologically sound by 2015 and that the first review of the River Basin Management Plans should take place in 2020.

2.3 Monitoring and Stock Size

Mussel Stocks

The mussels stock (*M. edulis*) of the North Sea can be considered as one stock. Mussel spat remains for 4 to 6 weeks in a planktonic phase in the water, which allows the exchange of genes between neighbouring populations. The local stock size of blue mussels depends highly on local conditions, such as food availability and favourable conditions for spat fall, whilst storms and severe winters may decimate the local mussel population. The Netherlands stock of blue mussels can be managed independently from stocks of the same species in neighbouring countries like Germany, Denmark and the UK.

In mussels the number of offspring per adult is very high and spat survival depends on environmental conditions such as food availability and predator density. The relationship between size of parental stock and the number of offspring is very weak. A small parent population can produce huge number of offspring while a huge stock will produce no offspring if conditions are unfavourable. The combination of a guaranteed minimum number of mussels under all conditions and the very high reproduction capacity, make it highly likely the stock is well above the point where recruitment is impaired.

All fishing boats are equipped with a black box which permanently monitors the location of the boats. The mussel harvest quotas are divided among the boats before the fishery starts. For economical reasons the mussel seed fishery only takes place in areas with sufficient mussel densities. Mussel fishing only in high mussel density areas also reduces habitat degradation as the mussel dredge only impacts on the upper surface of the sea bed.

During the mussel fishing season a boat of Productschap Vis (Dutch Fish Product Board) is permanently in the area and measures the harvest of all mussel fishing boats daily. As the fishery has to stop when the quota is fully fished, there is also a considerable social control amongst the mussel fishermen. The black box system onboard each boat registers all movements of each boat and acts as an efficient control tool. The black box records the GPS position of the fishing vessel at regular intervals of 6 seconds when fishing and 15 minutes when the vessel is moored (not moving).

The target harvest is an average of 40 million kg of mussels per year. Mussel fishing fleet information is available and the mussel fishing gear used is uniform. Closed areas are identifiable and well known. Fishing areas are described precisely in the fishing plan using coordinates. Violation of the fishing plan is almost impossible to go unnoticed as each vessel has a black box allowing monitoring of the position of the vessels 24 hours a day. The black box monitoring systems monitors the speed and direction of the mussel fishing boats. It can therefore determine when a boat is travelling to a fishing area fishing for mussels or laying mussels on the mussel beds. The black box monitoring of all mussel fishing boats regulates the fishing under the approved fishing plan. Violation of the fishing plan can lead to litigation using the black box fishing boat activity as evidence for court hearings and potentially financial implications.

Monitoring and Assessment

Prior to fishing in the Wadden Sea each spring and summer season, a stratified dredge sampling survey is conducted for use in monitoring programs on distribution and biomass estimates of shellfish. Additionally, the entire sub tidal area is investigated, taking 30 m² samples with a hydraulic dredge on a stratified grid.

The surveys are focusing not only on mussels, but also on pacific oysters (*Crassostrea gigas*), cockles (*Cerastoderma edule*), razor clams (*Ensis directus*) and soft-shelled clams (*Mya arenaria*) (Stralen, van, 2008). Several long term, small scale studies are also conducted in the Wadden Sea using grab sampling or box corers (Vorberg *et al.* 2009).

Inter tidal mussel stocks are also monitored by aerial photography in combination with ground observation (Smaal and Lucas 2000). Ground surveys are conducted on foot with mussel bank perimeters recorded via GPS. The GPS information can then be used to create maps of the location, size and shape of the mussel beds (Fey *et al.* 2009b). For a number of years a post harvest quantitative survey has been carried out as a basis for winter mortality estimation (Stralen van, 2008)

Prior to the autumn fishery a semi-quantitative survey is conducted as a basis for the fishing plan. Each year a fishing plan is made based on available stock. When two fisheries take place in a year, separate fishing plans are made for the autumn and the spring fishery. In the fishing plan the quantities to be fished in different areas or stability are defined and the quota are subdivided into individual quota for the mussel firms.

Monitoring of the mussel seed harvest is carried out by personnel of the Fish Product Board. During the weeks the seed fishery takes place a specialized boat with personnel of the Fish Board is present in the fishing area. All vessels taking part in the seed fishery have to pass by this vessel before they can seed their catch on the culture plots. The crew on the control vessel will measure the total tonnage of mussels and keeps records of this catch. The crew on board also monitors the movements of the vessels. Together with the use of the black box monitoring system the harvest of the agreed quantity of seed mussels is closely monitored.

Within the framework of the WOT-tasks, IMARES monitors the area of inter tidal mussel beds and the total biomass of mussels in the Dutch Wadden Sea and the Oosterschelde estuary annually. These measurements are carried out to monitor the development of mussel beds in the framework of NATURA 2000 and to facilitate policy making concerning mussel seed fishery (Fey *et al.* 2009a).

3 ECOSYSTEM

3.1 Characteristics

The Netherlands have two estuarine areas; the Dutch part of the Wadden Sea in the North, which is fed by the rivers Ems and Rhine, and the Delta area in the South-west (of which the Oosterschelde estuary is the most important for shellfish aquaculture) where the rivers Scheldt, Rhine and Meuse reach the North Sea (Troost 2009). Both the Wadden Sea and the Oosterschelde are characterised by a muddy to sandy substrate and relatively large tidal amplitude; about 1.5 – 3.0 m in the Wadden Sea, and 3.0 – 4.5 m in the Oosterschelde. These tidally driven estuaries are turbulent, resulting in a well-mixed water body (Smaal and Van Stralen 1990, Troost 2009).

The Wadden Sea is a shallow estuarine area situated along the coasts of Denmark, Germany, and The Netherlands and is separated from the North Sea by about 50 islands and high sandbanks (Van Berkel and Revier 1991, Wolff 2000). The estuary is an 8000 km² shallow plain of salt-marshes, mud flats and shoals, cut through by channels and gullies and is flooded by the water at high tide, with large areas falling dry at low tide (Wolff 2000, Vollmer et al. 2001). The Dutch part of the Wadden Sea is situated approximately 53°N and 5°E and covers about 2500 km², of which about 50% is bare tidal flats. Salt marshes cover about 85 km². The area can be divided into inter tidal and sub tidal zones. The inter tidal areas are alternately flooded and drained during the tidal cycle while the sub tidal area is influenced by the tidal currents but remains submerged during low tide. Inter tidal and sub tidal areas generally contain high abundances and high biomasses of benthic invertebrates. The sub tidal areas provide an important food resource for fishes and birds, a nursery area for many North Sea fish and crustaceans, and a resting area for migratory coastal birds (Van Berkel and Revier 1991, Wolff 2000).

Although the Wadden Sea is a naturally brackish water body, human interference has significantly altered the local environment. At the end of the Middle Ages the brackish, micro tidal Zuiderzee (3700 km²) developed as an extension of the Wadden Sea. In 1932 it was dammed and changed into a freshwater lake. Furthermore, most river estuaries have been dammed and provided with sluices or pumping engines. Hence, brackish-water habitats have declined significantly (Wolff 2000). The closing off of the Zuiderzee (now Lake IJssel) also changed the hydrographic conditions in the remaining area. This resulted in the disappearance of the eelgrass, *Zostera marina*, which never re-established. (Wolff 2000).

In the past the Wadden Sea has supported various commercial fisheries. Around 1930 the herring fishery in the area produced up to 20,000 tons annually. This ended with the closure of the Zuiderzee in 1932 along with the increased pollution in the River Elbe. Today, fisheries in the Wadden Sea are primarily for shrimp and shellfish and, on a much smaller scale for eel, smelt and flatfish (Wolff 2000). Mussel culture is carried out in sub tidal culture lots in the Western part of the Dutch Wadden Sea. The size of the designated area is 7000 ha, marked off by stakes. Within that area approximately 3000 ha is suitable for culture (Dankers and Koelemajij 1989).

The Oosterschelde is a large sand and mud flat plain feeding into the North Sea from the rivers Rhine, Meuse and Scheldt. The estuary is situated approximately 5°40'N and 3°50'E and covers an area of 351 km² of which 118 km² are tidal flats and 6.27 km² are salt marches (Smaal and Nienhuis 1992). Four different regions have been defined in the estuary based on geographical and hydrological characteristics: the Western, Central, Eastern and Northern areas. The Western and Central sections have large sandy shoals and are relatively deep with tidal gullies up to 55 m. The Northern section is predominantly salt marshes and is 35 % inter tidal. The main freshwater input in the Oosterschelde enters in this area through the Krammerlocks in the Philipsdam. The Eastern section is relatively shallow with a mean depth of 4.13 m, and is 43 % inter tidal. In this section the inter tidal and shallow sub littoral areas are characterised by peaty substrates as a result of mediaeval storm floods where much of the land mass was lost to the sea (Smaal and Nienhuis 1992). The estuary is an important feeding and resting area for migratory, over wintering and breeding birds.

The construction of artificial dams and locks has led to the compartmentalisation of the estuary and resulted in the estuary being largely closed off from river inputs. A storm surge barrier which can be closed in times of

dangerously high water levels during a storm surge, was built in the mouth of the estuary from 1979 to 1986 along with two auxiliary compartment dams. These barriers significantly reduced the tidal amplitude and current velocities in the estuary. Since the completion of the barriers, the tidal volume of water in the estuary decreased by 28 %, the total surface area of the saline tidal ecosystem decreased by 22 %, the surface area of the inter tidal flats decreased by 36 % and the salt marshes decreased in area by 63 %. These changes have caused a continuous erosion of the inter tidal area where excess sand and silt are deposited in the tidal gullies (Nienhuis and Smaal 1994). The estuary is now characterised by high salinity, high water transparency, long water residence time, and low inorganic nutrient concentrations (Nienhuis and Smaal 1994).

The Oosterschelde is economically important for shellfish fisheries and cultures, recreational use and shipping routes. Mussel culture is the dominant fishery in the estuary, but the area also supports other shellfish fishery. The European flat oyster (*Ostrea edulis*) was cultivated in the Oosterschelde until the population declined dramatically since 1979 due to the *Bonamia* disease. They were then replaced by the cultivation of *Crassostrea gigas*. Cockle fisheries also occur in the area, but rely on wild stocks (Smaal and Nienhuis 1992).

Mussel fishery in the Oosterschelde is supported by mussel spat and half-grown mussels collected from the Wadden Sea and brought to the Oosterschelde for further cultivation on lease sites (Ysebaert et al. 2009). Most culture plots are situated on the banks of tidal channels, from the inter-tidal range to 10–15 m below low tide level (Ysebaert et al. 2009). The majority of mussel cultures are located in the western and central area of the estuary on 22.53 km² of marked lots (Smaal and Nienhuis 1992). In the eastern section, 3.4 km² is used for storing and cleansing the mussels before further processing takes place.

3.2 By-catch and Discarding

In the mussel seed fishery no by-catch is retained. By-catches consist mainly of slipper limpets, oyster, starfish and some crabs. Other by-catch (such as flatfish and eel) is negligible. The major by-catch species slipper limpets and oysters are both highly fecund non-native bivalves and these by-catches are insignificant compared to their stock sizes.

In the suspended mussel seed production (spat collection with MZI's) there is very little by-catch. On the mussels and the ropes some tunicates may grow and small crabs may live between the mussels. None of these animals are retained. Apart from slipper limpets and oysters, the fishery of consumption sized mussels on the plots produces some by-catch of barnacles which are removed during processing and subsequently dumped in an appropriate place.

On the mussel plots there is also some by-catch of sea stars and crabs which are attracted to the plots by the high densities of their preferred food, the mussel. Both crabs (*Carcinus maenas*) and sea stars (*Asterias rubens*) are species that are very common in the coastal waters of the North Sea. Stocks of these species are very large and not believed to be impacted by this catch,

3.3 Ecosystem Impacts

In the last two decades identifying and minimising the impact of mussel fisheries on the ecosystem has become a priority. The crash of the mussel and cockle populations in the Netherlands in 1990–1991 brought new attention to the conflict between environmental organisations and the fishing sector (Imeson and van den Bergh 2006). This conflict concerns the impact of fishing on the ability of the Wadden Sea and the Oosterschelde region to sustain important ecological values relating to bird species, sea grass and mussel beds. Since then, the Sea and Coastal Fisheries Policy (SCFP) (Min. LNV 1993) was created to manage the systems and ensure that fishing activities take these ecological values into consideration by restricting fishing when and where the activity threatens these aspects of the ecosystem (Imeson and van den Bergh 2006). Ecosystem management of these two estuaries are major concerns for policies in Natura 2000. Both the entire Wadden Sea and Oosterschelde are designated as Natura 2000 areas based on certain Habitat Directives (Table 4 and 5). These directives are used to create area-specific management policies to preserve and maintain the habitat.

Habitat type	Code	Habitat type name
Open sea and tidal areas	1110	Sandbanks which are slightly covered by sea water all the time
	1140	Mudflats and sand flats not covered by seawater at low tide
Salt marshes	1310	Salicornia and other annuals colonising mud and sand
	1320	Spartina swards (<i>Spartinion maritimae</i>)
	1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)
Dunes	2110	Embryonic shifting dunes
	2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> ("white dunes")
	2130	Fixed coastal dunes with herbaceous vegetation ("grey dunes")
	2160	Dunes with <i>Hippophaë rhamnoides</i>
	2190	Humid dune slacks

Table 4. Habitat Directives for the Wadden Sea in Natura 2000

Habitat type	Code	Habitat type name
Open sea and tidal areas	1160	Large shallow inlets and bays
Salt marshes	1310	Salicornia and other annuals colonizing mud and sand
	1320	Spartina swards (<i>Spartinion maritimae</i>)
	1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)
Sphagnum acid bogs	7140	Transition mires and quaking bogs

Table 5. Habitat Directives for the Oosterschelde Estuary in Natura 2000

Benthos and Seabed Habitat Structure

The most obvious impact of mussel culture on the ecosystem is the removal of seed mussels (predominantly) from sub-tidal natural mussel beds and the translocation of mussels to areas where they will have better chances for survival.

The mussel seed beds are part of the habitat type of sub littoral sand banks. The effects on this Habitat type H1110 have been evaluated in appropriate assessments. On the basis of these assessment licenses in the framework of the Nature Conservation Act have been issued by the national government. In the appropriate assessments (van Stralen 2009 a,b) it is concluded that the mussel seed fishery has no detrimental effects on the biodiversity of Habitat type H1110 as the status of species marked as typical species is good and there are no signs of negative developments in the status of these species. Van Stralen (2006 a) has also evaluated the possible effect of the seed fishery on the recruitment of mussels and therefore on the possibilities of recovery of the beds that have been fished. He concluded that since the fishery has been ongoing for several decades and a negative effect on recruitment has never been detected the existence of such a negative (irreversible) effect is highly unlikely,

The mussel fishery in the intertidal of the Waddenzee has not taken place in the last 10 years. Theoretical a limited fishery is possible when certain conditions are met. The fishery in the intertidal could be allowed on a limited and experimental basis in case there is an area of more than 2000 hectares of mussel beds in the

intertidal. It can be concluded so far that with this management measure the development of intertidal mussel beds are effectively protected.

The effects of the mussel seed fishery and mussel culture in the subtidal areas of the Wadden Sea have also been investigated in the extensive research project EVA II. In Bult (2004) it is concluded that mussel culture in the Wadden Sea leads to an average increase of the mussel stock of 15 % despite the fact that mussels are harvested regularly. Mussels are transferred to areas with a higher growth and less mortality. During the autumn fishery, fishery is only allowed in relatively unstable areas where it is unlikely that mussels will survive. In the spring fishery is also allowed in less exposed areas where the development of stable mussel beds could be possible.

However there is another management measure that protects 20% of the mussel (seed) beds in the subtidal area. Under the mussel covenant it is agreed that 20% of mussel beds are excluded from the fishery. Therefore an area which contains 20% of the mussel beds is closed for fishing. If during the next year less than 20% of the mussel beds of the subtidal area is present in this closed area additional areas are closed to protect 20% of the beds again. In the future this 20% will gradually be increased to 100 %, depending on the supply of mussel seed from other resources such as the mussel seed collectors.

Van Stralen 2009ab concludes that through this approach the negative effects of the seed fishery on the development of more stable mature mussel beds is minimized.

In the Wadden Sea, a research program named PRODUS is in progress to identify and monitor the effects of the mussel seed fisheries on the biodiversity of subtidal mussel beds. In this research project a comparison between plots that are open or closed for fishery is included. The project will be finalised in 2012. The culture of mussels can also enhance otherwise poor habitats. Mussel beds allow the development of dense heterotrophic communities with high secondary production and energy flow (Dame *et al.* 1991). In the Oosterschelde, Ysebaert *et al.* (2009) showed that mussel culture increased the nutrient value of the substrate due to bio deposition, and provided a more complex habitat compared to uncultured sites where a higher diversity of associated fauna can exist.

The increase in mussel biomass due to mussel culture can influence the sedimentary environment of an ecosystem. Mussel farming is known to be responsible for bio deposition of faeces and pseudo-faeces that might cause changes in the physical and chemical characteristics of the sediments and the associated fauna (Mirto *et al.* 2000). In the Oosterschelde, the Ysebaert *et al.* (2009) showed an increase in sedimentary particulate organic carbon and nitrogen, phosphorus and plant pigment concentrations in the presence of mussel cultures.

Ysebaert *et al.* (2009) also reported a shift in endobenthic community composition. In uncultured, bare areas polychaetes were dominant, while in dense mussel beds there was a dominance of oligochaetes and *Capitella capitata*. Furthermore, they reported that the infaunal macrobenthic community structure significantly changed from species which are typically present in sandy environments to small opportunistic subsurface deposit feeding species, which are typically present in organically enriched sediments, as well as an increase in biomass of mobile epibenthic species such as crabs (*Carcinus maenas*) and sea stars (*Asterias rubens*) which are attracted to the mussels as prey.

However, the associated fauna in mussel beds in the Oosterschelde constituted only about 3–4% of the total biomass. Therefore, they concluded that because the biomass of the associated fauna within mussel beds often does not exceed that of fauna in surrounding habitats, mussel beds do not necessarily enhance production or biomass of associated fauna, but provide a habitat for particular species that otherwise could not exist in the surrounding bare soft-bottom environments (Ysebaert *et al.* 2009).

Both in the Waddenzee and in the Oosterschelde dwarf eelgrass (*Zostera noltii*) is present in the intertidal. Since the mussel fishery and culture takes place in the subtidal areas that are far away from these eelgrass beds the mussel culture and fishery is not expected to have an effect on the development of eelgrass.

Birds

The bird population in the Wadden Sea includes breeding birds, such as gulls, terns, and several species of shore birds, as well as non-breeding migratory species that use the estuaries as over wintering sites. (Wolff 2000). Bivalves in these areas are an important food source for these birds. Bivalves comprise about 80 % of the diet of shore birds including adult eiders *Somateria mollissima*, oystercatchers *Haematopus ostralegus* L. and the red knot, *Calidris canutus* (Kameramans 1992). These birds feed preferentially on *M. edulis*, *M. balthica* and *C. edule*. Especially for eider ducks in the Waddenzee mussel are a very important food source. Van Stralen (2006b) has evaluated the effects of the mussel culture on the food availability for eider ducks. He developed a calculation model (VKA) which included the fishing, culture and movement (out of the system) of mussels and the effects of these activities on the availability of mussels for birds. In the report (appropriate assessment) he concludes that there are no significant effects of these activities when a certain minimum quantity of the seed mussels that are fished remain in the Waddenzee. This quantity is guaranteed by the requirement in the management system that 85 % of the mussels fished in the Waddenzee should remain in this estuary for at least one year. When this condition is met van Stralen calculated that the overall food supply for birds is not reduced since the removals are compensated by the extra growth and reduced mortality of mussels on the culture plots. As is mentioned before Bult (2004) concluded that mussel culture results on average in a 15 % increase of the mussel stock of the Waddenzee.

Van Stralen (2008b) has also evaluated the relationship between mussel culture and trends in the population size of eider ducks. The evaluations showed that although the total populations size of eider ducks in the Netherlands declined the population inside the Waddenzee area where mussel culture takes place does not show such a trend. He concluded that there is no relation between mussel fishery or culture and the decline in the total population (Figure 7.).

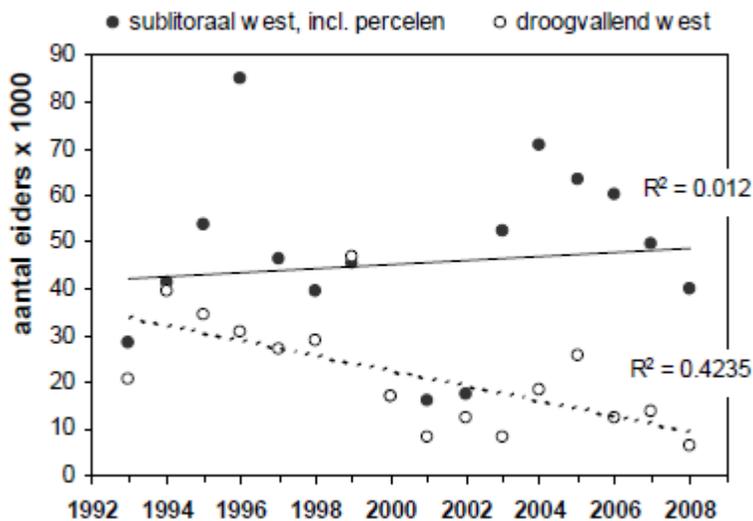


Figure 7. The number of eider ducks in the Western Waddenzee in the sublitoral area (closed dots) and in the intertidal areas in the western Wadden Sea.

In the Oosterschelde, the construction of the storm surge barrier and consequent changes in the environment added pressure to the bird populations (Schekkerman *et al.* 1994). As there never have been more than a few eider ducks in the Oosterschelde, the actual (sub tidal) mussel culture has no link with bird populations.

Protected Species

According to the “Habitatrichtlijn, Annex I, areas where mussel seed is fished (habitat type 1110a) there is no vegetation and there are found three red-list animals which have a status of “not threatened”:

Zeeanjelier	<i>Metridium senile</i>
Slakdolf	<i>Liparis liparis</i>
Grote Zeenaald	<i>Sygnathus acus</i> .

Legally protected under the Nature Conservation Law (Nb-wet / Vogel- en Habitatrichtlijn) are a few fish species which may occur on the mussel fishing grounds:

Elft / Fint	<i>Alosa alosa / A. fallax</i>
Houting	<i>Coregonus oxyrinchus</i>
Zeeprik	<i>Petromyzon marinus</i>
Rivierprik	<i>Lampetra fluviatilis</i>
Steur	<i>Acipenser sturio</i>

There are no reports on the inclusion of these animals in the mussel fishery. In view of the type of fishery the by-catch of fish is very low. By-catch is also returned to the sea, however some mortality may occur and it seems highly likely the fishery has little effect on these populations. Before fishing starts the areas with high densities of mussels are identified. On these mussel banks with young mussels the catches contain almost exclusively mussels.

4 FISHERY MANAGEMENT FRAMEWORK

4.1 Legislation and regulation

4.1.1 EU Regulations

The Netherlands are a Member State of the European Union, and its fishery is subject to the principles and practices of the Common Fisheries Policy. The fishery is managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (2371/2002). In force since 1983, the CFP aims to reconcile resource conservation with the preservation of income and jobs in coastal zones that offer few alternatives in terms of production or employment. It therefore covers not just resources but also markets and structures. The CFP was reviewed thoroughly in 2002.

This basis fisheries regulation is a ‘chapeau’ regulation setting out the strategic aims of the CFP and enabling the Council of Ministers, or in certain cases the Commission, to make more detailed Regulations. These include ones dealing with control requirements, fleet structure, technical conservation, marketing and annual total allowable catches (TAC), etc.

Implementation of the CFP at a national level is carried out through the individual Member States. Member States’ fisheries enforcement authorities co-operate in policing the fishery (e.g. satellite monitoring, landing recording etc). National fisheries administrations are responsible for a range of management and regulatory duties, including management of fleet activity, management of national quota, monitoring and control of all fisheries occurring within national jurisdiction, collection, collation and transmitting of key fishery data, and undertaking at least a base range of scientific monitoring and development work.

Mussels are a non-quota species under the common fisheries policy. Therefore EU technical regulations and yearly regulations establishing TAC’s do not apply to the mussel fishery. On the other hand regulations concerning fleet capacity and water quality do apply.

4.1.2 National Legislation and Regulations

The government policy for mussel culture is governed by an extensive set of laws and regulations. A short overview of the most relevant regulations is presented here.

Visserijwet 1963

The main Dutch legislative act concerning fisheries is the Visserijwet 1963 (Fisheries Act 1963). This act was originally adopted in 1963 and has been amended several times since. Pursuant to Article 3a of this law, secondary legislative competencies have been authorized to be exercised by Royal Decree.

Reglement Zee- en Kustvisserij

The most important part of the secondary legislation based on the Fisheries Act is formed by a Royal Decree originally adopted in 1977 (later amended) and called Reglement Zee- en Kustvisserij (Order on Sea and Coastal Fisheries). It contains more detailed provisions, notably an authorization for further delegation of normative power: according to Article 3(1)(a), the Minister of LNV has been granted competencies to issue implementation rules by ministerial decree.

Uitvoeringsregeling visserij

The “Uitvoeringsregeling visserij” is the Ministerial decree containing the specific rules for mussel fishery and culture. On the basis of this regulation, mussel fishing and culture is subject to fishing licences and the use of a culture plot is reserved to tenants of these plots. The regulations forbid mussel fishery and mussel relaying during night, the weekends and low visibility (article 47). Mussel seed collection using suspended installations is also subject to a specific licence (article 77).

Structuurnota Zee- en Kustvisserij

The general objectives of the fisheries policy of the Minister of LNV within the Common Fisheries Policy (CFP) framework were published in the 1992 Policy Document on Sea and Coastal Fisheries (Structuurnota Zee- en Kustvisserij). This policy document sets the direction for the national fisheries policy until 2003, when the policy was to be evaluated. The policy aimed at an integration of fishing activities and conserving natural values where possible, and a separation of these two activities where necessary. The policy document includes the policy for shellfish fisheries. In the document is laid down that 26 % of the tidal flats in the Wadden Sea are closed for fishing activities that touch the bottom.

Beleidsbesluit Schelpdiervisserij

The Policy Decision on Shellfish Fishery 2005-2020 (*‘Ruimte voor een zilte oogst’*) is a follow up on the Structuurnota Zee- en Kustvisserij and sets out the current government policy on shellfish fishery and culture in the Wadden Sea. The policy laid down in this document is aimed at improving the sustainability of the shellfish sector. The mussel sector is expected to meet the sustainability targets by 2020.

PKB Waddenzee

The Key National Planning Decision for the Wadden (PKB-Waddenzee) is a decree in which the governmental policy for the Wadden Sea for the period 2007-2017 is described. The main goal is sustainable protection and development of the Wadden Sea as a nature area and conservation of the unique open landscape. The policy for the Wadden Sea with respect to mutual relationships between nature protection, spatial planning, environment and water are described. This policy is further incorporated into other governmental decrees as well as provincial and town planning. This is the third policy document on the Wadden Sea. The first and second were issued in 1980 and 1993, respectively.

Natuurbeschermingswet 1998

On the 1st of October 2005 the amended Nature Conservation Act 1998 came into force. The new act ensures that nature areas designated under the Wild Birds and Habitats Directives are protected under Dutch law. In the protected areas a permit system is applied, with permits issued either by the provincial governments or the Ministry of LNV (Ministry of Agriculture, Nature and Food Quality).

The permit system aims at ensuring that future projects which may affect the Natura 2000 areas will be evaluated in an appropriate assessment (passende beoordeling) before permission is granted.

Verordening Quarantainevoorzieningen levende tweekleppige weekdieren

This regulation was issued by the Dutch Fish Product Board (Productschap Vis) on 21 July 2008. The objection of the rules set in this regulation is the prevention of the introduction of toxic dinoflagellates, shellfish diseases and viruses in shellfish production areas. The regulation contains a list of production areas abroad that are considered free from these animals and diseases. It is allowed to bring mussels (and water) from these areas into contact with water in the Oosterschelde. Mussels that do not originate from the areas listed should be kept in quarantine and processing water should not flow back to the Oosterschelde.

Reglement Mosselvisserij and Reglement afdoening overtredingen

These regulations are internal regulations of the Producenten Organisatie van de Nederlandse Mosselcultuur UA. The Reglement Mosselvisserij attributes powers to the board of the PO in order to regulate the mussel seed fishery. The board can set the period and quantity for the seed fishery and divides this quantity into individual quota for the PO members. The division of quota is based on a key that has been agreed on in the early 1990s. The regulation also implements the control of fished quantities by the members. Every catch has to be estimated (measured) by independent controllers.

4.2 Harvest strategy

In the past decade the mussel harvest strategy has developed in the direction of reducing fishing effort and increasing closed fishery areas.

Monitoring of both the stock and its fishery is well in place. The wild mussel stock is monitored before the autumn fishery and before the spring fishery. Areas with different mussel densities and different sizes of mussel (sizes are: seed, half-grown and mature) are identified.

Based on the results of the mussel surveys quota for the fishery are set by the Ministry. In the licence based on the Nature Conservation Act 1998. The PO applies for the licence and in the apply request for a certain amount. These amounts are based on the harvest rules which are defined in the policy paper "Naar een zilte oogst, Beleidsbesluit Schelpdiervisserij 2005-2020. The main harvest rule is that a minimum of 85% of the volume of the mussel seed fished in spring must remain for at least one year on the mussel plots in the Waddenzee. In the appropriate assessment the mussel sector must prove that their fishing activity does not reduce the food availability of shellfish eating birds, with the ultimate goal that the mussel population is equal to or higher than the population which would have existed in conditions with no mussel fishery at all.

In autumn the mussel seed fishery is only allowed in relatively exposed areas with a higher risk of storm damage and/or starfish predation in autumn and winter. For this purpose the seed areas in the Waddenzee are divided in areas ranking from class 1 (very unstable) to class 5 (very stable). The autumn seed fishery is only allowed in the class 1 to 3 areas where it is likely that mussels will be washed away by storms and thus not survive through the winter. The autumn fishery thus targets fishing in exposed sites: mussels in places with a high mortality risk in the winter. These mussels are transported to the more sheltered and protected mussel plots. In this way this fishery saves mussels from winter mortality and both the fishery sector and birds benefit from higher mussel survival rates in the winter.

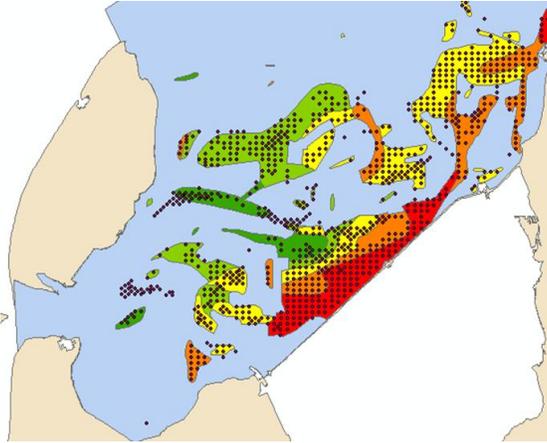


Figure 4.2.1. Map of the western Wadden Sea showing the relatively unstable areas in light green (class 1) and stable areas in red (class 5) and the intermediate classes 2-green, 3-yellow and 4-orange).

The spring monitoring shows the stock size after winter as a basis for the license for spring fishery. On the basis of a fishing plan of the PO and a permit of the Ministry it is allowed to fish on seed beds in relatively stable areas and transport them to the mussel plots. At least 85% of this stock should remain in the Wadden Sea plots for the coming winter in order to maintain food availability for birds.

This harvest strategy aims to fish in such a way that its impact on the size of the mussel stock is minimal and that the mussel culture as a whole does not reduce food availability for birds in the Waadzee. According to Bult et al, 2004 the mussel fisheries in the Waddenzee increases the mussel stock on average with 15%.

In the mussel agreement (covenant) it is agreed that bottom dredging for seed mussels is gradually phased out. As a first step currently 20 % of the subtidal mussel beds are excluded from the fishery. Currently an area of 210 hectares in the subtidal area of the Waddenzee is permanently closed for mussel fishing.

The harvest strategy reflects the state of the stock and elements of the harvest strategy work together to achieve the management objectives.

The mussel harvest strategy has been agreed with authorities and relevant NGO's and is generally accepted as appropriate. The agreement signed by the above mentioned partners states the requirement to reduce the mussel seed fishery and the framework of transition from mussel seed fishery towards mussel spat collection, by using MZI's will result in the reduction of the mussel seed fishery.

The mussel fishery effort is based on the available quota as indicated in the fishing plan. As the sector is well organised, the vessels used for fishing the quota are appointed before the fishery starts. Each vessel is equipped with a GPS apparatus ("black box") on board which permanently registers the position of the boat. During the fishery (which usually only takes place during a few weeks in spring and a month in the autumn), every load of mussels is measured by the independent organisation (PVIS) to monitor and control that the quota of the individual vessel and the total fleet are not exceeded.

Twice a year the mussel harvest strategy is evaluated.

4.3 Roles & Responsibilities

4.3.1 Government Management

Ministry of Agriculture, Nature and Food Quality

The Fisheries Department (Directie Visserij) of the Ministry of Agriculture, Nature and Food Quality (Ministerie van Landbouw, Natuur en Voedselkwaliteit, LNV) is the organization responsible for administering the mussel culture and fishery. The fisheries department develops and implements the policy for the mussel culture as it is laid down in the policy paper “Naar een zilte oogst, Beleidsbesluit Schelpdiervisserij 2005-2020”. The fisheries department also issues the fisheries licenses and the licences for MZI installations.

The framework in which the mussel sector operates is determined mainly by the policy paper “Ruimte voor een zilte oogst,” that defines the main objective to act to develop a healthy shellfish fishery sector, using production methods with respect for nature. Concerning the development of natural values, important objectives are used to develop more characteristic sea bottom biotopes (ecological niches) such as stable mussel banks and sea grass fields.

The policy paper also focuses on targets for:

- broadening the social basis and avoidance of judicial procedures among stakeholders (e.g. a sector against NGO's)
- conservation of historical-cultural values of the shellfish fishery
- communication with relevant stakeholders
- taking into account the social-economical consequences (such as regional employment opportunities).

Specific policies for the mussel fishery and culture described in the policy paper are:

- The areas that were permanently closed in 1993 on the basis of the Policy Document on Sea and Coastal Fisheries remain closed. This involves 26 % of the Waddenzee and 16 % of the Oosterschelde area.
- A reference area for research on the impacts of fishing is permanently closed.
- Fishing in close proximity of inter-tidal mussel beds and sea grass fields is not allowed. This is regulated in the fishing licences.
- Prior to fishing, the mussel sector must prove that their fishing activity contributes to the food availability of shellfish eating birds, with the ultimate goal that the mussel population is equal to or higher than the population which would have existed in conditions with no mussel fishery at all. The mussel seed fishery in autumn is only allowed in areas with a high risk of storm damage in the winter. In spring the remaining seed can be transported to the mussel plots. A minimum of 85% of the volume of the mussel seed fished in spring must remain for at least one year on the mussel plots in the Waddenzee.
- It is not allowed to scare away eider ducks from the culture plots.

The provision of licenses based on the Nature Conservation Act 1998 is delegated to the Departments of Regional Affairs (Directie Regelingen), The regional office of the Ministry based in the North of the Netherlands (DRZ Noord) evaluates the appropriate assessments commissioned by the industry and consequently issues the Nature Conservation Act licenses for the seed fishery in spring and autumn.

The regional office in the South evaluates the appropriate assessment of the import and consequently seeding of these mussels in the Oosterschelde and issues the Nature Conservation Act licence to sow foreign mussels in the Oosterschelde. A list of foreign production area from where the import of mussels is evaluated and allowed is attached to the licence.

The Dutch Fish Product Board (Productschap Vis) is a semi government agency with both public and private law authority. The fisheries board has a regional office in Yerseke (mosselkantoor). This regional office operates the mussel auction and all financial transactions.

The Fish Product Board has the authority to issue regulations in the field of product quality and acts to implement the EU Shellfish waters directive. The Fish Product Board designates shellfish waters and

implements a monitoring programme to control the water quality in these waters. The fisheries board may revise the designation of certain waters when water quality standards are not met.

4.3.2 Self Regulation

All Dutch mussel growers are member of the Producenten Organisatie van de Nederlandse Mosselcultuur UA (PO). Over the years The PO has developed and implemented an extensive management system based on self-regulation and co-management principles. The Dutch government has delegated the responsibilities for the allocation of quota and the management of mussel seed fishery to the PO.

As described in section 5.2 PO Mossel sets the total allowable catch for the seed fishery and allocates individual quota to its members. The total amount to be fished is included in the fishing plan that is drafted by the board of the PO. The seed fishery is regulated by two main regulations described in section 5.1. The “Reglement mosselvisserij” sets the general rules that apply to the seed fishery such as control measures and the authority of the board to close certain areas.

4.4 Monitoring, Control and Surveillance

In the Netherlands EU and national legislation is monitored and enforced by the General Inspection Service (Algemene Inspectiedienst, AID) of the Ministry of Agriculture, Nature and Food Safety

The AID is responsible for enforcement of fishery regulations and collecting information on fishing activity at sea within the nation states fishery limits.

The Ministry of LNV also operates inspection vessels in the Waddenzee and the Oosterschelde. The fishery inspectors onboard these vessels have policing powers and control fishing activities in these waters.

The black box continuously registers the position and speed of all mussel fishing boats. The records of the black box are regularly checked and inspected by a commission of two persons, who check the legality of all the movements and activities of the mussel fishing boats.

In case of a violation of a rule the procedure as described in the “Reglement afdoening overtredingen” is applied. The conduct of the fisherman involved will be evaluated by an independent commission that can impose a fine. Appeal against a ruling of the independent commission is possible at the arbitration committee of the fishing industry based in Rotterdam (Stichting Arbitrage Visserij).

4.5 Compliance

Levels of compliance and evaluations suggest that the self regulation system applied by the PO is generally highly effective. Some violations have occurred in the sense that the fishery has taken place in a closed area for research purpose. However, these events are very rare and the fishermen involved have been fined.

4.6 Dispute resolution

Disputes that arise are first of all dealt with by individual fishermen and by the local fishery organizations in Yerseke, Zierikzee and Bruinisse.

The PO plays a special role in dispute settlement. The chairman and secretary are at times asked to negotiate and or intervene to resolve/ and settle disputes. When a dispute concerns a violation of PO rules the independent commission appointed by the PO can make a ruling.

A special arbitration committee (Stichting Arbitrage Visserij) is established in the Netherlands where disputes can be presented by fishermen.

5 OTHER FISHERIES IN THE AREA AFFECTING THE TARGET STOCK

5.1 Wadden Sea

In the Wadden Sea the main fishery besides mussel fishery is the fishery for brown shrimp (*Crangon crangon*). Currently the number of licences for shrimp fishery in the Wadden Sea is 87. The areas that have been closed for the mussel fishery in 1993 (26 % of the intertidal mudflat area) are also closed for shrimp fishery. On top of these area closures also the areas with a high probability for the development of mussel banks that are closed for mussel seed fishery are closed for shrimp fishery as well. It is also believed that shrimp fishermen tend to avoid areas with mussels since the mussels can damage the shrimp trawls.

5.2 Oosterschelde

The Oosterschelde is the most important fishing and growing area for pacific oysters (*Crassostrea gigas*) in the Netherlands, Young oysters are caught in the wild and seeded on culture plots, Next to this also a fishery for marketable oysters takes place.

Trawl fishery takes place in the Oosterschelde at a very limited level. Although approximately 10 licences for trawl fishery in the area are issued only 3 fishermen actually fish in the Oosterschelde during part of the year. The target species of these fishermen are lobster and sole.

6 STANDARD USED

The MSC Principles and Criteria for Sustainable Fisheries form the standard against which the fishery is assessed and are organised in terms of three principles.

Principle 1 addresses the need to maintain the target stock at a sustainable level.

Principle 2 addresses the need to maintain the ecosystem in which the target stock exists.

Principle 3 addresses the need for an effective fishery management system to fulfil Principles 1 and 2 and ensure compliance with national and international regulations.

The Principles and their supporting Criteria are presented below.

6.1 Principle 1

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

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria:

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.
3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

6.2 Principle 2

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

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

The sequence in which the Principles and Criteria appear does not represent a ranking of their significance, but is rather intended to provide a logical guide to certifiers when assessing a fishery. The criteria by which the MSC Principles will be implemented will be reviewed and revised as appropriate in light of relevant new information, technologies and additional consultations.

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.
3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

6.3 Principle 3

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

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

A. Management System Criteria:

The management system shall:

1. Ensure that the fishery shall not be conducted under a controversial unilateral exemption to an international agreement.
2. Demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisan, and fishing-dependent communities shall be addressed as part of this process.
3. Be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings.
4. Observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability.
5. Incorporates an appropriate mechanism for the resolution of disputes arising within the system.
6. Provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing.

7. Act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty.
8. Incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.
9. Require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.
10. Specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
 - a) setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
 - b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
 - c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
 - d) mechanisms in place to limit or close fisheries when designated catch limits are reached;
 - e) establishing no-take zones where appropriate.
11. Contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

B. Operational Criteria

Fishing operations shall:

1. Make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive
2. Implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas.
3. Not use destructive fishing practices such as fishing with poisons or explosives;
4. Minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.
5. Be conducted in compliance with the fishery management system and all legal and administrative requirements.
6. Assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

7 BACKGROUND TO THE EVALUATION

7.1 Previous certification evaluations

The fishery has not been previously assessed against the MSC standard.

7.2 Inspections of the fishery

Inspection of the fishery focused on the practicalities of fishing operations, the mechanisms and efficiency of management agencies and the scientific assessment of the fisheries.

Some of the key issues discussed have been identified for each meeting.

8 STAKEHOLDER CONSULTATION

8.1 Stakeholder Consultation

Extent of available information

A total of 8 stakeholder organisations and individuals having relevant interest in the fishery assessment were identified and consulted during this assessment. The interest of others not appearing on this list was solicited through the postings on the MSC website, and by advertising in the Dutch weekly paper for the Fishery industry - Visserijnieuws.

Initial approaches were made by email and followed up by phone conversations. Issues raised during correspondence were investigated during research and information gathering activities, and during interviews. Meetings were held with stakeholders as follows. Some of the key issues discussed have been identified for each meeting.

Name	Organisation	Date	Key Issues
Paula Huissen	PO Mossel	18-05-2010	• Control and enforcement
Hans van Geesbergen	PO Mossel	18-05-2010	• Control and enforcement
Jaap Holstein	Mussel Traders	18-05-2010	• Fishery Management
Management	Premier Mossel	18-05-2010	• Processing

8.2 Stakeholder Issues

Written and verbal representations were provided to the assessment team expressing a range of views, opinions and concerns. The team is of the view that matters raised have been adequately debated and addressed as a part of the scoring process for this fishery and that none of the issues raised, therefore, require separate attention beyond that represented in this report.

9 OBSERVATIONS AND SCORING

9.1 Introduction to Scoring Methodology

The MSC Principles and Criteria set out the requirements of a certified fishery. These Principles and Criteria have been developed into a standard (Fishery Assessment Methodology) assessment tree - Performance Indicators and Scoring Guideposts - by the MSC, which is used in this assessment.

The Performance Indicators (PIs) have been released on the MSC website. In order to make the assessment process as clear and transparent as possible, each PI has three associated Scoring Guideposts (SG's) which identify the level of performance necessary to achieve 100, 80 (a pass score), and 60 scores for each Performance Indicator; 100 represents a theoretically ideal level of performance and 60 a measurable shortfall.

For each Performance Indicator, the performance of the fishery is assessed as a 'score'. In order for the fishery to achieve certification, an overall weighted average score of 80 is necessary for each of the three Principles and no Indicator should score less than 60. As it is not considered possible to allocate precise scores, a scoring interval of five is used in evaluations. As this represents a relatively crude level of scoring, average scores for each Principle are rounded to the nearest whole number.

Weights and scores for the Fishery are presented in the scoring table (Appendix A).

10 TRACEABILITY AND LOGO LICENSE REQUIREMENTS

The traceability of the product from the sea to the consumer is vital for insuring the maintenance of the MSC standard. There are several aspects of the traceability which the MSC require to be evaluated: Traceability within the fishery, at sea-processing; point of landing; and subsequently the eligibility of the product to enter the chain of custody. These requirements are assessed under the relevant headings within this section.

10.1 Traceability

The traceability of the fishing activity for this fishery is provided by the statutory requirement to land all mussels to the mussel auction at Yerseke. The Dutch Fish Product Board records all landings and sales at the auction. There is additional traceability of seed mussel fishing through the specific opening and closing of the mussel seed fishery. Fishermen can therefore only fish for mussel seed during these short fishing periods.

At the Yerseke rewatering areas, mussels from the Netherlands and from abroad are stored and traded. It is therefore possible that mussels from Dutch origin might get mixed up with those imported from abroad, leading to traceability problems. Mussels can get mixed either when seed is bought from abroad and seeded on the mussel plots for grow-out, or when full-grown mussels are imported to be cleaned, processed, packed and traded in Yerseke.

It is argued that the import of mussels and their mixing with locally grown mussels may be necessary to maintain the required size range and assortment, so that there are enough mussels of uniform size, to supply demanding clients. To resolve this problem, the industry will have to develop a management system to create a very clear physical and administrative barriers between MSC certified and non-MSC certified mussels.

The MSC Chain-of Custody which commences after the mussels are removed from the water to be processed and traded, will not be submitted for certification within the mussel fishery assessment for MSC certification.

10.2 At-Sea Processing

No at-sea processing is undertaken in this fishery. Mussels are either relaid on culture plots or landed on the day of catch for sale at the mussel auction in Yerseke.

10.3 Points of Landing

Mussels are only landed by the mussel producers at the mussel auction in Yerseke and are subject to inspections of the catch at this landing point by inspectors of the Dutch Fish Board (Productschap Vis). Mussels are relaid on purification plots in the Oosterschelde by the processing companies based in Yerseke. After purification the mussels are fished and landed in the port of Yerseke or at the waterfront next to the processing factories.

10.4 Eligibility to Enter Chain of Custody

The scope of this certification ends at the point of landing at the processing factories after purification in the Oosterschelde (Yerseke bank).

Currently, the assessment team is **not** satisfied with the system of tracking and tracing in the fishery and concludes that there is a large element of risk that not all fish and fish products identified as such by the fishery, originate from the evaluated fishery.

Due to the high level of risk that imported mussels (mussel seed and market sized mussels) may be mixed with the mussels from this fishery, it will not be possible to land mussels from the fishery that can enter into the MSC chain of custody system unless a change of the management system occurs before the fishery is MSC certified.

The management system must guarantee that either all the imported mussels are from MSC certified fisheries or that the imported mussels can be guaranteed to be kept separate from all the MSC fishery mussels at all times. In this situation all imported mussels would NOT be MSC certified and would not be able to enter the MSC chain of custody certification system.

The sale of mussels from the fishery as MSC CoC will need to be reviewed prior any sales taking place using the MSC Chain of custody assessment. All imported mussels will require to be from an MSC certified fishery and must be from an MSC Chain of Custody certified supplier.

10.5 Eligibility Data

The eligibility date for mussels from this fishery is the certification date.

10.6 Logo license requirements

The fishery client can use the logo free of charge for promotional purposes only.

The on-product use of the logo is covered by the consecutive Chain Of Custody certificate holders. Every use of the logo need MSC's approval.

11 ASSESSMENT RESULTS

11.1 Performance

The individual score of each PI as scored in the annexes A to D is as below:

Principle	Wt (L1)	Component	Wt (L2)	PI No.	Performance Indicator (PI)	Score UoC1	Score UoC2	Score UoC3	Score UoC4				
One	1	Outcome	0,5	1.1.1	Stock status	90	80						
				1.1.2	Reference points	85	85						
				1.1.3	Stock rebuilding								
				1.1.4	Genetic structure of Stock	80	80						
		Management	0,5	1.2.1	Harvest strategy	80	80						
				1.2.2	Harvest control rules & tools	80	80						
				1.2.3	Information & monitoring	75	75						
				1.2.4	Assessment of stock status	70	75						
				1.2.5	Genetic management	80	80						
				1.2.6	Genetic Information	75	75						
				Two	1	Retained species	0,2	2.1.1	Outcome	100	100	90	90
								2.1.2	Management	80	80	80	80
2.1.3	Information	90	90					80	90				
By catch species	0,2	2.2.1	Outcome			95	95	85	85				
		2.2.2	Management			80	80	80	80				
		2.2.3	Information			90	90	80	80				
ETP species	0,2	2.3.1	Outcome			90	90	80	80				
		2.3.2	Management			85	85	85	85				
		2.3.3	Information			90	90	80	80				
Habitats	0,2	2.4.1	Outcome			90	90	60	80				
		2.4.2	Management			90	90	85	90				
		2.4.3	Information			80	80	85	80				
Ecosystem	0,2	2.5.1	Outcome			80	80	80	80				
		2.5.2	Management			80	80	85	80				
		2.5.3	Information			75	75	85	75				
Three	1	Governance and policy	0,5			3.1.1	Legal & customary framework	90	90	90	90		
						3.1.2	Consultation, roles & responsibilities	90	90	90	90		
						3.1.3	Long term objectives	90	90	90	90		
				3.1.4	Incentives for sustainable fishing	85	85	85	85				
		Fishery specific management system	0,5	3.2.1	Fishery specific objectives	90	90	90	90				
				3.2.2	Decision making processes	85	85	85	85				
				3.2.3	Compliance & enforcement	85	85	85	70				
				3.2.4	Research plan	90	90	90	90				
				3.2.5	Management performance evaluation	85	85	85	85				

The Performance of the Fishery in relation to MSC Principles 1, 2 and 3 are summarised below:

MSC Principle	Fishery Performance
UoC 1	
Collection of mussel seed by suspended ropes	
Principle 1: Sustainability of exploited stock	Overall: 80,8 PASS
Principle 2: Maintenance of ecosystem	Overall: 86,3 PASS
Principle 3: Effective management system	Overall: 87,9 PASS
UoC 2	
Collection of mussel seed by suspended nets	
Principle 1: Sustainability of exploited stock	Overall: 80,8 PASS
Principle 2: Maintenance of ecosystem	Overall: 86,3 PASS
Principle 3: Effective management system	Overall: 87,9 PASS
UoC 3	
Collection of mussel seed by mussel dredging	
Principle 1: Sustainability of exploited stock	Overall: 80,8 PASS
Principle 2: Maintenance of ecosystem	Overall: 81,3 PASS
Principle 3: Effective management system	Overall: 87,9 PASS
UoC 4	
Collection of harvest size mussels by dredging	
Principle 1: Sustainability of exploited stock	Overall: 80,8 PASS
Principle 2: Maintenance of ecosystem	Overall: 81,7 PASS
Principle 3: Effective management system	Overall: 86,4 PASS

The fishery attained a score of 80 or more against each of the MSC Principles and did not score less than 60 against any Indicators. It is therefore determined that the Dutch Blue Shell Mussel fishery in North Sea ICES IVc (Waddenzee en Oosterschelde) be certified according to the Marine Stewardship Council Principles and Criteria for Sustainable Fisheries.

11.2 Conditions

Condition 1

Applicable to UoC 1 and UoC 2

Harvest Strategy	1.2.3 information & monitoring:
PI	Relevant information is collected to support the harvest strategy
SG 60	<u>Some</u> relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. 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.
SG 80	<u>Sufficient</u> relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy. Stock abundance and fishery removals are <u>regularly monitored at a level of accuracy and coverage consistent with the harvest control rule</u> , and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule. There is good information on all other fishery removals from the stock.
SG 100	A <u>comprehensive range</u> 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 relevant to the current harvest strategy, is available. <u>All information</u> required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent <u>uncertainties</u> in the information [data] and the robustness of assessment and management to this uncertainty.
Scoring	75
Rationale	Information about suspended seed mussel collectors (standing stock, harvested amounts) is available at the farm level. Once a year harvest data is collected from the farmers that are organised within the Producers Organisation, based on the information from the farmers. Farm level book keeping includes the amount of seed harvested from seed collectors and used for grow out. There is sufficient relevant information available related to seed harvest to support the harvest strategy. However, there are no protocols for the procedure and validation of independent data collection. As the data are critical for both impact assessment and progress in the transition process, and farmers may have conflicting interests in estimating the amount of seed they have collected with the MZIs it is important to have a reliable and independent estimate of the harvested amounts.
Condition	An independent and ongoing monitoring program should be in place to determine the size of stock and harvest of suspended mussel seed in order to estimate the effects of the harvesting strategy on the wild stocks. Timescale: By first surveillance audit: written evidence of the development towards an independent data collection system. By second surveillance audit: written evidence of the implementation of an ongoing monitoring program to determine the stock and harvest in this fishery.
Client Action Plan	The ministry (LNV) demands a report of the harvested quantity from each license holder. License holders are obliged to inform the ministry about the expected days of harvesting of the MZI's.

	<p>The Ministry checks during the harvesting at random the individual catches.</p> <p>The PO collects for the ministry from the license holders the reports with the information about the MZI systems and the quantity of suspended seed mussels which is harvested. The PO yearly prepares a report of the total harvested quantity for the ministry. The PO will check the reliability of the individual data by comparing them.</p> <p>This report is available for the research institutes.</p>
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Harvest Strategy	1.2.4. Assessment of stock
PI	There is an adequate assessment of the stock status
SG 60	The assessment estimates stock status relative to reference points. The major sources of uncertainty are identified.
SG 80	The assessment is appropriate for the stock and for the harvest control rule, and is evaluating stock status relative to reference points. The assessment takes uncertainty into account. The stock assessment is subject to peer review.
SG 100	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. The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way. The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. The assessment has been internally and externally peer reviewed.
Scoring	70
Rationale	<p>The stocks of seed mussels and the mussels on the culture plots is regularly assessed. This assessment is appropriate for the stock as a whole and for the harvest control rule, and is evaluating stock status relative to reference points.</p> <p>Concerning the size of the suspended mussel culture (stock) and the influence of this practice on the total mussel stock some uncertainties remain. The major sources of this uncertainty are identified (2-60). The stock of seed collectors is assessed at the moment of harvest by the farmers. Data is collected and reported annually for the total amount of seed and checked by fishery inspectors. However there are no protocols for the measurements and there is no independent (peer) review of these data.</p>
Condition	See condition 1 above.
Client Action Plan	<p>The ministry (LNV) demands a report of the harvested quantity from each license holder. License holders are obliged to inform the ministry about the expected days of harvesting of the MZI's.</p> <p>The Ministry checks during the harvesting at random the individual catches.</p> <p>The PO collects for the ministry from the license holders the reports with the information about the MZI systems and the quantity of suspended seed mussels which is harvested. The PO yearly prepares a report of the total harvested quantity for the ministry. The PO will check the reliability of the individual data by comparing them.</p>

	This report is available for the research institutes.
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Condition 2

Applicable to UoC 1, UoC 2, UoC 3 and UoC 4

Harvest Strategy	1.2.6 Genetic Information
PI	Information on the genetic structure of the population is adequate to determine the risk posed by the fishery and the effectiveness of the management of genetic diversity.
SG 60	Qualitative / inferential information is available on the genetic structure of the population. Information is adequate to broadly understand the likely impact of the fishery. Information is adequate to support measures to manage main genetic impacts of the fishery on the stock, if necessary.
SG 80	Qualitative / inferential information and some quantitative information is available on the genetic structure of the population. Information is sufficient to estimate the likely impact of the fishery. Information is adequate to support a partial strategy to manage main genetic impacts of the fishery on the stock, if necessary.
SG 100	Qualitative / inferential information and some quantitative information is available on the genetic structure of the population. Information is sufficient to estimate the likely impact of the fishery. Information is adequate to support a partial strategy to manage main genetic impacts of the fishery on the stock, if necessary.
Scoring	75
Rationale	Information on the genetic characteristics of the mussel population is available on the basis of a synoptic survey, but no monitoring is carried out on the development of the populations and their genetic characteristics, that may be affected by imported mussels.
Condition	A survey program for genetic profiling of the mussel population should be in place that is able to detect possible changes over a period time with a 5 years interval. Timescale: By first surveillance audit: provision of data and information encouraging the development of a survey program for genetic profiling for this fishery. By third surveillance audit: written evidence of implementation of a genetic survey program.
Client Action Plan	The PO will discuss with the Ministry the responsibility for the extra analysis of the mussels in the culture areas for their genetic profile. This analysis must give information about the consequences of the governmental policy concerning the replacement of bottom seed fishery by msc's on the genetic profile of the mussel populations in Dutch Waters.

Condition 3

Applicable to UoC 3

Habitat	2.4.1 Status
P2	The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.
SG 60	The fishery is <u>unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 80	The fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.
SG 100	There is <u>evidence</u> that the fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.
Scoring	60
Rationale	The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. Results of the ongoing research are required for further consideration. There is a research project going on to detect possible damage to the habitat at various spatial scales.
Condition	Results of impact studies need to be taken into account to evaluate the effects of the seed fishery on the habitat types. Timescale: By second surveillance audit.
Client Action Plan	The PO uses and will use the results of scientific studies and recommendations in the appropriate assessments for the application of a license based on the Nature Conservation Act. The possible effects of seed fishery on the habitat types is part of the actual Probus study of which the results are expected in 2012. Intermediate results will be taken into account.

Condition 4

Applicable to UoC 1, UoC 2 and UoC 4

Ecosystem	2.5.3 Information monitoring
P2	There is adequate knowledge of the impacts of the fishery on the ecosystem.
SG 60	Information is adequate to <u>identify</u> the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity). The main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>have not been investigated in detail</u> .
SG 80	Information is adequate to <u>broadly understand</u> the key elements of the ecosystem. The main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>may not have been investigated in detail</u> . The main functions of the Components (i.e. target, By-catch, Retained and ETP species and Habitats) in the ecosystem are <u>known</u> . 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 data continues 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).
SG 100	Information is adequate to <u>broadly understand the key elements</u> of the ecosystem. The main <u>interactions</u> between the fishery and these ecosystem elements can be inferred from existing information, and <u>have been investigated</u> . The impacts of the fishery on target, By-catch, Retained and ETP species and Habitats are identified and the main functions of these Components in the ecosystem are <u>understood</u> . Sufficient information is available on the impacts of the fishery on the Components <u>and elements</u> to allow the main consequences for the ecosystem to be inferred. Information is sufficient to support the development of strategies to manage ecosystem impacts.
Scoring	75
Rationale	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). Carrying capacity studies and spat fall seed collection data are needed before up scaling of the seed net collectors will take place.
Condition	Quantitative information on the effects of increase in the seed net collectors on the carrying capacity and effect on the ecosystem need to be available and applied. Independent data collection of stock and harvest size, need to be in place. Timescale: By second surveillance audit.
Client Action Plan	The agreement (Covenant) to change from dredging for seed to seed collecting (transition) will be executed. The data collection of seed from MZI's is available and research is done on the effects on the carrying capacity and ecosystem. These results will be taken in account in the decision about up scaling of MZI's.

Condition 5

Applicable to UoC 4

Fishery specific management system	3.2.3 Compliance and enforcement
P3	The monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.
SG 60	The monitoring, control and surveillance <u>mechanisms</u> that exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective. Sanctions to deal with non-compliance exist and there is some evidence that they are applied. Fishers are <u>generally thought</u> 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.
SG 80	A monitoring, control and surveillance <u>system</u> has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and / or rules. Sanctions to deal with non-compliance exist, <u>are consistently applied</u> and thought to provide effective deterrence. <u>Some evidence exists</u> 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 no evidence of systematic non-compliance.
SG 100	A <u>comprehensive</u> 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. Sanctions to deal with non-compliance exist, are consistently applied and <u>demonstrably</u> provide effective deterrence. There is a <u>high degree of confidence</u> that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery. There is no evidence of systematic non-compliance.
Scoring	70
Rationale	In the Oosterschelde mussel seed not only originating from Dutch waters but also foreign mussel seed is used for on growing. After the sale of mussels at the auction in Yerseke marketable mussels are purified at the watering plots in the Oosterschelde were also imported mussels are purified. It is currently common practice that mussels from different origins are `mixed` at the watering and culture plots in the Oosterschelde. The imported foreign mussels are outside the scope (UoC) of this certification and should therefore be strictly separated from MSC certified mussels. Currently there are no clear monitoring, control and surveillance measures in place that convincingly guarantee that mixing will not occur. Therefore at present the requirements for a monitoring, control and surveillance system that has demonstrated an ability to enforce relevant management measures, strategies and/or rules are not met.
Condition	To develop and implement a control, monitoring and enforcement system which provides sufficient guarantees that foreign mussel seed and mussels are kept separated from the locally produced mussels in all

	<p>stages of the production and purification process.</p> <p>Timescale: within 6 months after MSC fishery certification.</p>
Client Action Plan	<p>Each processing and packing company has to give sufficient information about their live stock administration system in the Chain of Custody Certification. This system makes it possible to track each load. Not msc mussels have to be stored on marked (parts of the) rewatering plots. Each farmer has to inform the ministry, based on the license, about the culture plot(s) where imported mussels are relayed. A copy is send to the PO. The lot can be followed with the weekly check of the black box. From this plot no msc mussels can be fished during the period that the mussels are on this plot. The auctionmaster is informed by the PO about the plots where imported mussel are farmed and will inform the buyers when the mussels are sold.</p>

11.3 Recommendations

Recommendation 1

Benthic impacts of up scaling of MZI's UoC 1, 2 and 3 (performance indicator 2.4.3)

Although the stakeholder consultations and available scientific evidence suggest that the impact of the current number of MZI's on benthic habitats is a relatively minor issue, it would be advantageous to future scoring of the fishery if these effects is could be described more accurately to confirm that the up scaling of MZI's would not have significant detrimental effects of bottom habitats.

Recommendation: Monitoring of the effects of SMC's on the sea bottom is therefore recommended.

Recommendation 2

Ecosystem effects of up scaling of MZI's UoC 1, 2 and 3 (performance indicator 2.5.1)

Mussels that grow on MZI's compete with other filter feeders in the ecosystem. The current quantity of mussel seed is not expected to have a significant effect on the food resource of other organisms in the ecosystem. However with the up scaling of MZI's the competition for food would increase.

Recommendation: It is recommended to determine the effects of any increase in numbers of SMC's on the carrying capacity and the effects on the ecosystem.

12 CLIENT ACTION PLAN

to/aan: Sander Buijs SGS
from/van: Jaap Holstein, namens PO mossel

re/betreft: Cliënt Action Plan
date/datum: 16-09-2010

I. Conditions

Condition 1: Harvest Strategy.

An independent and ongoing monitoring program should be in place to determine the size of stock and harvest of suspended mussel seed in order to estimate the effects of the harvesting strategy on the wild stocks.

Information about suspended seed mussel collectors (standing stock, harvested amounts) is available at the farm level. Annual harvest data is collected from the farmers that are members within the Producers Organisation. Farm level book keeping includes the amount of seed harvested from seed collectors and used for grow out. There is sufficient relevant information available related to seed harvest to support the harvest strategy. However, there are no protocols for the procedure and validation of independent data collection.

Comment PO: The goal of the use of suspended seed mussel collectors is to replace the seed mussel fishery with dredges on natural beds and to restore the area of wild mussel beds. The combination of collecting seed and fishing seed must result in enough seed mussels for the farmers to cover their culture plots. There is a need to register the harvested quantity of seed mussels as the pursued average quantity from MZI's is 40 million kilograms.

Client Action Plan

The ministry (LNV) demands a report of the harvested quantity from each license holder. License holders are obliged to inform the ministry about the expected days of harvesting of the smc's.

The Ministry checks during the harvesting at random the individual catches.

The PO collects for the ministry from the license holders the reports with the information about the MZI systems and the quantity of suspended seed mussels which is harvested. The PO yearly prepares a report of the total harvested quantity for the ministry. The PO will check the reliability of the individual data by comparing them.

This report is available for the research institutes.

Condition 2: Genetic Information.

A survey program for genetic profiling of the mussel population should be in place that is able to detect possible changes over a period time with a 5 years interval

Information on the genetic characteristics of the mussel population is available on the basis of a synoptic survey, but no monitoring is carried out on the development of the populations and their genetic characteristics, that may be affected by imported mussels.

Comment PO:

Although the imports of mussels may have had some impact on the population genetics of the Dutch populations, studies do not show distinct resemblances between the genetic structure of the populations in or close by the mussel export areas and the genetic structure of the populations in the Oosterschelde. It is furthermore unclear to what degree climate change may be responsible for some of the genotypes found in the Dutch waters.

Client Action Plan

The PO will discuss with the Ministry the responsibility for the extra analysis of the mussels in the culture areas for their genetic profile. This analysis must give information about the consequences of the governmental policy concerning the replacement of bottom seed fishery by msc's on the genetic profile of the mussel populations in Dutch Waters.

Condition 3: Harm to habitat

Results of impact studies need to be taken into account to evaluate the effects of the seed fishery on the habitat types.

The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm. Results of the ongoing research are required for further consideration.

Comment PO: Within 2 years the results of the long term research project (Probus) about the possible impact of seed fishery on habitat types will be published.

Client Action Plan

The PO uses and will use the results of scientific studies and recommendations in the appropriate assessments for the application of a license based on the Nature Conservation Act. The possible effects of seed fishery on the habitat types is part of the actual Probus study of which the results are expected in 2012. Intermediate results will be taken into account.

Condition 4: Fishery Impact On The Ecosystem.

Before up scaling of MZI's quantitative information on the effects of increase in the seed net collectors on the carrying capacity and effect on the ecosystem are available and applied. Independent data collection of stock and harvest size is in place.

Sufficient data continues 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). Carrying capacity studies and spat fall seed collection data are needed before up scaling of the seed net collectors can take place.

Comment PO: the use of seed mussel collectors is based on an agreement with ngo's and the ministry. The up scaling is part of this agreement. The effect on the ecosystem has to be compared with the effect of dredging for seed mussels on the ecosystem. The amount of mussels farmed is limited by the area of mussel plots. This area is restricted. Mussel biomass is only a part of the total amount of filter feeders in the production areas.

See paragraph 2.5.2: "Study outcomes will be used in the governmental policy decisions on up scaling and future site selections".

Client Action Plan

The agreement (Covenant) to change from dredging for seed to seed collecting (transition) will be executed. The data collection of seed from MZI's is available and research is done on the effects on the carrying capacity and ecosystem. These results will be taken in account in the decision about up scaling of MZI's.

Condition 5: Compliance and enforcement

To develop and implement a control, monitoring and enforcement system which provides

sufficient guarantees that foreign mussel seed and mussels are kept separated from the locally

produced mussels in all stages of the production and purification process.

Timescale: within 6 months after MSC fishery certification

To develop and implement a control, monitoring and enforcement system which provides sufficient guarantees that foreign mussel seed and mussels are kept separated from the locally

produced mussels in all stages of the production and purification process.

Comment PO: each processing company has an administration of the incoming and outgoing lots of mussels. This administration is part of the tracing and tracking system needed for the HACCP and ISO certification. This administration is also used for the registration of imported loads of mussels, as prescribed in the license based on the Nature Conservation Law.

Client Action Plan

Each processing and packing company has to give sufficient information about their live stock administration system in the Chain of Custody Certification. This system makes it

possible to track each load. Not msc mussels have to be stored on marked (parts of the) rewatering plots.

Each farmer has to inform the ministry, based on the license, about the culture plot(s) where imported mussels are relayed. A copy is send to the PO. The lot can be followed with the weekly check of the black box. From this plot no msc mussels can be fished during the period that

the mussels are on this plot. The auctionmaster is informed by the PO about the plots where imported mussel are farmed and will inform the buyers when the mussels are sold.

II. Recommendations

Recommendation 1

Benthic impacts of up scaling of SMC's (performance indicator 2.4.3)

Although the stakeholder consultations and available scientific evidence suggest that the impact of the current number of MZI's on benthic habitats is a relatively minor issue, it would be advantageous to future scoring of the fishery if these effects is could be described more accurately to confirm that the up scaling of MZI's would not have significant detrimental effects of bottom habitats. Monitoring of the effects of MZI's on the sea bottom is therefore recommended.

Comment PO: The impact of MZI's is already part of an existing research project and the effect will be monitored in the future. The actual locations of MZI's do not cause any problem.

Recommendation 2

Ecosystem effects of up scaling of MZI's (performance indicator 2.5.1)

Mussels that grow on MZI's compete with other filter feeders in the ecosystem. The current quantity of mussel seed is not expected to have a significant effect on the food resource of other organisms in the ecosystem. However with the up scaling of MZI's the competition for food would increase. Therefore it is recommended to determine the effects of any increase in numbers of MZI's on the carrying capacity and the effects on the ecosystem.

Comment PO: see Condition 4.

APPENDIX A: SCORING TABLES PRINCIPLE 1 FOR UoC 1, UoC 2, UoC 3 AND UoC 4

Principle 1	A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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1.1	Management outcome		
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1.1.1	Stock status: The stock is at a level which maintains high productivity and has a low probability of recruitment over fishing	(1-60) It is <u>likely</u> that the stock is above the point where recruitment would be impaired.	(1-80) It is <u>highly likely</u> that the stock is above the point where recruitment would be impaired. (2-80) The stock is at or fluctuating around its target reference point.	(1-100) (There is a <u>high degree of certainty</u> that the stock is above the point where recruitment would be impaired. (2-100) There is a <u>high degree of certainty</u> that the stock has been fluctuating around its target reference point, or has been above its target reference point, <u>over recent years</u> .
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Scoring comments

The mussels stock of the North Sea can be considered as one. Mussel spat remains for 4 - 6 weeks in a planktonic phase in the water, which allows partial exchange of genes between neighbouring populations. The local stock size of blue mussels depends highly on local conditions, such as food availability and favourable conditions for spat fall, whilst storms and severe winters may decimate the local mussel population. As such, the Netherlands stock of blue mussels can be managed independently of the stocks of the same species in neighbouring countries like Germany, Denmark and the UK. In mussels the number of offspring per adult is very high and spat survival depends on environmental conditions such as food availability and predator density. Hence, the relationship between size of parent stock and number of offspring is very weak. In other words a small parent population can produce huge number of offspring whilst a huge stock will produce no offspring if conditions are unfavourable. *Therefore, it is highly likely that existing exploitation has no effect on recruitment and the stock is above the level that recruitment would be impaired (1-80) . The combination of a guaranteed minimum number of mussels under all conditions and its high reproduction capacity results in the conclusion that it is highly likely that the stock has been fluctuating around its target reference point over recent years. (2-100 partly met).*

Score:

90

Audit trace references

Stralen, M. R. van, 2008-a

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
1.1.2	Reference Points: Limit and target reference points are appropriate for the stock.	(1-60) <u>Generic</u> limit and target reference points are based on justifiable and reasonable practice appropriate for the species category.	(1-80) Reference points are appropriate for the stock and can be estimated. (2-80) The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity. (3-80) The target reference point is such that the stock is maintained at a level consistent with BMSY or some measure or surrogate with similar intent or outcome. (4-80) For low trophic level species, the target reference point takes into account the ecological role of the stock.	(1-100) Reference points are appropriate for the stock and can be estimated. (2-100) The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of relevant <u>precautionary issues</u> . (3-100) The target reference point is such that the stock is maintained at a level consistent with BMSY or some measure or surrogate with similar intent or outcome, <u>or a higher level</u> , and takes into account relevant precautionary issues such as the ecological role of the stock with a high degree of certainty.

Scoring comments

Reproductive success in mussels is measured by the spat fall. Spat fall depends on (1) production of spat by the mussel population and (2) favourable conditions for its settlement on the bottom or any other substrate. Spat fall success depends mainly on natural conditions such as temperature, weather conditions and food availability. Reproductive capacity is only weakly related to stock biomass. There is a high degree of certainty that in any moment sufficient numbers of mussels are available for reproduction. On an annual basis, only a limited percentage of the total area is fished as the mussel fishery respects closed areas, such as the Eastern Wadden Sea and several smaller areas in the Western Wadden Sea, while in open areas the mussel fishery is permitted only in sub-littoral parts. The considerable number of mussels always remaining in the sea (on the mussel plots, closed areas and in areas where fishery is not economically feasible because of too low mussel densities) means that there is a high degree of certainty that stocks remain above the point where recruitment

is impaired.

The rules of the management agreement are that 85% of the seed biomass from the spring fishery in the Waddenzee, must be left in the Waddenzee for the over winter period each year, to avoid food shortage for diving ducks. Registration of mussel transplantations to the Oosterschelde is done by fishery inspectors. R&D Inventory is done in November to establish the stock size on the culture plots.

The autumn seed fishery is only done on unstable mussel seed beds (category 1,2,3 and not on category 4 and 5)

In the framework of the agreement and the transition process since 2009 300 hectares of wild sub-littoral mussel beds are closed for the mussel fishery.

Seed mussel collectors are in place to collect mussel spat. This is additional to natural spat fall on the bottom. The MZI's provide an additional tool for achieving the target reference point, being a mussel stock that is sufficient to maintain reproductive capacity (spawning stock biomass) and a stock size that provides sufficient food for protected bird species. Reference points are appropriate for the stock and can be estimated (1-80). The limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity following consideration of relevant precautionary issues (2-100). The management measures applied can be considered appropriate to maintain a high productivity of the stock (3-80).

Mussels are a low level trophic species and important food source for birds. Measures are in place to guarantee that this ecological function of the mussel stock is not impaired (4-80).

Score:

85

Audit trace references

Wijsman & Jol, 2008, Stralen, MR van, 2008-a,b, LNV 2009-a, Kamermans & Smaal, 2009

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
1.1.3	Stock Rebuilding: Where the stock is depleted, there is evidence of stock rebuilding.	(1-60) Where stocks are depleted rebuilding strategies which have a <u>reasonable expectation</u> of success are in place. (2-60) Monitoring is in place to determine whether they are effective in rebuilding the stock within a <u>specified</u> timeframe.	(1-80) Where stocks are depleted rebuilding strategies are in place. (2-80) There is <u>evidence</u> 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 <u>specified</u> timeframe.	(1-100) Where stocks are depleted, strategies are <u>demonstrated</u> to be rebuilding stocks continuously and there is strong evidence that rebuilding will be complete within the <u>shortest practicable</u> timeframe.

Scoring comments

Not applicable.

Score:

N/A

Audit trace references

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
1.1.4	Genetic Outcome: The fishery has negligible discernable impact on the genetic structure of the population	(1-60) The fishery is unlikely to impact genetic structure to a point where there would be serious or irreversible harm.	(1-80) The fishery is highly unlikely to impact genetic structure to a point where there would be serious or irreversible harm.	(1-100) (There is evidence that the fishery is highly unlikely to impact genetic structure to a point where there would be serious or irreversible harm.

Scoring comments

The mussels stock of the North Sea can be considered as one stock. Mussel spat remains for 4 - 6 weeks in a planktonic phase in the water, which allows partial exchange of genes between neighbouring populations. These populations consist predominantly of the species *Mytilus edulis* although occurrence of hybrids of *Mytilus edulis*, *Mytilus galloprovincialis* and *Mytilus trossulus* has been documented (for example in the Oosterschelde (Wenne et al, 2006) Seed collection on suspended structures may give some selective advantage to larvae that have preferential settlement and survival on these structures but this hypothesis lacks any proof. It is well known that mussel settlement has always occurred on a broad suite of substrates (rocky shores, poles, suspended structures, soft substrates, shell fragments, existing beds) without any sign of selectivity. It is therefore highly unlikely that seed collection for suspended culture impacts the genetic structure of the population to a point where there would be serious or irreversible harm (1-80).

Score:

90

Audit trace references

Wenne et al., 2006. Kijewski et al, 2009.

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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1.2 Harvest Strategy (management)	
1.2.1	<p>Harvest Strategy: There is a robust and precautionary harvest strategy in place</p> <p>(1-60) The harvest strategy is <u>expected</u> to achieve stock management objectives reflected in the target and limit reference points.</p> <p>(2-60) The harvest strategy is <u>likely</u> to work based on prior experience or plausible argument.</p> <p>3-60) <u>Monitoring</u> is in place that is expected to determine whether the harvest strategy is working.</p>
	<p>(1-80) The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy <u>work together</u> towards achieving management objectives reflected in the target and limit reference points.</p> <p>(2-80) The harvest strategy may not have been fully tested but monitoring is in place and <u>evidence</u> exists that it is achieving its objectives.</p>
	<p>(1-100) The harvest strategy is responsive to the state of the stock and is <u>designed</u> to achieve stock management objectives reflected in the target and limit reference points.</p> <p>(2-100) The performance of the harvest strategy has been <u>fully evaluated</u> and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.</p> <p>(3-100) The harvest strategy is <u>periodically reviewed and improved</u> as necessary.</p>

Scoring comments

Mussels can be considered to be “harvested” at two instances. Firstly when they are removed from the MZI as seed to be transported to the grow-out facilities and secondly when they are transported to the packing factory, when they reach the commercial size. The harvest strategy for suspended culture seed works at the farm level. The control rules are determined by the requirements at the farm and are subject to the registration system of the farm. At the farm level the harvest control rules are well defined, consistent with the harvest strategy and the exploitation rate is a direct function of the size of the seed stock on the collectors, hence it can be reduced when reference points are approached.

The main harvest controls however exist at the level of the total mussel stock in the Waddenzee en Oosterschelde. These rules are well defined and are consistent with the harvest strategy and ensure that the productivity of the stock is maintained at high levels. (1-80). The selection of the harvest control rules takes into account the main uncertainties, (2-80). Available evidence and evaluations of the management system indicate that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules (3-80).

Score:

80

Audit trace references

Kamermans & Smaal, 2009

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
1.2.2	Harvest control rules and tools: There are well defined and effective harvest control rules in place	<p>(1-60) <u>Generally understood</u> harvest control 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.</p> <p>(2-60) There is <u>some evidence</u> that tools used to implement harvest control rules are appropriate and effective in controlling exploitation.</p>	<p>(1-80) <u>Well defined</u> 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.</p> <p>(2-80) The <u>selection</u> of the harvest control rules takes into account the <u>main</u> uncertainties.</p> <p>(3-80) <u>Available evidence indicates</u> that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules</p>	<p>(1-100) <u>Well defined</u> 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.</p> <p>(2-100) The <u>design</u> of the harvest control rules take into account a <u>wide</u> range of uncertainties.</p> <p>(3-100) <u>Evidence clearly shows</u> that the tools in use are effective in achieving the exploitation levels required under the harvest control rules.</p>

Scoring comments

Mussels can be considered to be “harvested” at two instances. Firstly when they are removed from the MZI as seed to be transported to the grow-out facilities and secondly when they are transported to the packing factory, when they reach the commercial size. The harvest strategy for suspended culture seed works at the farm level. The control rules are determined by the requirements at the farm and are subject to the registration system of the farm. At the farm level the harvest control rules are well defined, consistent with the harvest strategy and the exploitation rate is a direct function of the size of the seed stock on the collectors, hence it can be reduced when reference points are approached.

The main harvest controls however exist at the level of the total mussel stock in the Waddenzee en Oosterschelde. These rules are well defined and are consistent with the harvest strategy and ensure that the productivity of the stock is maintained at high levels. (1-80). The selection of the harvest control rules takes into account the main uncertainties, (2-80). Available evidence and evaluations of the management system indicate that the tools in use are appropriate and effective in achieving the exploitation levels required under the harvest control rules (3-80).

Score:

80

Audit trace references

LNV 2009-a,c

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
1.2.3	Information / monitoring: Relevant information is collected to support the harvest strategy	<p>(1-60) <u>Some</u> relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.</p> <p>(2-60) 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.</p>	<p>(1-80) <u>Sufficient</u> relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.</p> <p>(2-80) Stock abundance and fishery removals are <u>regularly monitored at a level of accuracy and coverage consistent with the harvest control rule</u>, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule.</p> <p>(3-80) There is good information on all other fishery removals from the stock.</p>	<p>(1-100) A <u>comprehensive range</u> 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 relevant to the current harvest strategy, is available.</p> <p>(2-100) <u>All information</u> required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent <u>uncertainties</u> in the information [data] and the robustness of assessment and management to this uncertainty.</p>

Scoring comments

Sufficient relevant information related to stock structure, stock productivity, fleet composition, fishery removals and environmental information is available to support the harvest strategy for the mussel stock in the Waddenzee en Oostschelde. (1-80). The abundance of the seed stock, the mussels stock on the culture plots and fishery removals are regularly monitored at an appropriate level of accuracy and at least one indicator (mussel seed stock) is available and monitored with sufficient frequency to support the harvest control rule (2-80).

Information about suspended seed mussel collectors and suspended consumption size culture (standing stock, harvested amounts) is available at the farm level. Once a year MZI harvest data is collected from the farmers that are organised within the Producers Organisation, based on the information from the farmers. Farm level book keeping includes the amount of seed harvested from seed collectors and used for grow out. There is sufficient relevant information available related to seed harvest to support the harvest strategy. However, there are no protocols for the procedure and validation of independent data collection (3-80 partly met).

CONDITION: An independent monitoring program should be in place of the size of stock and harvest of suspended mussel seed in order to estimate the effects of the harvesting strategy on the wild stocks.

Score:

70

Audit trace references

LNV 2009-a,c; Kamermans & Smaal, 2009

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
1.2.4	Assessment of stock status: There is an adequate assessment of the stock status	<p>(1-60) The assessment estimates stock status relative to reference points.</p> <p>(2-60) The major sources of uncertainty are identified.</p>	<p>(1-80) The assessment is appropriate for the stock and for the harvest control rule, and is evaluating stock status relative to reference points.</p> <p>(2-80) The assessment takes uncertainty into account.</p> <p>(4-80) The stock assessment is subject to peer review.</p> <p>(1-100) 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.</p> <p>(2-100) The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.</p> <p>(3-100) The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.</p> <p>(4-100) The assessment has been <u>internally and externally</u> peer reviewed.</p>

Scoring comments

The stocks of seed mussels and the mussels on the culture plots are regularly assessed. This assessment is appropriate for the stock as a whole and for the harvest control rule, and is evaluating stock status relative to reference points (1-80). Concerning the size of the suspended mussel culture (stock) and the influence of this practice on the total mussel stock some uncertainties remain. The major sources of this uncertainty are identified (2-60). The stock of seed collectors is assessed at the moment of harvest by the farmers. Data is collected and reported annually for the total amount of seed and checked by fishery inspectors. However there are no protocols for the measurements and there is no independent (peer) review of these data.

CONDITION: An independent monitoring program should be in place of the size of stock and harvest of suspended mussel seed in order to estimate the effects of the harvesting strategy on the wild stocks.

Score:

70

Audit trace references

Kamermans & Smaal, 2009;

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
1.2.5	Genetic Management: There is a strategy in place for managing translocations such that the fishery does not pose a risk of serious or irreversible harm to the genetic diversity of the stock.	(1-60) There are measures in place, if necessary, which are expected to maintain the genetic structure of the population at levels compatible with the SG80 Genetic outcome level of performance (PI 1.1.4). The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	(1-80) There is a partial strategy in place, if necessary, which is expected to maintain the genetic structure of the population at levels compatible with the SG80 Genetic outcome level of performance (PI 1.1.4). There is some objective basis for confidence that the partial strategy will work, based on information directly about the population /s involved. There is some evidence that the partial strategy is being implemented successfully, if necessary.	(1-100) There is a strategy in place to maintain the genetic structure of the population at levels compatible with the SG80 Genetic outcome level of performance (PI 1.1.4). The strategy is based on in-depth knowledge of the genetic structure of the population and testing supports high confidence that the strategy will work. There is clear evidence that the strategy is being Implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its overall objective.

Scoring comments

Seed collectors are used in the same areas as where bottom culture is carried out, hence, translocation occurs on a very limited spatial scale. The seed and adult stocks belong to the same genetic group hence the risk of serious or irreversible harm is non-existent for the use of seed from collectors in bottom culture. . Therefore a strategy to maintain the genetic structure is not necessary for this fishery. This means that the SG 80 level is met (1-80).

Score:

80

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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1.2.6	1.2.6 – Genetic Information Information on the genetic structure of the population is adequate to determine the risk posed by the fishery and the effectiveness of the management of genetic diversity.	(1-60) Qualitative or Inferential information is available on the genetic structure of the population. Information is adequate to broadly understand the likely impact of the fishery. Information is adequate to support measures to manage main genetic impacts of the fishery on the stock, if necessary.	(1-80) Qualitative / inferential information and some quantitative information is available on the genetic structure of the population. Information is sufficient to estimate the likely impact of the fishery. Information is adequate to support a partial strategy to manage main genetic impacts of the fishery on the stock, if necessary.	(1-100) The genetic structure of the population is understood in detail. Information is sufficient to estimate the impact of the fishery with a high degree of certainty. Information is adequate to support a comprehensive strategy to manage the genetic impacts of the fishery on the stock, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
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Scoring comments

Qualitative or inferential information on the genetic characteristics of the mussel population is available on the basis of a synoptic survey. The information is sufficient to estimate the likely impact of the fishery. The Information is adequate to support measures to manage main genetic impacts of the fishery on the stock, if necessary (1-60).

However no monitoring is carried out on the development of the populations and their genetic characteristics that may be affected by imported mussels.

CONDITION: A survey program for genetic profiling of the mussel population should be in place that is able to detect possible changes over a period time with a 5 years interval.

Score:

75

Audit trace references

Wenne et al, 2006; Kijewski et al, 2009

APPENDIX B: SCORING TABLES PRINCIPLE 2 FOR UoC 1 AND UoC 2

Principle 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.1	Retained non-target species		
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2.1.1	<p>Status: 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.</p>	<p>(1-60) Main retained species are <u>likely</u> to be within biologically based limits or if outside the limits there are <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.</p> <p>(2-60) 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.</p>	<p>(1-80) Main retained species are <u>highly likely</u> to be within biologically based limits, or if outside the limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> management measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that retained species are within biologically based limits.</p> <p>(2-100) Target reference points are defined and retained species are at or fluctuating around their target reference points.</p>
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Scoring comments

(1-60) (1-80) (1-100) (2-60) (2-100) In the mussel seed collection there are no retained species; all species are returned to the fishery as the seed from collectors is transported to the culture plots. With the mussel seed collection there is little by-catch and none of it is retained. Species present on the seed collectors have been scientifically identified.

Score:

100

Audit trace references

Wijsman & de Mesel, 2008



Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.1.2</p>	<p>Management strategy: 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.</p>	<p>(1-60) There are <u>measures</u> 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.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>partial strategy</u> 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.</p> <p>(2-80) There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or species involved.</p> <p>(4-80) There is <u>some evidence</u> that the partial strategy is being <u>implemented successfully</u>.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing retained species.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and <u>testing</u> supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being <u>implemented successfully</u>, and intended changes are occurring.</p> <p>(4-100) There is some evidence that the strategy is <u>achieving its overall objective</u>.</p>

Scoring comments

No species are retained and all species are returned to the fishery. *A management strategy for retained species is therefore not necessary. The fishery has no impact on this particular component.*

Score:

80

Audit trace references

Wijsman & de Mesel, 2008

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.1.3	Information / monitoring: 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>(1-60) <u>Qualitative information</u> is available on the amount of main retained species taken by the fishery.</p> <p>-</p> <p>(2-60) Information is <u>adequate to qualitatively assess</u> outcome status with respect to biologically based limits.</p> <p>-</p> <p>(3-60) Information is adequate to support <u>measures</u> to manage <u>main</u> retained species.</p>	<p>(1-80) <u>Qualitative information</u> and some quantitative information are available on the amount of main retained species taken by the fishery.</p> <p>(2-80) Information is <u>sufficient</u> to estimate outcome status with respect to biologically based limits.</p> <p>(3-80) Information is adequate to support a <u>partial strategy</u> to manage <u>main</u> retained species.</p> <p>(4-80) 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 strategy).</p>	<p>(1-100) Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</p> <p>(2-100) Information is <u>sufficient to quantitatively estimate</u> outcome status with a <u>high degree of certainty</u>.</p> <p>(3-100) Information is adequate to support a <u>comprehensive strategy</u> to manage retained species, and evaluate with a <u>high degree of certainty</u> whether the strategy is achieving its objective.</p> <p>(4-100) Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</p>

Scoring comments

No species are retained and all species are returned to the fishery. *A management strategy for retained species is therefore not necessary. The fishery has no impact on this particular component.*

Score:

90

Audit trace references

Wijsman & de Mesel, 2008

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
2.2	Discarded species (also known as “by-catch” or “discards”)			
2.2.1	<p>Status: The fishery does not pose a risk of serious or irreversible harm to the by-catch species or species groups and does not hinder recovery of depleted by-catch species or species groups.</p>	<p>(1-60) Main by-catch species are <u>likely</u> to be within biologically based limits, or if outside such limits there are mitigation <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding.</p> <p>(2-60) If the status is poorly known there are measures or practices in place that are expected result in the fishery not causing the by-catch species to be biologically based limits or hindering recovery.</p>	<p>(1-80) Main by-catch species are <u>highly likely</u> to be within biologically based limits or if outside such limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> mitigation measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that by-catch species are within biologically based limits.</p>

Scoring comments

Reports on by catch and associated fauna on the seed mussel collectors shows that the number of bycatch species is limited and that they all comprise less than 5% of the mussel catch. Therefore they can all be considered as minor by-catch species. The consequence is that SG 80 is met (1-80). The by-catch species are all attached to the ropes and nets or live between the mussels. None of these species is considered a vulnerable species. The MZI installations can be considered as an extra substrate for species (like Tunicates, Barnacles and Sponges) that occur on existing substrates like subtidal rocky shores for dike protection and other structures. Populations supported by the natural habitat structures may even increase in density and will not be affected negatively by the mussel culture on MZIs. All animals are either returned into the water or transferred into socks. Although there may be a certain mortality caused by handling the effects on species level are certainly negligible. Therefore there is a high degree of certainty that by-catch species are within biologically based limits (1-100)

Score:

95

Audit trace references

Wijsman & de Mesel, 2008

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.2.2</p>	<p>Management strategy: There is a strategy in place for managing by-catch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to by-catch populations.</p>	<p>(1-60) There are <u>measures</u> in place, if necessary, which are expected to maintain main by-catch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>partial strategy</u> in place, if necessary, for managing by-catch that is expected to maintain main by-catch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>(2-80) There is <u>some objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or the species involved.</p> <p>(3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing and minimising by-catch.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>

Scoring comments

There are no main by-catch species and all by-catch species are returned to the water or fishery. *A management strategy for by-catch species is therefore not necessary. The fishery has no impact on this particular component*

Score:

80

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.2.3</p>	<p>Information / monitoring: Information on the nature and amount of by-catch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage by-catch.</p>	<p>(1-60) <u>Qualitative information</u> is available on the amount of main by catch species affected by the fishery.</p> <p>(2-60) Information is <u>adequate to broadly understand</u> outcome status with respect to biologically based limits.</p> <p>(3-60) Information is adequate to support <u>measures</u> to manage by-catch.</p>	<p>(1-80) <u>Qualitative information and some quantitative information</u> are available on the amount of main by catch species affected by the fishery.</p> <p>(2-80) Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>(3-80) Information is adequate to support a <u>partial strategy</u> to manage main by catch species.</p> <p>(4-80) Sufficient data continue to be collected to detect any increase in risk to main by-catch 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>(1-100) <u>Accurate and verifiable information</u> is available on the amount of all by catch and the consequences for the status of affected populations.</p> <p>(2-100) Information is <u>sufficient</u> to quantitatively estimate outcome status with respect to biologically based limits with a <u>high degree of certainty</u>.</p> <p>(3-100) Information is adequate to support a <u>comprehensive strategy</u> to manage by-catch, and evaluate with a high degree of certainty whether a strategy is achieving its objective.</p> <p>(4-100) Monitoring of by-catch data is conducted in sufficient detail to assess ongoing mortalities to all by catch species.</p>

Scoring comments

Expert knowledge, results of scientific research and some monitoring provide a sound basis for the conclusion that there are no main by-catch species and that the effects on by-catch species is negligible.

Score:

90

Audit trace references

2.3 Endangered, Threatened and Protected (ETP) species

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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<p>2.3.1</p> <p>Status: The fishery meets national and international requirements for protection of ETP species.</p> <p>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>(1-60) Known effects of the fishery are <u>likely</u> to be within limits of national and international requirements for protection of ETP species.</p>	<p>(1-80) The effects of the fishery are known and are <u>highly likely</u> to be within limits of national and international requirements for protection of ETP species.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that the effects of the fishery are within limits of national and international requirements for protection of ETP species.</p>
	<p>(2-60) Known direct effects are <u>unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p>	<p>(2-80) Direct effects are <u>highly unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p> <p>(3-80) Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</p>	<p>(2-100) There is a <u>high degree of confidence</u> that there are <u>no significant detrimental effects (direct and indirect)</u> of the fishery on ETP species.</p>

Scoring comments

Impacts of mussel collecting ropes or nets on protected species such as seals and birds are monitored and no negative effects have been observed. To avoid disturbance there is a minimum distance requirement from existing seal and bird colonies.

Therefore it can be concluded that 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 (1-80). There is a high degree of confidence that there are no significant detrimental effects (direct and indirect) of the fishery on ETP species (2-100).

Score:

90

Audit trace references

Jongbloed et al, 2009; Wiersinga et al, 2009; Min LNV, 2009 c

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.3.2</p>	<p>Management strategy: 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 or irreversible harm to ETP species; - ensure the fishery does not hinder recovery of ETP species; and - minimise mortality of ETP species. 	<p>(1-60) There are <u>measures</u> in place that minimise mortality, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>(2-60) The measures are <u>considered</u> likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>strategy</u> in place for managing the fishery’s impact on ETP species, including measures to minimise mortality that is designed to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>(2-80) There is an <u>objective basis for confidence</u> that the strategy will work, based on <u>some information</u> directly about the fishery and/or the species involved.</p> <p>(3-80) There is <u>evidence</u> that the strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>comprehensive strategy</u> in place for managing the fishery’s impact on ETP species, including measures to minimise mortality that is designed to achieve above national and international requirements for the protection of ETP species.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and a <u>quantitative analysis</u> supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is evidence that the strategy is achieving its objective.</p>

Scoring comments

Because the gears applied in this fishery are immobile there have never been any reports of mortality of ETP species in this fishery. Mortality of seals or birds should be considered very unlikely and therefore there is no need for a strategy to minimise mortality. The policy regarding site selection of MZI’s includes a minimum distance of the collectors from existing seal and bird colonies to prevent disturbance of these animals.

There is an objective basis for confidence that the strategy will work, based on some information directly about the fishery and the species involved (2-80).

There is a strategy in place for managing the fishery’s impact on ETP species, including measures to minimise mortality that is designed to be highly likely to achieve national and international requirements for the protection of ETP species (1-80). There is clear evidence that the strategy is being implemented successfully (3-100 partly met).

Score:

Audit trace references

Jongbloed et al, 2009a,b; LNV, 2009-c; Kamermans et al, 2010

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>2.3.3</p>	<p>Information / monitoring Relevant information is collected to support the management of fishery impacts on ETP species, including: - information for the development of the management strategy; - information to assess the effectiveness of the management strategy; and - information to determine the outcome status of ETP species.</p>	<p>(1-60) Information is <u>adequate</u> to <u>broadly understand</u> the impact of the fishery on ETP species.</p> <p>(2-60) Information is adequate to support <u>measures</u> to manage the impacts on ETP species</p> <p>(3-60) <u>Information</u> is sufficient to <u>qualitatively</u> estimate the fishery related mortality of ETP species.</p>	<p>(1-80) Information is <u>sufficient</u> to determine whether the fishery may be a threat to protection and recovery of the ETP species, and if so, to measure trends and support a <u>full strategy</u> to manage impacts.</p> <p>(2-80) <u>Sufficient data</u> are available to allow fishery related mortality and the impact of fishing to be <u>quantitatively</u> estimated for ETP species.</p>	<p>(1-100) Information is <u>sufficient</u> to <u>quantitatively</u> estimate outcome status with a high degree of certainty.</p> <p>(2-100) Information is adequate to support a <u>comprehensive strategy</u> 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.</p> <p>(3-100) <u>Accurate and verifiable information</u> is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species</p>

Scoring comments

Information is available from the ongoing monitoring program of the seed mussel collector's impacts. Population size of seals and birds are monitored continuously and compared against the base line studies. This information is sufficient to conclude that there is no fishery related mortality (2-80) and the fishery is thus no threat to the protection and recovery of ETP species. (1-80). The conclusion on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species is verifiable and accurate (3-100).

Score:

90

Audit trace references

Kamermans et al, 2010

2.4	Habitat
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.4.1	Status: The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.	(1-60) The fishery is <u>unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	(1-80) The fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	(1-100) There is evidence that the fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.
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Scoring comments

Emperical studies and modelling exercises did not show impact of suspended mussel culture on sediment and benthic biota in the vicinity of the installations. This is ascribed to the relatively dynamic conditions that prevail at the sites of the MZI's, preventing local accumulation of biodeposits, in combination with the relatively limited scale at which the MZI's are in use at present. Therefore a recommendation (2.4.3.) and a condition (2.5.3) have been formulated to address benthic impacts in when upscaling will be carried out.

There is some evidence that it is highly unlikely that the fishery reduces habitat structure and function to a point where there would be serious or irreversible harm (1-100 partly met)..

Score:

90

Audit trace references

Meesters et al, 2007; de Mesel et al, 2008, Kamermans et al, 2010

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.4.2	<p>Management strategy: 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.</p>	<p>(1-60) There are <u>measures</u> in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).</p>	<p>(1-80) There is a <u>partial strategy</u> in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</p> <p>(2-80) There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.</p> <p>(3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing the impact of the fishery on habitat types.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>

Scoring comments

For site selection the strategy is to avoid sensitive areas such as eel grass beds; this is part of the government policy in the framework of Natura 2000. The use of immobile floating constructions guarantees that the impact on bottom life is very small compared to for instance bottom trawling. This practice can be seen as a management strategy to minimize habitat impacts. Therefore it is concluded that there is a strategy in place for managing the impact of the fishery on habitat types (1-100); The strategy is mainly based on the fishing practice and habitats involved. There is high confidence that the strategy will work (2-100). . There is also evidence that the partial strategy is being implemented successfully (3-100 partly met).

Score:

90

Audit trace references

LNV, 2009-c: Wiersinga et al, 2009.

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.4.3	<p>Information / monitoring: 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>	<p>(1-60) There is a basic understanding of the types and distribution of main habitats in the area of the fishery.</p> <p>(2-60) Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.</p>	<p>(1-80) The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery.</p> <p>(2-80) 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, timing and location of use of the fishing gear.</p> <p>(3-80) 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).</p>	<p>(1-100) The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</p> <p>(2-100) Changes in habitat distributions over time are measured.</p> <p>(3-100) The physical impacts of the gear on the habitat types have been quantified fully.</p>

Scoring comments

The Waddenzee and the Oosterschelde are important nature reserves that have been investigated for many years. Therefore, the nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery (1-80).

A detailed study in 2009 on the impact of suspended mussel culture on sediment and benthic biota showed no impact and further monitoring at the present level of MZI's is being carried out. 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, timing and location of use of the fishing gear. (2-80). The monitoring of the impacts of MZI's will continue and therefore sufficient data continue to be collected to detect any increase in risk to habitat (3-80).

RECOMMENDATION: When up scaling of the MZI's takes place it is recommended to pay attention to benthic impacts.

Score:

80

Audit trace references

Kamermans et al, 2010

2.5	Ecosystem
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.5.1	Status: The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.	(1-60) The fishery is <u>unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	(1-80) The fishery is <u>highly unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	(1-100) There is <u>evidence</u> 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.
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Scoring comments

MZI's may have an impact on the carrying capacity of the ecosystem, as a function of the scale and site of the MZI's. For the present scale of operating MZI's an impacts analysis on the basis of model calculations detected no significant negative impacts. There are no signs of negative impact of the MZI's on natural settlement on the bottom; in contrast there have been some indications of positive effects on bottom recruitment of mussels. Therefore the fishery is highly unlikely to disrupt the key elements underlying ecosystem structure and function, to a point where there would be serious or irreversible harm to the environment (1-80).

RECOMMENDATION: On up scaling of the MZI's it is recommended to determine the effects of any increase in numbers of MZI's on the carrying capacity and the effects on the ecosystem.

Score:

80

Audit trace references

Jongbloed et al 2009; Wiersinga et al, 2009.

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.5.2	<p>Management strategy: There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.</p>	(1-60) There are <u>measures</u> in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem.	(1-80) There is a <u>partial strategy</u> in place, if necessary, that 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.	(1-100) There is a <u>strategy</u> that consists of a plan, containing 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.
		(2-60) The measures are considered likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/ ecosystems).	<p>(2-80) The partial strategy is considered likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/ ecosystems).</p> <p>(3-80) There is <u>some evidence</u> that the measures comprising the partial strategy are being implemented successfully.</p>	<p>(2-100) 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> <p>(3-100) The measures are considered likely to work based on <u>prior experience</u>, plausible argument or <u>information</u> directly from the fishery/ecosystems involved.</p> <p>(4-100) There is <u>evidence</u> that the measures are being implemented successfully.</p>

Scoring comments

Carrying capacity studies and spat fall seed collection data are in place and will be referred to before up scaling of the MZI's will be realized. Positive or negative impacts of MZI's on natural settlement on the bottom are being studied. Study outcomes will be used in the governmental policy decisions on up scaling and future site selection.

There is a strategy in place that 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 (1-80). The partial strategy is considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/ ecosystems).(2-80). There is some evidence that the measures comprising the partial strategy are being implemented successfully (3-80).

Score:

Audit trace references

Kamermans et al, 2010; LNV, 2009-c

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.5.3	Information / monitoring: There is adequate knowledge of the impacts of the fishery on the ecosystem.	<p>(1-60) Information is adequate to <u>identify</u> the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity).</p> <p>(2-60) Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>have not been investigated in detail</u>.</p>	<p>(1-80) Information is adequate to <u>broadly understand the functions</u> of the key elements of the ecosystem.</p> <p>(2-80) Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>may not have been investigated in detail</u>.</p> <p>(3-80) The main functions of the Components (i.e. target, By-catch, Retained and ETP species and Habitats) in the ecosystem are <u>known</u>.</p> <p>(4-80) Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.</p> <p>(5-80) 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).</p>	<p>(1-100) Information is adequate to <u>broadly understand the key elements</u> of the ecosystem.</p> <p>(2-100) Main <u>interactions</u> between the fishery and these ecosystem elements can be inferred from existing information, and <u>have been investigated</u>.</p> <p>(3-100) The impacts of the fishery on target, By-catch, Retained and ETP species and Habitats are identified and the main functions of these components in the ecosystem are <u>understood</u>.</p> <p>(4-100) Sufficient information is available on the impacts of the fishery on the components <u>and elements</u> to allow the main consequences for the ecosystem to be inferred.</p> <p>(5-100) Information is sufficient to support the development of strategies to manage ecosystem impacts.</p>

Scoring comments

There is extensive research carried out on the Waddenzee and Oosterschelde ecosystems. The existing Information on this ecosystem is adequate to broadly understand the functions of the key elements of the ecosystem (1-80). Main impacts of the fishery on these key ecosystem elements can be inferred from expert knowledge and existing information, but may not all have been investigated in full detail.(2-80). The main functions of the Components (i.e. target, By-catch, Retained and ETP species and Habitats) in the ecosystem are known. (3-80). 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.(4-80). However the foreseen upscaling of the spat collection through MZIs might result in the increase in risk levels. In order to detect possible increases in risk levels carrying capacity studies and spat fall seed collection data are needed.

CONDITION: Before the up scaling of MZI's quantitative information on the effects of increase in the seed mussel collectors on the carrying capacity and effect on the ecosystem must be available and applied before the expansion commences. Independent data collection of stock and harvest size is in place.

Score:

75

Audit trace references

Kamermans et al, 2010; LNV, 2009-c

APPENDIX C: SCORING TABLES PRINCIPLE 2 FOR UoC 3

Principle 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends		
Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100

2.1 Retained non-target species

<p>2.1.1</p>	<p>Status: 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.</p>	<p>(1-60) Main retained species are <u>likely</u> to be within biologically based limits or if outside the limits there are <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.</p> <p>(2-60) 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.</p>	<p>(1-80) Main retained species are <u>highly likely</u> to be within biologically based limits, or if outside the limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> management measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that retained species are within biologically based limits.</p> <p>(2-100) Target reference points are defined and retained species are at or fluctuating around their target reference points.</p>
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Scoring comments

In the mussel seed bottom fishery there are no retained species. None of the by-catch species is retained.

Score:

90

Audit trace references

MR van Stralen, 2008a,b

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.1.2</p>	<p>Management strategy: 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.</p>	<p>(1-60) There are <u>measures</u> 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.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>partial strategy</u> 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.</p> <p>(2-80) There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or species involved.</p> <p>(3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing retained species.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and <u>testing</u> supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being <u>implemented successfully</u>, and intended changes are occurring.</p> <p>(4-100) There is some evidence that the strategy is <u>achieving its overall objective</u>.</p>

Scoring comments

No non target species are retained and all species are returned to the fishery. A management strategy for retained species is therefore not necessary. The fishery has no impact on this particular component.

Score:

80

Audit trace references

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.1.3	Information / monitoring: 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>(1-60) <u>Qualitative information</u> is available on the amount of main retained species taken by the fishery.</p> <p>-</p> <p>(2-60) Information is <u>adequate to qualitatively assess</u> outcome status with respect to biologically based limits.</p> <p>-</p> <p>(3-60) Information is adequate to support <u>measures</u> to manage <u>main</u> retained species.</p>	<p>(1-80) <u>Qualitative information</u> and some quantitative information are available on the amount of main retained species taken by the fishery.</p> <p>(2-80) Information is <u>sufficient</u> to estimate outcome status with respect to biologically based limits.</p> <p>(3-80) Information is adequate to support a <u>partial strategy</u> to manage <u>main</u> retained species.</p> <p>(3-80) 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 strategy).</p>	<p>(1-100) Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</p> <p>(2-100) Information is <u>sufficient to quantitatively estimate</u> outcome status with a <u>high degree of certainty</u>.</p> <p>(3-100) Information is adequate to support a <u>comprehensive strategy</u> to manage retained species, and evaluate with a <u>high degree of certainty</u> whether the strategy is achieving its objective.</p> <p>(4-100) Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</p>

Scoring comments

Expert knowledge, results of scientific research and some monitoring provide a sound basis for the conclusion that there are no retained species.

Score:

80

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
2.2	Discarded species (also known as “by-catch” or “discards”)			
2.2.1	<p>Status: The fishery does not pose a risk of serious or irreversible harm to the by-catch species or species groups and does not hinder recovery of depleted by-catch species or species groups.</p>	<p>(1-60) Main by-catch species are <u>likely</u> to be within biologically based limits, or if outside such limits there are mitigation <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding.</p> <p>(2-60) If the status is poorly known there are measures or practices in place that are expected result in the fishery not causing the by-catch species to be biologically based limits or hindering recovery.</p>	<p>(1-80) Main by-catch species are <u>highly likely</u> to be within biologically based limits or if outside such limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> mitigation measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that by-catch species are within biologically based limits.</p>

Scoring comments

Reports on by catch show that the number of by-catch species is limited and that they all comprise less than 5% of the mussel catch except occasionally crabs (*Cancer pagurus*) and common starfish (*Asterias rubens*). Therefore only crabs and starfish are to be considered as main by-catch species.

Starfish are not retained but for commercial reasons they are not thrown back but disposed of due to their predation on the collected mussels. . The common starfish is the most prevalent species of starfish in the North Sea and Wadden Sea. *Asterias rubens* is found in great numbers in all North Sea coastal waters and estuaries where beds of mussels and barnacles can be found. From the data of the Demersal Fish Survey (DFS) it can be concluded that both starfish and shore crabs (*Carcinus maenas*) are among the most common and abundant species in the Waddenzee and the Oosterschelde. Both species are regarded as resilient and the stock are regarded as healthy. The common starfish is the most prevalent species of starfish in the North Sea and Wadden Sea. Crabs are discarded and will survive in most cases.

Both main by-catch species are not on the red list and there is not any indication their populations are not sound. It is highly likely that the populations of by-catch species will remain within safe limits (1-80)

Score:

85

Audit trace references

MR van Stralen, 2008-a,b;



<http://www.surveyswageningenimares.wur.nl/UK/Survey+list/flatfish+surveys/Demersal+Fish+Survey+%28DFS%29/DFS+survey+results/>

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.2.2</p>	<p>Management strategy: There is a strategy in place for managing by-catch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to by-catch populations.</p>	<p>(1-60) There are <u>measures</u> in place, if necessary, which are expected to maintain main by-catch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>partial strategy</u> in place, if necessary, for managing by-catch that is expected to maintain main by-catch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>(2-80) There is <u>some objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or the species involved.</p> <p>(3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing and minimising by-catch.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>

Scoring comments

The establishment of closed areas for seed fishery which provides secure areas for potential by-catch species can be considered as a partial strategy to maintain main by/catch species (1-80). The by-catch species are trans located after seed fishery and the survival rate for crabs is high.

The main by-catch species starfish and crabs are both very common species and there are not considered sensitive to the effects of fishing. The stocks are highly dynamic. Therefore a management strategy for by-catch species is not necessary. There is evidence that the populations of starfish and crabs are healthy (2-80 and 3-80).

Score:

80

Audit trace references

LNV, 2008-b

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.2.3</p>	<p>Information / monitoring: Information on the nature and amount of by-catch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage by-catch.</p>	<p>(1-60) Qualitative information is available on the amount of main by-catch species affected by the fishery.</p> <p>(2-60) Information is <u>adequate to broadly understand</u> outcome status with respect to biologically based limits.</p> <p>(3-60) Information is adequate to support <u>measures</u> to manage by-catch.</p>	<p>(1-80) Qualitative information and <u>some quantitative information</u> are available on the amount of main by-catch species affected by the fishery.</p> <p>(2-80) Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>(3-80) Information is adequate to support a <u>partial strategy</u> to manage main by-catch species.</p> <p>(4-80) Sufficient data continue to be collected to detect any increase in risk to main by-catch 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>(1-100) Accurate and verifiable information is available on the amount of all by-catch and the consequences for the status of affected populations.</p> <p>(2-100) Information is <u>sufficient</u> to quantitatively estimate outcome status with respect to biologically based limits with a <u>high degree of certainty</u>.</p> <p>(3-100) Information is adequate to support a <u>comprehensive strategy</u> to manage by-catch, and evaluate with a high degree of certainty whether a strategy is achieving its objective.</p> <p>(4-100) Monitoring of by-catch data is conducted in sufficient detail to assess ongoing mortalities to all by-catch species.</p>

Scoring comments

During the pre- and post fishery mussel seed assessment surveys potential by-catch species are quantified, and these data can be used to evaluate impact on by-catch species. The only main by/catch species are crabs and starfish and a management strategy to reduce the by/catch of these species is not considered necessary. In the annual demersal young fish survey data on the occurrence of crabs and starfish are being collected. This information is adequate to determine that the fishery poses no risk to these very common main by/catch species.

Score:

80

Audit trace references

M.R. van Stralen, 2008-a,b; DFYS

2.3 Endangered, Threatened and Protected (ETP) species

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.3.1</p>	<p>Status: The fishery meets national and international requirements for protection of ETP species.</p> <p>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>(1-60) Known effects of the fishery are <u>likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>(2-60) Known direct effects are <u>unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p>	<p>(1-80) The effects of the fishery are known and are <u>highly likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>(2-80) Direct effects are <u>highly unlikely</u> to create <u>unacceptable impacts</u> to ETP species.</p> <p>(3-80) Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that the effects of the fishery are within limits of national and international requirements for protection of ETP species.</p> <p>(2-100) There is a <u>high degree of confidence</u> that there are <u>no significant detrimental effects (direct and indirect)</u> of the fishery on ETP species.</p>

Scoring comments

Mussel seed fishery may have impact on the following ETP species: Shell eating sea birds Eider duck (*Somateria mollissima*)-, Goldeneye (*Bucephala clangula*), Greater scaup (*Athya marila*); Harbour seal (*Phoca vitulina*), Harbour porpoise (*Phocoena phocoena*), and three species of fish (lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), Thwaid shad (*Alosa fallax*)), and OSPAR list species - thorn back ray (*Raja clavata*).

For the fish species mentioned there is no interaction.

Most bird species do not rely on the mussel seed as their main feed source and the most of the seed is relaid and kept within the Wadden Sea for at least one year. . Scaup are observed near the mussel seed areas which are fished 100%; Goldeneye are not known to fish for mussel seed.

These two bird species are known to have stable populations which are not declining. Eider duck (*Somateria mollissima*) populations do not rely on mussels seed; populations near to the mussel culture plots have been proven to be stable compared to declining populations away from the mussel beds.

Possible local impacts of seed fishery are part of the Probus research project, so more knowledge will be available in 2012.

As the seed mussels are maintained within the system, direct effects are highly unlikely to create unacceptable impacts to ETP species.

Score:

80

Audit trace references

Imares, 2005

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.3.2</p>	<p>Management strategy: 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 or irreversible harm to ETP species; - ensure the fishery does not hinder recovery of ETP species; and - minimise mortality of ETP species. 	<p>(1-60) There are <u>measures</u> in place that minimise mortality, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>(2-60) The measures are <u>considered</u> likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality that is designed to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>(2-80) There is an <u>objective basis for confidence</u> that the strategy will work, based on <u>some information</u> directly about the fishery and/or the species involved.</p> <p>(3-80) There is <u>evidence</u> that the strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>comprehensive strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality that is designed to achieve above national and international requirements for the protection of ETP species.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and a <u>quantitative analysis</u> supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is evidence that the strategy is achieving its objective.</p>

Scoring comments

For mussel seed fishery a permit is required in the frame of the Nature Conservancy Act and therefore appropriate assessments are carried out that address possible impact on ETP species. Fishing plans are based on assessment surveys of the seed stock, and these surveys also are used to evaluate the stock size and its distribution. Fishing strategy is focused on unstable beds in autumn, leaving food for birds on wild beds undisturbed over the winter. For R & D areas have been closed since 2006, and within the mussel transition policy fishing areas are closed.

There is a comprehensive strategy in place for managing the fishery's impact on ETP species, including measures to minimise mortality that is designed to achieve above national and international requirements for the protection of ETP species.

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

Score:

85

Audit trace references

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.3.3	<p>Information / monitoring 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>(1-60) Information is <u>adequate</u> to <u>broadly understand</u> the impact of the fishery on ETP species.</p> <p>(2-60) Information is adequate to support <u>measures</u> to manage the impacts on ETP species</p> <p>(3-60) <u>Information</u> is sufficient to <u>qualitatively</u> estimate the fishery related mortality of ETP species.</p>	<p>(1-80) Information is <u>sufficient</u> to determine whether the fishery may be a threat to protection and recovery of the ETP species, and if so, to measure trends and support a <u>full strategy</u> to manage impacts.</p> <p>(2-80) <u>Sufficient data</u> are available to allow fishery related mortality and the impact of fishing to be <u>quantitatively</u> estimated for ETP species.</p>	<p>(1-100) Information is <u>sufficient</u> to <u>quantitatively</u> estimate outcome status with a high degree of certainty.</p> <p>(2-100) Information is adequate to support a <u>comprehensive strategy</u> 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.</p> <p>(3-100) <u>Accurate and verifiable information</u> is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species</p>

Scoring comments

There are monitoring programs in place for ETP species such as eider ducks, scaup, goldeneye, seals and fish. There is a specific impact assessment project Probus that makes use of closed and open areas, following a BACI approach, and seed stocks are monitored. Fishery is monitored by black box control and tracing of fishing activity and estimations of harvest size.

Sufficient data are available to allow fishery related mortality and the impact of fishing to be quantitatively estimated for ETP species, and Information is sufficient to quantitatively estimate outcome status with a high degree of certainty

Score:
85

Audit trace references

MR van Stralen, 2008-a; LNV, 2004, 2008-b

2.4	Habitat
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.4.1	Status: The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.	(1-60) The fishery is <u>unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	(1-80) The fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	(3-100) There is evidence that the fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.
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Scoring comments

The mussel seed beds are part of the habitat type of sub littoral sand banks. The effects on this Habitattype H1110 have been evaluated in appropriate assessments. On the basis of these assessment licenses in the framework of the Nature Conservation Act have been issued by the national government. In the appropriate assessments (van Stralen 2009 a,b) it is concluded that the mussel seed fishery has no detrimental effects on the biodiversity of Habitat type H1110 as the status of species marked as typical species is good and there are no signs of negative developments in the status of these species. Van Stralen (2006 a) has also evaluated the possible effect of the seed fishery on the recruitment of mussels and therefore on the possibilities of recovery of the beds that have been fished. He concluded that since the fishery has been ongoing for several decades and a negative effect on recruitment has never been detected the existence of such a negative (irreversible) effect is highly unlikely,

The effects of the mussel seed fishery and mussel culture in the subtidal areas of the Wadden Sea have also been investigated in the extensive research project EVA II. In Bult et al (2004) it is concluded that mussel culture in the Wadden Sea leads to an average increase of the mussel stock of 15 % despite the fact that mussels are harvested regularly. Mussels are transferred to areas with a higher growth and less mortality.

. The subtidal Wadden Sea is divided in areas ranking from class 1 (very unstable) to class 5 (very stable). The autumn seed fishery is only allowed in the class 1 to 3 areas where it is unlikely that mussel seed beds will develop to mature mussel beds (reefs). In the spring mussel seed fishery the fishery in areas 4 and 5 is allowed on a limited scale. This approach results in the fact that mussel seed is predominantlt fished from unstable areas and therefor to the conclusion that the effect on the development of more stable mature mussel beds is minimized.

Competing claims in the western Wadden Sea of mussel seed fishery and nature conservation of mussel bed habitats has resulted in a transition process to gradually reduce the bottom fishery. Several (stable) seed bed areas are now permanently closed to fishery and subject to a monitoring program

As the information on the development of natural sub littoral mussel bed development is rather limited a follow up (to EVA II) research project has been set up to analyse fishery impacts by a BACI approach that includes the comparison over time of plots that are closed and open to fishery.

On the basis of the research information from EVA II project and the appropriate assessments it is concluded that the fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.

CONDITION: Results of impact studies need to be taken into account to evaluate effects of seed fishery on the habitat types.

Score:

60

Audit trace references

Imares, 2005; Fey et al, 2008; LNV, 2008-b
Van Stralen 2009 a and b, Van Stralen 2006 a, .
Bult et al, 2004.

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.4.2	Management strategy: 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.	(1-60) There are <u>measures</u> in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance. (2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).	(1-80) There is a <u>partial strategy</u> in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above. (2-80) There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or habitats involved. (3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.	(1-100) There is a <u>strategy</u> in place for managing the impact of the fishery on habitat types. (2-100) The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work. (3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.

Scoring comments

The management agreement and procedures are acting to reduce the seed dredging area by 20% per year depending on fishing results, down to 100% restriction by 2020 and replacement of mussel seed collection by rope and net seed collection systems.
There is a strategy in place for managing the impact of the fishery on habitat types. There is clear evidence that the strategy is being implemented successfully, and intended changes are occurring.

Score:

85

Audit trace references

LNV, 2008-b

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.4.3	<p>Information / monitoring: 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>	<p>(1-60) There is a basic understanding of the types and distribution of main habitats in the area of the fishery.</p> <p>(2-60) Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.</p>	<p>(1-80) The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery.</p> <p><u>(2-80)</u> 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, timing and location of use of the fishing gear.</p> <p><u>(3-80)</u> 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).</p>	<p>(1-100) The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</p> <p>(2-100) Changes in habitat distributions over time are measured.</p> <p>(3-100) The physical impacts of the gear on the habitat types have been quantified fully.</p>

Scoring comments

Extensive research is being carried regarding habitat changes over time compared to control areas, following a BACI approach in 40 plots of 2 * 4 ha (Probus project); monitoring of closed area is also in place; Results will come available in the coming years. The Probus research project will be completed in 2012. *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

Score:

85

Audit trace references

Imares, 2005; Fey et al, 2008.

2.5	Ecosystem
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.5.1	Status: The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.	(1-60) The fishery is <u>unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	(1-80) The fishery is <u>highly unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	(1-100) There is <u>evidence</u> 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.
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Scoring comments

Mussel seed fishery results predominantly results in translocation of mussels within the ecosystems, hence the functions of the seed mussels, such as food for higher trophic level and their filtration and nutrient regeneration capacities for the greater part remain in the system. Bult et al (2004) concluded that mussel culture in the Wadden Sea leads to an average increase of the mussel stock of 15 %. Therefore the function of mussels in the ecosystem is stimulated rather than hampered by the fishery. .

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.

Score:

80

Audit trace references

MR van Stralen 2008-a,b

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.5.2	<p>Management strategy: There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.</p>	(1-60) There are <u>measures</u> in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem.	(1-80) There is a <u>partial strategy</u> in place, if necessary, that 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.	(1-100) There is a <u>strategy</u> that consists of a plan, containing 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.
		(2-60) The measures are considered likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/ ecosystems).	<p>(2-80) The partial strategy is considered likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/ ecosystems).</p> <p>(3-80) There is <u>some evidence</u> that the measures comprising the partial strategy are being implemented successfully.</p>	<p>(2-100) 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> <p>(3-100) The measures are considered likely to work based on <u>prior experience</u>, plausible argument or <u>information</u> directly from the fishery/ecosystems involved.</p> <p>(4-100) There is <u>evidence</u> that the measures are being implemented successfully.</p>

Scoring comments

The management agreement and procedures are acting to come to a stepwise reduction of the seed fishery area, down to 100% restriction by 2020 and replacement of mussel seed collection by rope and net seed collection systems (see 2.4.2.) Research is carried out to analyse the impact of seed fishery on the ecosystem

There is a strategy that consists of a plan, containing measures to address all main impacts of the fishery on the ecosystem, and at least some of these measures are in place. 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

Score:

85

Audit trace references

LNV, 2008-b

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>2.5.3</p> <p>Information / monitoring: There is adequate knowledge of the impacts of the fishery on the ecosystem.</p>	<p>(1-60) Information is adequate to <u>identify</u> the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity).</p> <p>(2-60) Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>have not been investigated in detail</u>.</p>	<p>(1-80) Information is adequate to <u>broadly understand the functions</u> of the key elements of the ecosystem.</p> <p>(2-80) Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>may not have been investigated in detail</u>.</p> <p>(3-80) The main functions of the Components (i.e. target, By-catch, Retained and ETP species and Habitats) in the ecosystem are <u>known</u>.</p> <p>(4-80) Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.</p>	<p>(1-100) Information is adequate to <u>broadly understand the key elements</u> of the ecosystem.</p> <p>(2-100) Main <u>interactions</u> between the fishery and these ecosystem elements can be inferred from existing information, and <u>have been investigated</u>.</p> <p>(3-100) The impacts of the fishery on target, By-catch, Retained and ETP species and Habitats are identified and the main functions of these components in the ecosystem are <u>understood</u>.</p> <p>(4-100) Sufficient information is available on the impacts of the fishery on the components <u>and elements</u> to allow the main consequences for the ecosystem to be inferred.</p>

		<p>(5-80) 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).</p>	<p>Information is sufficient to support the development of strategies to manage ecosystem impacts.</p>
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Scoring comments

Monitoring and assessment programs are in place for the mussel seed stock abundance, distribution, recruitment and survival. Harvested amounts are controlled and fishery activity data are available from the black box onboard fishing vessels.
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. Information is sufficient to support the development of strategies to manage ecosystem impacts

Score:

85

Audit trace references

MR Van Stralen, 2008-a; Wijsman & Jol, 2008, PO Mosselcultuur, 2004

APPENDIX D: SCORING TABLES PRINCIPLE 2 FOR UoC 4

Principle 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.1	Retained non-target species		
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2.1.1	<p>Status: 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.</p>	<p>(1-60) Main retained species are <u>likely</u> to be within biologically based limits or if outside the limits there are <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding of the depleted species.</p> <p>(2-60) 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.</p>	<p>(1-80) Main retained species are <u>highly likely</u> to be within biologically based limits, or if outside the limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> management measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that retained species are within biologically based limits.</p> <p>(2-100) Target reference points are defined and retained species are at or fluctuating around their target reference points.</p>
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Scoring comments

There are no retained species.

Score:

80

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.1.2</p>	<p>Management strategy: 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.</p>	<p>(1-60) There are <u>measures</u> 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.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>partial strategy</u> 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.</p> <p>(2-80) There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or species involved.</p> <p>(3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing retained species.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and <u>testing</u> supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being <u>implemented successfully</u>, and intended changes are occurring.</p> <p>(4-100) There is some evidence that the strategy is <u>achieving its overall objective</u>.</p>

Scoring comments

There are no retained species from mussel bottom culture.

Score:

80

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.1.3</p>	<p>Information / monitoring: 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>(1-60) <u>Qualitative information</u> is available on the amount of main retained species taken by the fishery.</p> <p>(2-60) Information is <u>adequate to qualitatively assess</u> outcome status with respect to biologically based limits.</p> <p>(3-60) Information is adequate to support <u>measures</u> to manage <u>main</u> retained species.</p>	<p>(1-80) <u>Qualitative information</u> and some quantitative information are available on the amount of main retained species taken by the fishery.</p> <p>(2-80) Information is <u>sufficient</u> to estimate outcome status with respect to biologically based limits.</p> <p>(3-80) Information is adequate to support a <u>partial strategy</u> to manage <u>main</u> retained species.</p> <p>(4-80) 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 strategy).</p>	<p>(1-100) Accurate and verifiable information is available on the catch of all retained species and the consequences for the status of affected populations.</p> <p>(2-100) Information is <u>sufficient to quantitatively estimate</u> outcome status with a <u>high degree of certainty</u>.</p> <p>(3-100) Information is adequate to support a <u>comprehensive strategy</u> to manage retained species, and evaluate with a <u>high degree of certainty</u> whether the strategy is achieving its objective.</p> <p>(4-100) Monitoring of retained species is conducted in sufficient detail to assess ongoing mortalities to all retained species.</p>

Scoring comments

There are no retained species from mussel bottom culture

Score:

80

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
2.2	Discarded species (also known as “by-catch” or “discards”)			
2.2.1	<p>Status: The fishery does not pose a risk of serious or irreversible harm to the by-catch species or species groups and does not hinder recovery of depleted by-catch species or species groups.</p>	<p>(1-60) Main by-catch species are <u>likely</u> to be within biologically based limits, or if outside such limits there are mitigation <u>measures</u> in place that are <u>expected</u> to ensure that the fishery does not hinder recovery and rebuilding.</p> <p>(2-60) If the status is poorly known there are measures or practices in place that are expected result in the fishery not causing the by-catch species to be biologically based limits or hindering recovery.</p>	<p>(1-80) Main by-catch species are <u>highly likely</u> to be within biologically based limits or if outside such limits there is a <u>partial strategy</u> of <u>demonstrably effective</u> mitigation measures in place such that the fishery does not hinder recovery and rebuilding.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that by-catch species are within biologically based limits.</p>

Scoring comments

By-catches consist of slipper limpets, crabs, starfish, barnacles and some pacific oysters. Starfish are not retained but for commercial reasons they are not thrown back but disposed of due to their predation on the cultured mussels. The common starfish is the most prevalent species of starfish in the North Sea and Wadden Sea. *Asterias rubens* is found in great numbers in all North Sea coastal waters and estuaries where beds of mussels and barnacles can be found. From the data of the Demersal Fish Survey (DFS) it can be concluded that both starfish and shore crabs (*Carcinus maenas*) are among the most common and abundant species in the Waddenzee and the Oosterschelde. Both species are regarded as resilient and the stock are regarded as healthy. *There is a high degree of certainty that by-catch species are within biologically based limits.*

Score:

85

Audit trace references

<http://www.surveyswageningenimares.wur.nl/UK/Survey+list/flatfish+surveys/Demersal+Fish+Survey+%28DFS%29/DFS+survey+results/>

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.2.2</p>	<p>Management strategy: There is a strategy in place for managing by-catch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to by-catch populations.</p>	<p>(1-60) There are <u>measures</u> in place, if necessary, which are expected to maintain main by-catch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>partial strategy</u> in place, if necessary, for managing by-catch that is expected to maintain main by-catch species at levels which are highly likely to be within biologically based limits or to ensure that the fishery does not hinder their recovery.</p> <p>(2-80) There is <u>some objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or the species involved.</p> <p>(3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing and minimising by-catch.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and testing supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>

Scoring comments

By-catch species are considered to be within biologically safe limits; therefore no protective strategy is required of mussel culture plots.

Score:

80

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.2.3</p>	<p>Information / monitoring: Information on the nature and amount of by-catch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage by-catch.</p>	<p>(1-60) <u>Qualitative information</u> is available on the amount of main by-catch species affected by the fishery.</p> <p>(2-60) Information is <u>adequate to broadly understand</u> outcome status with respect to biologically based limits.</p> <p>(3-60) Information is adequate to support <u>measures</u> to manage by-catch.</p>	<p>(1-80) <u>Qualitative information and some quantitative information</u> are available on the amount of main by-catch species affected by the fishery.</p> <p>(2-80) Information is sufficient to estimate outcome status with respect to biologically based limits.</p> <p>(3-80) Information is adequate to support a <u>partial strategy</u> to manage main by-catch species.</p> <p>(4-80) Sufficient data continue to be collected to detect any increase in risk to main by-catch 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>(1-100) <u>Accurate and verifiable information</u> is available on the amount of all by-catch and the consequences for the status of affected populations.</p> <p>(1-100) Information is <u>sufficient</u> to quantitatively estimate outcome status with respect to biologically based limits with a <u>high degree of certainty</u>.</p> <p>(1-100) Information is adequate to support a <u>comprehensive strategy</u> to manage by-catch, and evaluate with a high degree of certainty whether a strategy is achieving its objective.</p> <p>(1-100) Monitoring of by-catch data is conducted in sufficient detail to assess ongoing mortalities to all by-catch species.</p>

Scoring comments

Management strategy is that all cultured mussels go through the mussel auction. All auctioned mussels are assessed for by-catch species. DFYS survey delivers data on species status.
Information is sufficient to estimate outcome status with respect to biologically based limits Monitoring of by-catch data is conducted in sufficient detail to assess ongoing mortalities to all by-catch species

Score:

80

Audit trace references

DYFS

2.3 Endangered, Threatened and Protected (ETP) species

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>2.3.1</p> <p>Status: The fishery meets national and international requirements for protection of ETP species.</p> <p>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>(1-60) Known effects of the fishery are <u>likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>(2-60) Known direct effects are <u>unlikely to create unacceptable impacts</u> to ETP species.</p>	<p>(1-80) The effects of the fishery are known and are <u>highly likely</u> to be within limits of national and international requirements for protection of ETP species.</p> <p>(2-80) Direct effects are <u>highly unlikely to create unacceptable impacts</u> to ETP species.</p> <p>(3-80) Indirect effects have been considered and are thought to be unlikely to create unacceptable impacts.</p>	<p>(1-100) There is a <u>high degree of certainty</u> that the effects of the fishery are within limits of national and international requirements for protection of ETP species.</p> <p>(2-100) There is a <u>high degree of confidence</u> that there are <u>no significant detrimental effects (direct and indirect)</u> of the fishery on ETP species.</p>

Scoring comments

Mussel culture on bottom plots increases total mussel stock in the area, hence increased food availability for protected bird species such as Eider ducks. Harvest rules include maintenance of stocks on the culture plots over the winter period. For the other ETP species there is no interaction with mussel culture as culture plots are located outside resting areas of seals and birds
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

Score:

80

Audit trace references

Bult et al, 2004. LNV 2008-b

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.3.2</p>	<p>Management strategy: 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 or irreversible harm to ETP species; - ensure the fishery does not hinder recovery of ETP species; and - minimise mortality of ETP species. 	<p>(1-60) There are <u>measures</u> in place that minimise mortality, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>(2-60) The measures are <u>considered</u> likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>(1-80) There is a <u>strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality that is designed to be highly likely to achieve national and international requirements for the protection of ETP species.</p> <p>(2-80) There is an <u>objective basis for confidence</u> that the strategy will work, based on <u>some information</u> directly about the fishery and/or the species involved.</p> <p>(3-80) There is <u>evidence</u> that the strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>comprehensive strategy</u> in place for managing the fishery's impact on ETP species, including measures to minimise mortality that is designed to achieve above national and international requirements for the protection of ETP species.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or species involved, and a <u>quantitative analysis</u> supports <u>high confidence</u> that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is evidence that the strategy is achieving its objective.</p>

Scoring comments

The fishery has a management system in place with the ultimate goal that the mussel population is equal to or higher than the population which would have existed in conditions with no mussel fishery at all. Appropriate assessments (Van Stralen, 2006b) have shown that the strategy is working and is implemented successfully.

There is an objective basis for confidence that the strategy will work, based on some information directly about the fishery and/or the species involved.

Score:

85

Audit trace references

LNV 2008-b

Van Stralen, 2006-b

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>2.3.3</p>	<p>Information / monitoring Relevant information is collected to support the management of fishery impacts on ETP species, including: - information for the development of the management strategy; - information to assess the effectiveness of the management strategy; and - information to determine the outcome status of ETP species.</p>	<p>(1-60) Information is <u>adequate to broadly understand</u> the impact of the fishery on ETP species.</p> <p>(2-60) Information is adequate to support <u>measures</u> to manage the impacts on ETP species</p> <p>(3-60) <u>Information</u> is sufficient to <u>qualitatively</u> estimate the fishery related mortality of ETP species.</p>	<p>(1-80) Information is <u>sufficient to determine</u> whether the fishery may be a threat to protection and recovery of the ETP species, and if so, to measure trends and support a <u>full strategy</u> to manage impacts.</p> <p>(2-80) <u>Sufficient data</u> are available to allow fishery related mortality and the impact of fishing to be <u>quantitatively</u> estimated for ETP species.</p>	<p>(1-100) Information is <u>sufficient to quantitatively</u> estimate outcome status with a high degree of certainty.</p> <p>(2-100) Information is adequate to support a <u>comprehensive strategy</u> 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.</p> <p>(3-100) <u>Accurate and verifiable information</u> is available on the magnitude of all impacts, mortalities and injuries and the consequences for the status of ETP species</p>

Scoring comments

There are monitoring programs for ETP species. Also the stock of mussels on culture plots is surveyed annually. Translocation of mussels from culture plots in the Wadden Sea to the Oosterschelde is registered by the fishery inspectors.
Information is sufficient to quantitatively estimate outcome status with a high degree of certainty

Score:

80

Audit trace references

Wijsman & Jol, 2008

2.4	Habitat
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.4.1	Status: The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or bioregional basis, and function.	(1-60) The fishery is <u>unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	(1-80) The fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.	(1-100) There is evidence that the fishery is <u>highly unlikely</u> to reduce habitat structure and function to a point where there would be serious or irreversible harm.
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Scoring comments

Mussel farming is creating additional mussel habitats in the form of mussel beds on culture plots. The mussels are seeded and harvested from this habitats on an ongoing basis. The mussel beds have been used for many decades and there are no signs of habitat degradation or irreversible effects.

The fishery is highly unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm.

Score:

80

Audit trace references

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.4.2	<p>Management strategy: 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.</p>	<p>(1-60) There are <u>measures</u> in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.</p> <p>(2-60) The measures are considered <u>likely</u> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/habitats).</p>	<p>(1-80) There is a <u>partial strategy</u> in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.</p> <p>(2-80) There is some <u>objective basis for confidence</u> that the partial strategy will work, based on some information directly about the fishery and/or habitats involved.</p> <p>(3-80) There is <u>some evidence</u> that the partial strategy is being implemented successfully.</p>	<p>(1-100) There is a <u>strategy</u> in place for managing the impact of the fishery on habitat types.</p> <p>(2-100) The strategy is mainly based on information directly about the fishery and/or habitats involved, and testing supports high confidence that the strategy will work.</p> <p>(3-100) There is <u>clear evidence</u> that the strategy is being implemented successfully, and intended changes are occurring. There is some evidence that the strategy is achieving its objective.</p>

Scoring comments

The management strategy includes maintenance of a minimum stock on culture plots, thereby maintaining and continuously renewing the mussel bed habitat on the culture plots.. As the culture habitat is additionally created by the mussel farmers there is no negative impact of the mussel culture on this type of habitat.

There is an objective basis for confidence that the partial strategy will work, based on some information directly about the fishery and/or habitats involved

Score:

90

Audit trace references

Wijsman & Jol, 2008

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
2.4.3	<p>Information / monitoring: 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>	<p>(1-60) There is a basic understanding of the types and distribution of main habitats in the area of the fishery.</p> <p>(2-60) Information is adequate to broadly understand the main impacts of gear use on the main habitats, including spatial extent of interaction.</p>	<p>(1-80) The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery.</p> <p>(2-80) 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, timing and location of use of the fishing gear.</p> <p>(3-80) 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).</p>	<p>(1-100) The distribution of habitat types is known over their range, with particular attention to the occurrence of vulnerable habitat types.</p> <p>(2-100) Changes in habitat distributions over time are measured.</p> <p>(3-100) The physical impacts of the gear on the habitat types have been quantified fully.</p>

Scoring comments

There is a monitoring and assessment program to estimate mussel stock size on culture plots; it shows data about the extent of mussel stock maintained on the culture plots, hence of the habitat type maintenance

The nature, distribution and vulnerability of all main habitat types in the fishery area are known at a level of detail relevant to the scale and intensity of the fishery.

Changes in habitat distributions over time are measured

Score:

80

Audit trace references

Wijsman & Jol, 2008

2.5	Ecosystem
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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2.5.1	<p>Status: The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.</p>	<p>(1-60) The fishery is <u>unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.</p>	<p>(1-80) The fishery is <u>highly unlikely</u> to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.</p>	<p>(1-100) There is <u>evidence</u> 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.</p>
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Scoring comments

Mussel culture includes maintenance of mussels stocks on the culture plots. Thereby the functions of mussel stocks, such as food for higher trophic level and their filtration and nutrient regeneration capacities are maintained within the system. Mussel culture probably increases total mussel in the cultured areas compared with a situation without culture. It is noticed that in some areas mussel culture may induce over exploitation of the local carrying capacity, also because other (invasive) filter feeders such as pacific oysters and razor clams expand their population size.

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

Score:

80

Audit trace references

Bult at al, 2004.

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>2.5.2</p>	<p>Management strategy: There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.</p>	<p>(1-60) There are <u>measures</u> in place, if necessary, that take into account potential impacts of the fishery on key elements of the ecosystem.</p>	<p>(1-80) There is a <u>partial strategy</u> in place, if necessary, that 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>
		<p>(2-60) The measures are considered likely to work, based on <u>plausible argument</u> (eg, general experience, theory or comparison with similar fisheries/ ecosystems).</p>	<p>(2-80) The partial strategy is considered likely to work, based on <u>plausible argument</u> (e.g. general experience, theory or comparison with similar fisheries/ ecosystems).</p> <p>(3-80) There is <u>some evidence</u> that the measures comprising the partial strategy are being implemented successfully.</p>
			<p>(1-100) There is a <u>strategy</u> that consists of a plan, containing 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>(2-100) 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> <p>(3-100) The measures are considered likely to work based on <u>prior experience</u>, plausible argument or <u>information</u> directly from the fishery/ecosystems involved.</p> <p>(4-100) There is <u>evidence</u> that the measures are being implemented successfully.</p>

Scoring comments

At the farm level there is a strategy to maintain stocks on culture plots, in order to be able to harvest the proper size at the proper time. The fishery has a management strategy in place with the ultimate goal that the mussel population is equal to or higher than the population which would have existed in conditions with no mussel fishery at all. Appropriate assessments (Van Stralen, 2006b) have shown that the strategy is working and is implemented successfully.

There is a strategy that consists of a plan, containing 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

Score:

80

Audit trace references

LNV 2008-b; Bult et al, 2004

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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<p>2.5.3</p>	<p>Information / monitoring: There is adequate knowledge of the impacts of the fishery on the ecosystem.</p>	<p>(1-60) Information is adequate to <u>identify</u> the key elements of the ecosystem (e.g. trophic structure and function, community composition, productivity pattern and biodiversity).</p> <p>(2-60) Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>have not been investigated in detail</u>.</p>	<p>(1-80) Information is adequate to <u>broadly understand the functions</u> of the key elements of the ecosystem.</p> <p>(2-80) Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but <u>may not have been investigated in detail</u>.</p> <p>(3-80) The main functions of the Components (i.e. target, By-catch, Retained and ETP species and Habitats) in the ecosystem are <u>known</u>.</p> <p>(4-80) Sufficient information is available on the impacts of the fishery on these Components to allow some of the main consequences for the ecosystem to be inferred.</p>	<p>(1-100) Information is adequate to <u>broadly understand the key elements</u> of the ecosystem.</p> <p>(2-100) Main <u>interactions</u> between the fishery and these ecosystem elements can be inferred from existing information, and <u>have been investigated</u>.</p> <p>(3-100) The impacts of the fishery on target, By-catch, Retained and ETP species and Habitats are identified and the main functions of these components in the ecosystem are <u>understood</u>.</p> <p>(4-100) Sufficient information is available on the impacts of the fishery on the components <u>and elements</u> to allow the main consequences for the ecosystem to be inferred.</p>
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			(5-80) 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).	(5-100) Information is sufficient to support the development of strategies to manage ecosystem impacts.
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Scoring comments

Information on stock size, growth, yield is based on ongoing monitoring of culture plot stocks, and harvest size, quality and by catch data collection at the mussel auction. Stock assessment of other filter feeders is partly in place for cockles, but data collection on stocks of invasive oysters and razor clams is not addressed by monitoring programs; hence there are not sufficient data to prevent carrying capacity overexploitation.

Main impacts of the fishery on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.

CONDITION: Interaction with the increase of seed collectors needs to be monitored.

Score:

75

Audit trace references

WOT monitoring programma; Kamermans et al, 2010

APPENDIX E: SCORING TABLES PRINCIPLE 3 FOR UoC 1 AND UoC 2

Principle 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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3.1	Governance and Policy		
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3.1.1	<p>Legal and/or customary framework: The management system exists within an appropriate and effective 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; - 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>(1-60) (The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p>	<p>(1-80) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p>	<p>(1-100) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p>
		<p>(2-60) The management system incorporates or is subject by law to a <u>mechanism</u> for the resolution of legal disputes arising within the system.</p>	<p>(2-80) The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes which is <u>considered to be effective</u> in dealing with most issues and that is appropriate to the context of the fishery.</p>	<p>(2-100) The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes that is appropriate to the context of the fishery and has been <u>tested and proven to be effective</u>.</p>
		<p>(3-60) 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.</p>	<p>(3-80) The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges.</p>	<p>(3-100) The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges.</p>

		4-60) (5-60) (5-80) (5-100) The management system has a mechanism to <u>generally respect</u> 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.	(4-80) The management system has a mechanism to <u>observe</u> 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.	(4-100) The management system has a mechanism to <u>formally commit</u> to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
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Scoring comments

At EU level fisheries are managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (EC. 2371/2002).

Article 2.2 of this regulation states, "The Common Fisheries Policy shall be guided by the following principles of good governance:

- (a) clear definition of responsibilities at the Community, national and local levels;
- (b) a decision-making process based on sound scientific advice which delivers timely results;
- (c) broad involvement of stakeholders at all stages of the policy from conception to implementation;
- (d) consistent with other Community policies, in particular with environmental, social, regional, development, health and consumer protection policies.

At National Level, the Dutch Government's Fisheries Act (Visserijwet, 1963) forms the basis for the implementation of the reformed EU Common Fisheries Policy. (2371/2002). The act established an institutional framework, licencing procedures and control and enforcement responsibilities.

A clear legal framework also exists for judicial decisions to be appealed against both at national, and if necessary EU level. The European Court of Justice is the jurisdictional institutional monitoring the observance of community law and the interpretation and the application of European Treaties. Its areas of competence cover disputes between member states, disputes between the Union and the member states, between the institutions and between private individuals and the Union (European Court of Justice). Any binding decisions arising are complied with in a timely fashion. The management system – both at EU and national level – is consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2 (1-100). It observes the legal and cultural rights of fishers (4-80).

The system of industry representation in a local fishing organization enables a proactive approach to be taken to avoid legal disputes (3-100).

The management system incorporates or is 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.(2-100)

Score:

90

Audit trace references

COUNCIL REGULATION (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.1.2</p> <p>Consultation, roles and responsibilities: 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.</p>	<p>(1-60) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>generally understood</u>.</p> <p>-</p> <p>(2-60) The management system includes consultation processes that <u>obtain relevant information</u> from the main affected parties, including local knowledge, to inform the management system.</p> <p>-</p>	<p>(1-80) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>key areas</u> of responsibility and interaction.</p> <p>(2-80) The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.</p> <p>(3-80) The consultation process <u>provides opportunity</u> for all interested and affected parties to be involved.</p>	<p>(1-100) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>all areas</u> of responsibility and interaction.</p> <p>(2-100) The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information and <u>explains how it is used or not used</u>.</p> <p>(3-100) The consultation process <u>provides opportunity and encouragement</u> for all interested and affected parties to be involved, and <u>facilitates</u> their effective engagement.</p>

Scoring comments

There is clear and evident division of responsibility between EU, and national institutions and authorities. The capacity of the mussel fleet and the water quality of production areas is managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (2371/2002) and the Water Directive (113/2006).

At the national level, national fisheries administrations and industry bodies (Ministerie van Landbouw, Natuur en Voedselkwaliteit, Algemene Inspectiedienst (AID) and POs) are responsible for a range of management and regulatory duties, including management of fleet activity, management of quota, monitoring and control of all fisheries occurring within national jurisdiction. Functions, roles and responsibilities of these organizations are explicitly defined and well understood for all areas of responsibility and interaction (1-100). The management system also includes consultation processes that regularly seek and receive relevant information, including local knowledge (for example through regular consultation meetings organised by the Minister and the Mussel Advisory Commission of the Dutch Fisheries Board). The management system demonstrates consideration of the information obtained (2-80).

The core backdrop to the management of this fishery is the advice provided by IMARES which scientists are conducting stock assessments and assess

the impacts of the fishery.

There is effective industry representation through the Producer Organisations, (PO van de Nederlandse Mosselcultuur UA).

The system does provide the opportunity for effective stakeholder involvement (3-80).

Score:

90

Audit trace references

COUNCIL REGULATION (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

DIRECTIVE 2006/113/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the quality required of waters (codified version)

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.1.3 Long term objectives: 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.	(1-60) Long-term objectives to guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>implicit</u> within management policy.	(1-80) <u>Clear</u> long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within management policy.	(1-100) <u>Clear</u> long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within <u>and required by</u> management policy.

Scoring comments

At the EU level, the reformed CFP has clearly defined long-term objectives aimed at the improvement of the basis of the decision-making process through sound and transparent scientific advice and increased participation of stakeholders. The Common Fisheries Policy is designed to ensure sustainable exploitation of living aquatic resources, through the application of a precautionary approach to protect and conserve living aquatic resources, and to minimise the impact of fishing activities on marine eco-systems. It shall aim at a progressive implementation of an eco-system-based approach to fisheries management. It shall aim to contribute to efficient fishing activities within an economically viable and competitive fisheries and aquaculture industry, providing a fair standard of living for those who depend on fishing activities and taking into account the interests of consumers.

The long-term objectives of the fisheries policy of the Minister of LNV were published in the 1992 Policy Document on Sea and Coastal Fisheries (Structuurnota Zee- en Kustvisserij). The policy document aimed at an integration of fishing activities and conserving natural values where possible, and a separation of these two activities where necessary. The specific management objectives for mussel culture are laid down in the policy paper "Naar een zilte oogst, Beleidsbesluit Schelpdiervisserij 2005-2020". In more recent years the objectives of the national fisheries policy of the Netherlands are regularly noted in letters from the Minister of LNV to the Parliament. The mussel fishing and culture areas are in areas that are designated as special areas of conservation (SACs) and special conservation areas (SPCs) in the framework of the EU Habitat and Bird Directive. For these areas which together form the Natura 2000 framework conservation goals for a good status of conservation are set.

Clear long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy (1-80). There are some requirements within the management system that long term objectives are pursued.

Score:

90

Audit trace references

LNV.1993. Vissen naar evenwicht: Regeringsbeslissing Structuurnota Zee-en kustvisserij. Ministerie van Landbouw, Natuurbeheer en Visserij, The Hague.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Official Journal L 206, 22/07/1992.
 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds. Official Journal L 103, 25/04/1979 P. 0001 – 0018.

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.1.4</p> <p><i>Incentives for sustainable fishing:</i> The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.</p>	<p>(1-60) The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.</p>	<p>(1-80) 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 negative incentives do not arise.</p>	<p>(1-100) The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and <u>explicitly considers</u> incentives in a <u>regular review</u> of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices.</p>

Scoring comments

The system has no direct subsidies or incentives that contribute to unsustainable fishing or ecosystem degradation. The management of the seed fishery is designed in such a way that every fisherman has his own seed quota which prevents an unsustainable race for the mussel seed available. Subsidies for innovations in the fishery and culture are available through the European Fisheries Fund (Europees Visserij Fonds, EVF). These however work as incentives to develop more environmentally friendly fishing techniques such as spat collection on ropes. The agreement (covenant) for transition of the mussel industry and its implementation plan (uitvoeringsplan) include procedures for regular evaluations. 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 negative incentives do not arise (1-80). Occasional review of management policy or procedures ensures that they do not contribute to unsustainable fishing practices.

Score:

85

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
3.2 Fishery- specific management system				
3.2.1	<i>Fishery- specific objectives:</i> The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.	(1-60) <u>Objectives</u> , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>implicit</u> within the fishery's management system.	(1-80) <u>Short and long term objectives</u> , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.	(1-100) <u>Well defined and measurable short and long term objectives</u> , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.

Scoring comments

After an extensive evaluation (EVA II) of the shellfish fisheries policy for the period 1993-2003 the minister of LNV published the Policy Decision on Fishery 2005-2020 ('Ruimte voor een zilte oogst') in 2005. This document sets out the current government policy on fishery and culture in the Waddenzee and Oosterschelde for the period until the year 2020. Clear short and long term-objectives consistent with MSC Criteria and Principles for mussel culture in the Netherlands are laid down in this policy document. The main objective of the policy laid down in this document is an economically viable industry with production methods that respect nature and where possible improve nature values.

In October 2008 the Minister of LNV, the mussel industry and major nature conservation groups have concluded an agreement on a transition of the mussel culture towards a practice with less impact on Wadden Sea bottom habitats. This so called "Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds. Official Journal L 103, 25/04/1979 P. 0001 - 0018 Convenant transitie mosselsector en natuurherstel Waddenzee" includes objectives and a step-wise approach in order to reach the long term objective for the year 2020. The objective is to replace the current practice of bottom fishery for mussel seed by a of bottom spat collections system (MZI). The strategy is therefore focused on the restoration of sub tidal mussel banks in the Wadden Sea.

Well defined and measurable 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 (1-100 partly met)

Score:

90

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.2.2</p> <p><i>Decision-making processes:</i> The fishery-specific management system includes effective decision making processes that result in measures and strategies to achieve the objectives.</p>	<p>(1-60) There are <u>informal</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-60) Decision-making processes respond to <u>serious issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take <u>some</u> account of the wider implications of decisions.</p>	<p>(1-80) There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-80) Decision-making processes respond to <u>serious and other important issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>(3-80) Decision-making processes use the precautionary approach and are based on best available information.</p> <p>(4-80) <u>Explanations</u> are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>	<p>(1-100) There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-100) Decision-making processes respond to <u>all issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>(3-100) Decision-making processes use the precautionary approach and are based on best available information.</p> <p>(4-100) <u>Formal reporting</u> to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>

Scoring comments

Consultation processes exist between the national authorities, the mussel industry and NGO's. In the framework of the agreement (covenant) on the transition of the mussel culture these processes are institutionalized in steering and working groups that oversee the transition process. There are established decision making processes that have clearly resulted in measures and strategies to achieve the objective of a sustainable and viable mussel culture (1-100). 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.(2-80).The absence of information has not been used as a reason for failing to take management actions (site restrictions) (3-80)

Management strategies and measures also exist in terms of setting of quota for the mussel seed fishery and the implementation of undisturbed areas for

the purpose of developing sub tidal mussel banks and research into this development. Procedures exist for measuring performance of fishery in terms of stock levels and fishing effort.

The mussel seed fishery is subject to a licence under the Natura Conservation Act 1998 which under article 19 makes it compulsory to carry out appropriate assessments of the implications of the fishery for the conservation objectives of the special area of conservation (SAC) Wadden Sea. In the appropriate assessment all relevant results and knowledge, the results of the stock assessment and monitoring are evaluated and taken into account. The procedure for the issuing of the license includes a consultation round with all relevant stakeholders in a transparent manner. In the licenses there is always an extensive description of stakeholder's views and explanations are provided for decisions taken. Explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity (4-80).

Research and stock monitoring is undertaken regularly within this fishery and results are available to all stakeholders. There is good cooperation and close communication between science, management and the fishery and decision making processes in relation to findings are considered to be based on best available information.

Decision making to culture plots is linked to the rental of the plots to the farmers by the government on a private law agreement.

Score:

85

Audit trace references

Stralen M,R, van 2009. Passende Beoordeling voor de mosselzaadvisserij in de Oosterschelde in 2009. Marinx rapport 2009.84.2
LNV, 2008-d /Ruimte voor mosselzaadinstallaties (MZI's), Startnotitie beleidsproces opschaling MZI's, December 2008

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>3.2.3</p>	<p>Compliance and enforcement: Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.</p>	<p>(1-60) (5-60) (5-80) (5-100) Monitoring, control and surveillance <u>mechanisms</u> exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.</p> <p>(2-60) Sanctions to deal with non-compliance exist and there is some evidence that they are applied.</p> <p>(3-60) Fishers are <u>generally thought</u> 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.</p>	<p>(1-80) A monitoring, control and surveillance <u>system</u> has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</p> <p>(2-80) Sanctions to deal with non-compliance exist, <u>are consistently applied</u> and thought to provide effective deterrence.</p> <p>(3-80) <u>Some evidence exists</u> to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.</p> <p>(4-80) There is no evidence of systematic non compliance.</p>	<p>(1-100) A <u>comprehensive</u> 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.</p> <p>(2-100) Sanctions to deal with non-compliance exist, are consistently applied and <u>demonstrably</u> provide effective deterrence.</p> <p>(3-100) There is a <u>high degree of confidence</u> that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.</p> <p>(4-100) There is no evidence of systematic non compliance.</p>

Scoring comments

In the Oosterschelde and the Waddenzee surveillance of fishing activities takes place by inspection vessels of the Wadden Unit of the Regional Office of the Ministry of LNV. The skippers of these vessels have policing authority and they are powered to set sanctions in case of violation of rules. The inspection vessels patrol regularly and the crew of the vessels is up to date with fisheries regulations and licences issued. The inspectors know the fishermen in their control area and therefore know very well in which cases certain conduct is suspect.

The locations for suspended spat collection are allocated to an individual or groups of companies, Therefore monitoring of the activity is relatively easy. There is no evidence of non compliance with these area allocations.

The structures for spat collection are dependent to a licence of the Ministry of Public Works and Water Management. They have to be removed every year

before the first of November.

Sanctions to deal with non compliance are set by the national authorities, are consistently applied and thought to provide effective deterrence.

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 (1-80). Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence. (2-80)

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 (3-100). There is no evidence of systematic non compliance (4-80)

Score:

85

Audit trace references

scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.2.4	Research plan: The fishery has a research plan that addresses the information needs of management.	(1-60) <u>Research</u> is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2. (2-60) Research results are <u>available</u> to interested parties.	(1-80) A <u>research plan</u> provides the management system with a strategic approach to research and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. (2-80) Research results are <u>disseminated</u> to all interested parties in a timely fashion.	(1-100) A <u>comprehensive research</u> plan provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. (2-100) Research <u>plan</u> and results are <u>disseminated</u> to all interested parties in a <u>timely</u> fashion and are <u>widely and publicly available</u> .

Scoring comments

Under the Marine Strategy Framework Member States are required to develop strategies for their marine waters. The marine strategies must contain a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes.

At national level the Dutch government funds national (fisheries) research institutes. This funding of research projects automatically involves research planning and selecting research areas that require further information. For instance in recent years several surveys. Nationally IMARES has periodic meetings to plan research and to respond to EU research calls.

From 1997 until 2003 an extensive research project on the effects of culture and harvesting has been carried out by IMARES and other research institute. This project called EVA II was guided by an overall research plan. With the new policy document on fisheries in 2005 also a new research project has started. This project for sustainable culture (Project Duurzame Schelpdiercultuur, PRODUS) is jointly financed by the government and the mussel industry. Produs is a comprehensive research plan that is developed to provide the management system with reliable and timely information sufficient to achieve the objectives consistent with MSC's principles 1 and 2 (1-80). The planning and results of PRODUS are disseminated to all interested parties and are widely and publicly available (2-80).

Score:

90

Audit trace references

Ens, B, A. Smaal & J. de Vlas (2004). The effects of fishery on the ecosystems of Wadden Sea and Oosterschelde. Alterra rapport 1011.

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.2.5	<p>Monitoring and management performance evaluation: There is a system for 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.</p>	(1-60) The fishery has in place mechanisms to evaluate <u>some</u> parts of the management system and is subject to <u>occasional internal</u> review.	(1-80) The fishery has in place mechanisms to evaluate <u>key</u> parts of the management system and is subject to <u>regular internal</u> and <u>occasional external</u> review.	(1-100) The fishery has in place mechanisms to evaluate <u>all</u> parts of the management system and is subject to <u>regular internal</u> and <u>external</u> review.

Scoring comments

The CFP was reviewed thoroughly prior to the 2002 reform of the CFP. An obligation to review the basic regulation for the CFP before the end of 2012 is built into the regulation. At the time of writing an EU Green Paper on the reform of the CFP is currently out to public consultation with a new legislative proposal expected during 2011.

The efficiency of the management has been studied extensively in the framework of the EVA II project. On the basis of the EVA II reports looking into different subjects an overall evaluation report has been written (Ens, 2004). On the basis of the findings of the EVA II project the management system has been reviewed and modified where appropriate. The current management system is guided by the agreement (covenant) on transition of the mussel fishery. Under the implementation of this system regular evaluation of the performance of the covenant agreements against its objectives is anticipated. Government, industry and NGO's are represented in the steering group overseeing the implementation of the covenant. The PRODUS research project is subject to both internal and external review. The results of PRODUS are published in recognized scientific journals and submissions are subject to peer review. On the level of fishermen's organizations (PO's) procedures are reviewed by their board. The operations of the PO's monitoring, control and enforcement system (fishery management plan, black box) is regularly described in an annual report that is presented to the annual meeting of members of the PO. It is concluded that the fishery has in place mechanisms to evaluate key parts of the management system and is subject to regular internal and external review (1-80).(1-100 partly met)

Score:

85

Audit trace references

Ens, B, A. Smaal & J. de Vlas (2004). The effects of fishery on the ecosystems of Wadden Sea and Oosterschelde. Alterra rapport 1011.
COMBO (2009) Jaarverslag 2009 van de Commissie Behandeling Overtredingen (COMBO).

APPENDIX F: SCORING TABLES PRINCIPLE 3 FOR UoC 3

Principle 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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3.1	Governance and Policy		
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3.1.1	<p>Legal and/or customary framework: The management system exists within an appropriate and effective 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; - 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>(1-60) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>(2-60) The management system incorporates or is subject by law to a <u>mechanism</u> for the resolution of legal disputes arising within the system.</p> <p>(3-60) 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.</p>	<p>(1-80) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>(2-80) The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes which is <u>considered to be effective</u> in dealing with most issues and that is appropriate to the context of the fishery.</p> <p>(3-80) The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges.</p>	<p>(1-100) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>(2-100) The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes that is appropriate to the context of the fishery and has been <u>tested and proven to be effective</u>.</p> <p>(3-100) The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges.</p>
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		4-60) The management system has a mechanism to <u>generally respect</u> 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.	(4-80) The management system has a mechanism to <u>observe</u> 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.	(4-100) The management system has a mechanism to <u>formally commit</u> to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
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Scoring comments

At EU level fisheries are managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (EC. 2371/2002).

Article 2.2 of this regulation states, "The Common Fisheries Policy shall be guided by the following principles of good governance:

- (a) clear definition of responsibilities at the Community, national and local levels;
- (b) a decision-making process based on sound scientific advice which delivers timely results;
- (c) broad involvement of stakeholders at all stages of the policy from conception to implementation;
- (d) consistent with other Community policies, in particular with environmental, social, regional, development, health and consumer protection policies.

At National Level, the Dutch Government's Fisheries Act (Visserijwet, 1963) forms the basis for the implementation of the reformed EU Common Fisheries Policy. (2371/2002). The act established an institutional framework, licencing procedures and control and enforcement responsibilities.

A clear legal framework also exists for judicial decisions to be appealed against both at national, and if necessary EU level. The European Court of Justice is the jurisdictional institutional monitoring the observance of community law and the interpretation and the application of European Treaties. Its areas of competence cover disputes between member states, disputes between the Union and the member states, between the institutions and between private individuals and the Union (European Court of Justice). Any binding decisions arising are complied with in a timely fashion. The management system – both at EU and national level – is consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2 (1-100). It observes the legal and cultural rights of fishers (4-80).

The system of industry representation in a local fishing organization enables a proactive approach to be taken to avoid legal disputes (3-100).

The management system incorporates or is 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.(2-100)

Score:

90

Audit trace references

COUNCIL REGULATION (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.1.2</p> <p>Consultation, roles and responsibilities: 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.</p>	<p>(1-60) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>generally understood</u>.</p> <p>-</p> <p>(2-60) The management system includes consultation processes that <u>obtain relevant information</u> from the main affected parties, including local knowledge, to inform the management system.</p> <p>-</p>	<p>(1-80) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>key areas</u> of responsibility and interaction.</p> <p>(2-80) The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.</p> <p>(3-80) The consultation process <u>provides opportunity</u> for all interested and affected parties to be involved.</p>	<p>(1-100) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>all areas</u> of responsibility and interaction.</p> <p>(2-100) The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information and <u>explains how it is used or not used</u>.</p> <p>(3-100) The consultation process <u>provides opportunity and encouragement</u> for all interested and affected parties to be involved, and <u>facilitates</u> their effective engagement.</p>

Scoring comments

There is clear and evident division of responsibility between EU, and national institutions and authorities. The capacity of the mussel fleet and the water quality of production areas is managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (2371/2002) and the Water Directive (113/2006).

At the national level, national fisheries administrations and industry bodies (Ministerie van Landbouw, Natuur en Voedselkwaliteit, Algemene Inspectiedienst (AID) and POs) are responsible for a range of management and regulatory duties, including management of fleet activity, management of quota, monitoring and control of all fisheries occurring within national jurisdiction. Functions, roles and responsibilities of these organizations are explicitly defined and well understood for all areas of responsibility and interaction (1-100). The management system also includes consultation processes that regularly seek and receive relevant information, including local knowledge (for example through regular consultation meetings organised by the Minister and the Mussel Advisory Commission of the Dutch Fisheries Board). The management system demonstrates consideration of the information obtained (2-80).

The core backdrop to the management of this fishery is the advice provided by IMARES wh scientists are conducting stock assessments and assess the

impacts of the fishery.

There is effective industry representation through the Producer Organisations, (PO van de Nederlandse Mosselcultuur UA).

The system does provide the opportunity for effective stakeholder involvement (3-80).

Score:

90

Audit trace references

COUNCIL REGULATION (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

DIRECTIVE 2006/113/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the quality required of waters (codified version)

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.1.3 Long term objectives: 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.	(1-60) Long-term objectives to guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>implicit</u> within management policy.	(1-80) <u>Clear</u> long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within management policy.	(1-100) <u>Clear</u> long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within <u>and required by</u> management policy.

Scoring comments

At the EU level, the reformed CFP has clearly defined long-term objectives aimed at the improvement of the basis of the decision-making process through sound and transparent scientific advice and increased participation of stakeholders. The Common Fisheries Policy is designed to ensure sustainable exploitation of living aquatic resources, through the application of a precautionary approach to protect and conserve living aquatic resources, and to minimise the impact of fishing activities on marine eco-systems. It shall aim at a progressive implementation of an eco-system-based approach to fisheries management. It shall aim to contribute to efficient fishing activities within an economically viable and competitive fisheries and aquaculture industry, providing a fair standard of living for those who depend on fishing activities and taking into account the interests of consumers.

The long-term objectives of the fisheries policy of the Minister of LNV were published in the 1992 Policy Document on Sea and Coastal Fisheries (Structuurnota Zee- en Kustvisserij). The policy document aimed at an integration of fishing activities and conserving natural values where possible, and a separation of these two activities where necessary. The specific management objectives for mussel culture are laid down in the policy paper "Naar een zilte oogst, Beleidsbesluit Schelpdiervisserij 2005-2020". In more recent years the objectives of the national fisheries policy of the Netherlands are regularly noted in letters from the Minister of LNV to the Parliament. The mussel fishing and culture areas are in areas that are designated as special areas of conservation (SACs) and special conservation areas (SPCs) in the framework of the EU Habitat and Bird Directive. For these areas which together form the Natura 2000 framework conservation goals for a good status of conservation are set.

Clear long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy (1-80). There are some requirements within the management system that long term objectives are pursued.

Score:

90

Audit trace references

LNV. 1993. Vissen naar evenwicht: Regeringsbeslissing Structuurnota Zee-en kustvisserij. . Ministerie van Landbouw, Natuurbeheer en Visserij, The Hague.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Official Journal L 206, 22/07/1992.
 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds. Official Journal L 103, 25/04/1979 P. 0001 – 0018.

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.1.4</p> <p><i>Incentives for sustainable fishing:</i> The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.</p>	<p>(1-60) The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.</p>	<p>(1-80) 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 negative incentives do not arise.</p>	<p>(1-100) The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and <u>explicitly considers</u> incentives in a <u>regular review</u> of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices.</p>

Scoring comments

The system has no direct subsidies or incentives that contribute to unsustainable fishing or ecosystem degradation. The management of the seed fishery is designed in such a way that every fisherman has his own seed quota which prevents an unsustainable race for the mussel seed available. Subsidies for innovations in the fishery and culture are available through the European Fisheries Fund (Europees Visserij Fonds, EVF). These however work as incentives to develop more environmentally friendly fishing techniques such as spat collection on ropes. The agreement (covenant) for transition of the mussel industry and its implementation plan (uitvoeringsplan) include procedures for regular evaluations. 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 negative incentives do not arise (1-80). Occasional review of management policy or procedures ensures that they do not contribute to unsustainable fishing practices.

Score:

85

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
3.2 Fishery- specific management system				
3.2.1	<i>Fishery- specific objectives:</i> The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.	(1-60) <u>Objectives</u> , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>implicit</u> within the fishery's management system.	(1-80) <u>Short and long term objectives</u> , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.	(1-100) <u>Well defined and measurable short and long term objectives</u> , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.

Scoring comments

After an extensive evaluation (EVA II) of the shellfish fisheries policy for the period 1993-2003 the minister of LNV published the Policy Decision on Fishery 2005-2020 (*'Ruimte voor een zilte oogst'*) in 2005. This document sets out the current government policy on fishery and culture in the Waddenzee and Oosterschelde for the period until the year 2020. Clear short and long term-objectives consistent with MSC Criteria and Principles for mussel culture in the Netherlands are laid down in this policy document. The main objective of the policy laid down in this document is an economically viable industry with production methods that respect nature and where possible improve nature values.

In October 2008 the Minister of LNV, the mussel industry and major nature conservation groups have concluded and agreement on a transition of the mussel culture towards a practice with less impact on Wadden Sea bottom habitats. This so called "Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds. Official Journal L 103, 25/04/1979 P. 0001 - 0018 Convenant transitie mosselsector en natuurherstel Waddenzee" includes objectives and a step-wise approach in order to reach the long term objective for the year 2020. The objective is to replace the current practice of bottom fishery for mussel seed by a of bottom spat collections system (MZI). The strategy is therefore focused on the restoration of sub tidal mussel banks in the Wadden Sea.

Well defined and measurable 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 (1-100 partly met)

Score:

90

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.2.2</p> <p><i>Decision-making processes:</i> The fishery-specific management system includes effective decision making processes that result in measures and strategies to achieve the objectives.</p>	<p>(1-60) There are <u>informal</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-60) Decision-making processes respond to <u>serious issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take <u>some</u> account of the wider implications of decisions.</p>	<p>(1-80) There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-80) Decision-making processes respond to <u>serious and other important issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>(3-80) Decision-making processes use the precautionary approach and are based on best available information.</p> <p>(4-80) <u>Explanations</u> are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>	<p>(1-100) There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-100) Decision-making processes respond to <u>all issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>(3-100) Decision-making processes use the precautionary approach and are based on best available information.</p> <p>(4-100) <u>Formal reporting</u> to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>

Scoring comments

Consultation processes exist between the national authorities, the mussel industry and NGO's. In the framework of the agreement (covenant) on the transition of the mussel culture these processes are institutionalized in steering and working groups that oversee the transition process. The are established decision making processes that have clearly resulted in measures and strategies to achieve the objective of a sustainable and viable mussel culture (1-100). 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.(2-80).The absence of information has not been used as a reason for failing to take management actions (site restrictions) (3-80)

Management strategies and measures also exist in terms of setting of quota for the mussel seed fishery and the implementation of undisturbed areas for

the purpose of developing sub tidal mussel banks and research into this development. Procedures exist for measuring performance of fishery in terms of stock levels and fishing effort.

The mussel seed fishery is subject to a licence under the Natura Conservation Act 1998 which under article 19 makes it compulsory to carry out appropriate assessments of the implications of the fishery for the conservation objectives of the special area of conservation (SAC) Wadden Sea. In the appropriate assessment all relevant results and knowledge, the results of the stock assessment and monitoring are evaluated and taken into account. The procedure for the issuing of the license includes a consultation round with all relevant stakeholders in a transparent manner. In the licenses there is always an extensive description of stakeholder's views and explanations are provided for decisions taken. Explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity (4-80).

Research and stock monitoring is undertaken regularly within this fishery and results are available to all stakeholders. There is good cooperation and close communication between science, management and the fishery and decision making processes in relation to findings are considered to be based on best available information.

Decision making to culture plots is linked to the rental of the plots to the farmers by the government on a private law agreement.

Score:

85

Audit trace references

Stralen M,R, van 2009. Passende Beoordeling voor de mosselzaadvisserij in de Oosterschelde in 2009. Marinx rapport 2009.84.2
LNV, 2008-d /Ruimte voor mosselzaadinstallaties (MZI's), Startnotitie beleidsproces opschaling MZI's, December 2008

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>3.2.3</p>	<p>Compliance and enforcement: Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.</p>	<p>(1-60) Monitoring, control and surveillance <u>mechanisms</u> exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.</p> <p>(2-60) Sanctions to deal with non-compliance exist and there is some evidence that they are applied.</p> <p>(3-60) Fishers are <u>generally thought</u> 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.</p>	<p>(1-80) A monitoring, control and surveillance <u>system</u> has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</p> <p>(2-80) Sanctions to deal with non-compliance exist, <u>are consistently applied</u> and thought to provide effective deterrence.</p> <p>(3-80) <u>Some evidence exists</u> to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.</p> <p>(4-80) There is no evidence of systematic non compliance.</p>	<p>(1-100) A <u>comprehensive</u> 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.</p> <p>(2-100) Sanctions to deal with non-compliance exist, are consistently applied and <u>demonstrably</u> provide effective deterrence.</p> <p>(3-100) There is a <u>high degree of confidence</u> that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.</p> <p>(4-100) There is no evidence of systematic non compliance.</p>

Scoring comments

In the Oosterschelde and the Waddenzee surveillance of fishing activities takes place by inspection vessels of the Wadden Unit of the Regional Office of the Ministry of LNV. The skippers of these vessels have policing authority and they are powered to set sanctions in case of violation of rules. The inspection vessels patrol regularly and the crew of the vessels is up to date with fisheries regulations and licences issued. The inspectors know the fishermen in their control area and therefore know very well in which cases certain conduct is suspect.

A comprehensive monitoring, control and surveillance system is in place for the mussel seed fishery, with inspections by auditors of the Fish Product Board and a satellite monitoring system through a so called black box system. This system has a demonstrated ability to enforce the relevant management measures and agreed quota division by the PO (1-80).

Sanctions to deal with non compliance are set by the national authorities but more important in this case by the PO in the PO regulations concerning enforcement (Reglement Afdoening Overtredingen). These sanctions are consistently applied and demonstrable provide effective deterrence (2-100).

There is some evidence that fishers comply with the management system governing the mussel seed fishery (3-80).

There is no evidence of systematic non compliance (4-80). Cases have occurred where fishers have fished in areas that were closed for research purposes or have exceeded their quota. These cases have been dealt with by the enforcement procedures implemented by the PO. Therefore violations of regulations are consistently subject to sanctions which demonstrably provide an effective deterrence against violations.

Score:

85

Audit trace references

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.2.4	Research plan: The fishery has a research plan that addresses the information needs of management.	(1-60) <u>Research</u> is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2. (2-60) Research results are <u>available</u> to interested parties.	(1-80) A <u>research plan</u> provides the management system with a strategic approach to research and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. (2-80) Research results are <u>disseminated</u> to all interested parties in a timely fashion.	(1-100) A <u>comprehensive research plan</u> provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. (2-100) Research <u>plan</u> and results are <u>disseminated</u> to all interested parties in a <u>timely</u> fashion and are <u>widely and publicly available</u> .

Scoring comments

Under the Marine Strategy Framework Member States are required to develop strategies for their marine waters. The marine strategies must contain a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes.

At national level the Dutch government funds national (fisheries) research institutes. This funding of research projects automatically involves research planning and selecting research areas that require further information. For instance in recent years several surveys. Nationally IMARES has periodic meetings to plan research and to respond to EU research calls.

From 1997 until 2003 an extensive research project on the effects of culture and harvesting has been carried out by IMARES and other research institute. This project called EVA II was guided by an overall research plan. With the new policy document on fisheries in 2005 also a new research project has started. This project for sustainable culture (Project Duurzame Schelpdiercultuur, PRODUS) is jointly financed by the government and the mussel industry. Produs is a comprehensive research plan that is developed to provide the management system with reliable and timely information sufficient to achieve the objectives consistent with MSC's principles 1 and 2 (1-80). The planning and results of PRODUS are disseminated to all interested parties and are widely and publicly available (2-80).

Score:

90

Audit trace references

Ens, B, A. Smaal & J. de Vlas (2004). The effects of fishery on the ecosystems of Wadden Sea and Oosterschelde. Alterra rapport 1011.

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.2.5	<p>Monitoring and management performance evaluation: There is a system for 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.</p>	(1-60) The fishery has in place mechanisms to evaluate <u>some</u> parts of the management system and is subject to <u>occasional internal</u> review.	(1-80) The fishery has in place mechanisms to evaluate <u>key</u> parts of the management system and is subject to <u>regular internal</u> and <u>occasional external</u> review.	(1-100) The fishery has in place mechanisms to evaluate <u>all</u> parts of the management system and is subject to <u>regular internal</u> and <u>external</u> review.

Scoring comments

The CFP was reviewed thoroughly prior to the 2002 reform of the CFP. An obligation to review the basic regulation for the CFP before the end of 2012 is built into the regulation. At the time of writing an EU Green Paper on the reform of the CFP is currently out to public consultation with a new legislative proposal expected during 2011.

The efficiency of the management has been studied extensively in the framework of the EVA II project. On the basis of the EVA II reports looking into different subjects an overall evaluation report has been written (Ens, 2004). On the basis of the findings of the EVA II project the management system has been reviewed and modified where appropriate. The current management system is guided by the agreement (covenant) on transition of the mussel fishery. Under the implementation of this system regular evaluation of the performance of the covenant agreements against its objectives is anticipated. Government, industry and NGO's are represented in the steering group overseeing the implementation of the covenant. The PRODUS research project is subject to both internal and external review. The results of PRODUS are published in recognized scientific journals and submissions are subject to peer review. On the level of fishermen's organizations (PO's) procedures are reviewed by their board. The operations of the PO's monitoring, control and enforcement system (fishery management plan, black box) is regularly described in an annual report that is presented to the annual meeting of members of the PO. It is concluded that the fishery has in place mechanisms to evaluate key parts of the management system and is subject to regular internal and external review (1-80).(1-100 partly met)

Score:

85

Audit trace references

Ens, B, A. Smaal & J. de Vlas (2004). The effects of fishery on the ecosystems of Wadden Sea and Oosterschelde. Alterra rapport 1011.
COMBO (2009) Jaarverslag 2009 van de Commissie Behandeling Overtredingen (COMBO).

APPENDIX G: SCORING TABLES PRINCIPLE 3 FOR UoC 4

Principle 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable
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Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
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3.1	Governance and Policy		
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3.1.1	<p><i>Legal and/or customary framework:</i> The management system exists within an appropriate and effective 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; - 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>(1-60) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>(2-60) The management system incorporates or is subject by law to a <u>mechanism</u> for the resolution of legal disputes arising within the system.</p> <p>(3-60) 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.</p>	<p>(1-80) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>(2-80) The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes which is <u>considered to be effective</u> in dealing with most issues and that is appropriate to the context of the fishery.</p> <p>(3-80) The management system or fishery is attempting to comply in a timely fashion with binding judicial decisions arising from any legal challenges.</p>	<p>(1-100) The management system is generally consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2.</p> <p>(2-100) The management system incorporates or is subject by law to a <u>transparent mechanism</u> for the resolution of legal disputes that is appropriate to the context of the fishery and has been <u>tested and proven to be effective</u>.</p> <p>(3-100) The management system or fishery acts proactively to avoid legal disputes or rapidly implements binding judicial decisions arising from legal challenges.</p>
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		<p>4-60) The management system has a mechanism to <u>generally respect</u> 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.</p>	<p>(4-80) The management system has a mechanism to <u>observe</u> 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.</p>	<p>(4-100) The management system has a mechanism to <u>formally commit</u> to the legal rights created explicitly or established by custom on people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>
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Scoring comments

At EU level fisheries are managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (EC. 2371/2002). Article 2.2 of this regulation states, “The Common Fisheries Policy shall be guided by the following principles of good governance:

- (a) clear definition of responsibilities at the Community, national and local levels;
- (b) a decision-making process based on sound scientific advice which delivers timely results;
- (c) broad involvement of stakeholders at all stages of the policy from conception to implementation;
- (d) consistent with other Community policies, in particular with environmental, social, regional, development, health and consumer protection policies.

At National Level, the Dutch Government’s Fisheries Act (Visserijwet, 1963) forms the basis for the implementation of the reformed EU Common Fisheries Policy. (2371/2002). The act established an institutional framework, licencing procedures and control and enforcement responsibilities. A clear legal framework also exists for judicial decisions to be appealed against both at national, and if necessary EU level. The European Court of Justice is the jurisdictional institutional monitoring the observance of community law and the interpretation and the application of European Treaties. Its areas of competence cover disputes between member states, disputes between the Union and the member states, between the institutions and between private individuals and the Union (European Court of Justice). Any binding decisions arising are complied with in a timely fashion. The management system – both at EU and national level – is consistent with local, national or international laws or standards that are aimed at achieving sustainable fisheries in accordance with MSC Principles 1 and 2 (1-100). It observes the legal and cultural rights of fishers (4-80).

The system of industry representation in a local fishing organization enables a proactive approach to be taken to avoid legal disputes (3-100). The management system incorporates or is 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.(2-100)

Score:

90

Audit trace references

COUNCIL REGULATION (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.1.2</p> <p>Consultation, roles and responsibilities: 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.</p>	<p>(1-60) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>generally understood</u>.</p> <p>-</p> <p>(2-60) The management system includes consultation processes that <u>obtain relevant information</u> from the main affected parties, including local knowledge, to inform the management system.</p> <p>-</p>	<p>(1-80) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>key areas</u> of responsibility and interaction.</p> <p>(2-80) The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.</p> <p>(3-80) The consultation process <u>provides opportunity</u> for all interested and affected parties to be involved.</p>	<p>(1-100) Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are <u>explicitly defined and well understood</u> for <u>all areas</u> of responsibility and interaction.</p> <p>(2-100) The management system includes consultation processes that <u>regularly seek and accept</u> relevant information, including local knowledge. The management system demonstrates consideration of the information and <u>explains how it is used or not used</u>.</p> <p>(3-100) The consultation process <u>provides opportunity and encouragement</u> for all interested and affected parties to be involved, and <u>facilitates</u> their effective engagement.</p>

Scoring comments

There is clear and evident division of responsibility between EU, and national institutions and authorities. The capacity of the mussel fleet and the water quality of production areas is managed through the Common Fisheries Policy of the EU in accordance with the basic fisheries regulation (2371/2002) and the Water Directive (113/2006).

At the national level, national fisheries administrations and industry bodies (Ministerie van Landbouw, Natuur en Voedselkwaliteit, Algemene Inspectiedienst (AID) and POs) are responsible for a range of management and regulatory duties, including management of fleet activity, management of quota, monitoring and control of all fisheries occurring within national jurisdiction. Functions, roles and responsibilities of these organizations are explicitly defined and well understood for all areas of responsibility and interaction (1-100). The management system also includes consultation processes that regularly seek and receive relevant information, including local knowledge (for example through regular consultation meetings organized by the Minister and the Mussel Advisory Commission of the Dutch Fisheries Board). The management system demonstrates consideration of the information obtained (2-80).

The core backdrop to the management of this fishery is the advice provided by IMARES which scientists are conducting stock assessments and assess

the impacts of the fishery.

There is effective industry representation through the Producer Organisations, (PO van de Nederlandse Mosselcultuur UA).

The system does provide the opportunity for effective stakeholder involvement (3-80).

Score:

90

Audit trace references

COUNCIL REGULATION (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy

DIRECTIVE 2006/113/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2006 on the quality required of waters (codified version)

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.1.3 Long term objectives: 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.	(1-60) Long-term objectives to guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>implicit</u> within management policy.	(1-80) <u>Clear</u> long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within management policy.	(1-100) <u>Clear</u> long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are <u>explicit</u> within <u>and required by</u> management policy.

Scoring comments

At the EU level, the reformed CFP has clearly defined long-term objectives aimed at the improvement of the basis of the decision-making process through sound and transparent scientific advice and increased participation of stakeholders. The Common Fisheries Policy is designed to ensure sustainable exploitation of living aquatic resources, through the application of a precautionary approach to protect and conserve living aquatic resources, and to minimise the impact of fishing activities on marine eco-systems. It shall aim at a progressive implementation of an eco-system-based approach to fisheries management. It shall aim to contribute to efficient fishing activities within an economically viable and competitive fisheries and aquaculture industry, providing a fair standard of living for those who depend on fishing activities and taking into account the interests of consumers.

The long-term objectives of the fisheries policy of the Minister of LNV were published in the 1992 Policy Document on Sea and Coastal Fisheries (Structuurnota Zee- en Kustvisserij). The policy document aimed at an integration of fishing activities and conserving natural values where possible, and a separation of these two activities where necessary. The specific management objectives for mussel culture are laid down in the policy paper "Naar een zilte oogst, Beleidsbesluit Schelpdiervisserij 2005-2020". In more recent years the objectives of the national fisheries policy of the Netherlands are regularly noted in letters from the Minister of LNV to the Parliament. The mussel fishing and culture areas are in areas that are designated as special areas of conservation (SACs) and special conservation areas (SPCs) in the framework of the EU Habitat and Bird Directive. For these areas which together form the Natura 2000 framework conservation goals for a good status of conservation are set.

Clear long-term objectives that guide decision making, consistent with MSC Principles and Criteria and the precautionary approach, are explicit within management policy (1-80). There are some requirements within the management system that long term objectives are pursued.

Score:

90

Audit trace references

LNV. 1993. Vissen naar evenwicht: Regeringsbeslissing Structuurnota Zee-en kustvisserij. Ministerie van Landbouw, Natuurbeheer en Visserij, The Hague.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. Official Journal L 206, 22/07/1992.
 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds. Official Journal L 103, 25/04/1979 P. 0001 – 0018.

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.1.4	<p><i>Incentives for sustainable fishing:</i> The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.</p>	(1-60) The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2.	(1-80) 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 negative incentives do not arise.	(1-100) The management system provides for incentives that are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, and <u>explicitly considers</u> incentives in a <u>regular review</u> of management policy or procedures to ensure that they do not contribute to unsustainable fishing practices.

Scoring comments

The system has no direct subsidies or incentives that contribute to unsustainable fishing or ecosystem degradation. The management of the seed fishery is designed in such a way that every fisherman has his own seed quota which prevents an unsustainable race for the mussel seed available. Subsidies for innovations in the fishery and culture are available through the European Fisheries Fund (Europees Visserij Fonds, EVF). These however work as incentives to develop more environmentally friendly fishing techniques such as spat collection on ropes. The agreement (covenant) for transition of the mussel industry and its implementation plan (uitvoeringsplan) include procedures for regular evaluations. 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 negative incentives do not arise (1-80). Occasional review of management policy or procedures ensures that they do not contribute to unsustainable fishing practices.

Score:

85

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
3.2 Fishery- specific management system				
3.2.1	<i>Fishery- specific objectives:</i> The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.	(1-60) <u>Objectives</u> , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>implicit</u> within the fishery's management system.	(1-80) <u>Short and long term objectives</u> , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.	(1-100) <u>Well defined and measurable short and long term objectives</u> , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are <u>explicit</u> within the fishery's management system.

Scoring comments

After an extensive evaluation (EVA II) of the shellfish fisheries policy for the period 1993-2003 the minister of LNV published the Policy Decision on Fishery 2005-2020 ('Ruimte voor een zilte oogst') in 2005. This document sets out the current government policy on fishery and culture in the Waddenzee and Oosterschelde for the period until the year 2020. Clear short and long term-objectives consistent with MSC Criteria and Principles for mussel culture in the Netherlands are laid down in this policy document. The main objective of the policy laid down in this document is an economically viable industry with production methods that respect nature and where possible improve nature values.

In October 2008 the Minister of LNV, the mussel industry and major nature conservation groups have concluded and agreement on a transition of the mussel culture towards a practice with less impact on Wadden Sea bottom habitats. This so called "Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds. Official Journal L 103, 25/04/1979 P. 0001 - 0018 Convenant transitie mosselsector en natuurherstel Waddenzee" includes objectives and a step-wise approach in order to reach the long term objective for the year 2020. The objective is to replace the current practice of bottom fishery for mussel seed by a of bottom spat collections system (MZI). The strategy is therefore focused on the restoration of sub tidal mussel banks in the Wadden Sea.

Well defined and measurable 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 (1-100 partly met)

Score:

90

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
<p>3.2.2</p> <p><i>Decision-making processes:</i> The fishery-specific management system includes effective decision making processes that result in measures and strategies to achieve the objectives.</p>	<p>(1-60) There are <u>informal</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-60) Decision-making processes respond to <u>serious issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take <u>some</u> account of the wider implications of decisions.</p>	<p>(1-80) There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-80) Decision-making processes respond to <u>serious and other important issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>(3-80) Decision-making processes use the precautionary approach and are based on best available information.</p> <p>(4-80) <u>Explanations</u> are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>	<p>(1-100) There are <u>established</u> decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.</p> <p>(2-100) Decision-making processes respond to <u>all issues</u> identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.</p> <p>(3-100) Decision-making processes use the precautionary approach and are based on best available information.</p> <p>(4-100) <u>Formal reporting</u> to all interested stakeholders describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>

Scoring comments

Consultation processes exist between the national authorities, the mussel industry and NGO's. In the framework of the agreement (covenant) on the transition of the mussel culture these processes are institutionalized in steering and working groups that oversee the transition process. There are established decision making processes that have clearly resulted in measures and strategies to achieve the objective of a sustainable and viable mussel culture (1-100). 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.(2-80).The absence of information has not been used as a reason for failing to take management actions (site restrictions) (3-80)

Management strategies and measures also exist in terms of setting of quota for the mussel seed fishery and the implementation of undisturbed areas for

the purpose of developing sub tidal mussel banks and research into this development. Procedures exist for measuring performance of fishery in terms of stock levels and fishing effort.

The mussel seed fishery is subject to a licence under the Natura Conservation Act 1998 which under article 19 makes it compulsory to carry out appropriate assessments of the implications of the fishery for the conservation objectives of the special area of conservation (SAC) Wadden Sea. In the appropriate assessment all relevant results and knowledge, the results of the stock assessment and monitoring are evaluated and taken into account. The procedure for the issuing of the license includes a consultation round with all relevant stakeholders in a transparent manner. In the licenses there is always an extensive description of stakeholder's views and explanations are provided for decisions taken. Explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity (4-80).

Research and stock monitoring is undertaken regularly within this fishery and results are available to all stakeholders. There is good cooperation and close communication between science, management and the fishery and decision making processes in relation to findings are considered to be based on best available information.

Decision making to culture plots is linked to the rental of the plots to the farmers by the government on a private law agreement.

Score:

85

Audit trace references

Stralen M,R, van 2009. Passende Beoordeling voor de mosselzaadvisserij in de Oosterschelde in 2009. Marinx rapport 2009.84.2
LNV, 2008-d /Ruimte voor mosselzaadinstallaties (MZI's), Startnotitie beleidsproces opschaling MZI's, December 2008

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100	
<p>3.2.3</p>	<p>Compliance and enforcement: Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with.</p>	<p>(1-60) Monitoring, control and surveillance <u>mechanisms</u> exist, are implemented in the fishery under assessment and there is a reasonable expectation that they are effective.</p> <p>(2-60) Sanctions to deal with non-compliance exist and there is some evidence that they are applied.</p> <p>(3-60) Fishers are <u>generally thought</u> 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.</p>	<p>(1-80) A monitoring, control and surveillance <u>system</u> has been implemented in the fishery under assessment and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.</p> <p>(2-80) Sanctions to deal with non-compliance exist, <u>are consistently applied</u> and thought to provide effective deterrence.</p> <p>(3-80) <u>Some evidence exists</u> to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.</p> <p>(4-80) There is no evidence of systematic non compliance.</p>	<p>(1-100) A <u>comprehensive</u> 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.</p> <p>(2-100) Sanctions to deal with non-compliance exist, are consistently applied and <u>demonstrably</u> provide effective deterrence.</p> <p>(3-100) There is a <u>high degree of confidence</u> that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.</p> <p>(4-100) There is no evidence of systematic non compliance.</p>

Scoring comments

In the Oosterschelde and the Waddenzee surveillance of fishing activities takes place by inspection vessels of the Wadden Unit of the Regional Office of the Ministry of LNV. The skippers of these vessels have policing authority and they are powered to set sanctions in case of violation of rules. The inspection vessels patrol regularly and the crew of the vessels is up to date with fisheries regulations and licences issued. The inspectors know the fishermen in their control area and therefore know very well in which cases certain conduct is suspect.

The black box system is activated throughout the whole year. This is a compulsory rule and violations are subject to sanctions by the PO. Through the black box system the movements of the vessels can be followed on all times. Movements away from or outside the limits of culture plots can therefore be noticed. 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 (1-80). Sanctions to deal with non-compliance exist, are consistently applied and thought to

provide effective deterrence (2-80).

The assessment team has however noticed that under the present practices of the industry mussels from different origin are seeded on culture plots. After the harvesting of mussels from plots in the Oosterschelde or Waddenzee the mussels are sold at the auction in Yerseke and seeded back to the watering plots in the Oosterschelde.

Since also imported mussels are present on the culture plots in the Oosterschelde and on the watering plots, It is a current practice to mix mussels from different origins on culture or watering plots. Therefore at present there is insufficient evidence that MSC mussels will be kept separate from non MSC mussels. There is an element of risk that not all mussels originate from the evaluated fishery (UoC4).

In paragraph 11.4 it is stated therefore that due to the high level of risk that imported mussels may be mixed with the mussels from this fishery, all the mussels landed from UoC 4 may not enter into the MSC chains of custody and are not eligible to carry the MSC logo. This non eligibility shall remain in force until the decision is reviewed and revised by a subsequent chain of custody assessment.

CONDITION: To develop and implement a control, monitoring and enforcement system which provides sufficient guarantees that foreign mussel seed and mussels are kept separated from the locally produced mussels in all stages of the production and purification processes.

Timescale: Within 6 months after MSC fishery certification

Score:

70

Audit trace references

Scoring criteria	Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.2.4	Research plan: The fishery has a research plan that addresses the information needs of management.	(1-60) <u>Research</u> is undertaken, as required, to achieve the objectives consistent with MSC's Principles 1 and 2. (2-60) Research results are <u>available</u> to interested parties.	(1-80) A <u>research plan</u> provides the management system with a strategic approach to research and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. (2-80) Research results are <u>disseminated</u> to all interested parties in a timely fashion. (1-100) A <u>comprehensive research plan</u> provides the management system with a coherent and strategic approach to research across P1, P2 and P3, and <u>reliable and timely information</u> sufficient to achieve the objectives consistent with MSC's Principles 1 and 2. (2-100) Research <u>plan</u> and results are <u>disseminated</u> to all interested parties in a <u>timely</u> fashion and are <u>widely and publicly available</u> .

Scoring comments

Under the Marine Strategy Framework Member States are required to develop strategies for their marine waters. The marine strategies must contain a detailed assessment of the state of the environment, a definition of "good environmental status" at regional level and the establishment of clear environmental targets and monitoring programmes.

At national level the Dutch government funds national (fisheries) research institutes. This funding of research projects automatically involves research planning and selecting research areas that require further information. For instance in recent years several surveys. Nationally IMARES has periodic meetings to plan research and to respond to EU research calls.

From 1997 until 2003 an extensive research project on the effects of culture and harvesting has been carried out by IMARES and other research institute. This project called EVA II was guided by an overall research plan. With the new policy document on fisheries in 2005 also a new research project has started. This project for sustainable culture (Project Duurzame Schelpdiercultuur, PRODUS) is jointly financed by the government and the mussel industry. Produs is a comprehensive research plan that is developed to provide the management system with reliable and timely information sufficient to achieve the objectives consistent with MSC's principles 1 and 2 (1-80). The planning and results of PRODUS are disseminated to all interested parties and are

widely and publicly available (2-80).

Score:

90

Audit trace references

Ens, B, A. Smaal & J. de Vlas (2004). The effects of fishery on the ecosystems of Wadden Sea and Oosterschelde. Alterra rapport 1011.

Scoring criteria		Scoring guidepost 60	Scoring guidepost 80	Scoring guidepost 100
3.2.5	<p>Monitoring and management performance evaluation: There is a system for 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.</p>	(1-60) The fishery has in place mechanisms to evaluate <u>some</u> parts of the management system and is subject to <u>occasional internal</u> review.	(1-80) The fishery has in place mechanisms to evaluate <u>key</u> parts of the management system and is subject to <u>regular internal</u> and <u>occasional external</u> review.	(1-100) The fishery has in place mechanisms to evaluate <u>all</u> parts of the management system and is subject to <u>regular internal</u> and <u>external</u> review.

Scoring comments

The CFP was reviewed thoroughly prior to the 2002 reform of the CFP. An obligation to review the basic regulation for the CFP before the end of 2012 is built into the regulation. At the time of writing an EU Green Paper on the reform of the CFP is currently out to public consultation with a new legislative proposal expected during 2011.

The efficiency of the management has been studied extensively in the framework of the EVA II project. On the basis of the EVA II reports looking into different subjects an overall evaluation report has been written (Ens, 2004). On the basis of the findings of the EVA II project the management system has been reviewed and modified where appropriate. The current management system is guided by the agreement (covenant) on transition of the mussel fishery. Under the implementation of this system regular evaluation of the performance of the covenant agreements against its objectives is anticipated. Government, industry and NGO's are represented in the steering group overseeing the implementation of the covenant. The PRODUS research project is subject to both internal and external review. The results of PRODUS are published in recognized scientific journals and submissions are subject to peer review. On the level of fishermen's organizations (PO's) procedures are reviewed by their board. The operations of the PO's monitoring, control and enforcement system (fishery management plan, black box) is regularly described in an annual report that is presented to the annual meeting of members of the PO. It is concluded that the fishery has in place mechanisms to evaluate key parts of the management system and is subject to regular internal and external review (1-80).(1-100 partly met)

Score:

85

Audit trace references

Ens, B, A. Smaal & J. de Vlas (2004). The effects of fishery on the ecosystems of Wadden Sea and Oosterschelde. Alterra rapport 1011.
COMBO (2009) Jaarverslag 2009 van de Commissie Behandeling Overtredingen (COMBO).

APPENDIX H. PEER REVIEW REPORTS

Peer review report A.

Producenten Organisatie voor de Nederlandse Mosselcultuur UA:: Dutch Blue Shell Mussel Fishery, Waddenzee and Zeeuwse delta dredge and suspended seed mussel collectors, culture, catch and grow

Peer review of the MSC Certification report

The report provides a summary of the Dutch mussel fishery and relevant ecological issues in the areas. The report is detailed in relation to the descriptions of data collection on mussel stocks, the ecosystems and the legislation of the fishery, whereas the descriptions of fishery practice (descriptions of spat collection devices, dredging activities, relay procedures) and ecological impact is more superficial.

The assessment has been carried out against the MSC principle and the decisions is substantially supported by sound scientific evidence, except for scoring criteria 2.4.1 in Principle 2 where I have identified a critical gap in the scientific body of evidence.

A critical point in the assessment is scoring criteria 2.4.1 of UoC 3 where the assessments conclude that the fishery of seed is unlikely to reduce habitat structure and function to a point where there would be no serious or irreversible harm. The report concludes that no scientific investigations addressing this issue are available and that research is ongoing to investigating this issue (PRODUS). The informations from PRODUS are not yet available, but will be available in 2011. In the assessment of Principle 3 for UoC3 it is stated that the transition of seed collection from dredging to suspended seed collection before 2020 is due to reduce impact on Wadden Sea bottom habitats and that "The strategy is therefore focussed on the restoration of subtidal mussel banks in the Wadden Sea." (Scoring criteria 3.2.1). So in conclusion the report conclude in one scoring criteria that seed fishery do not seriously harm habitats, and in another scoring criteria it is stated that long-term management strategies are in place to reduce habitat impact and to support restoration. As scoring criteria 2.4.1 score 60, this criteria should be addressed in more details.

Recommendation: The scientific basis for the scoring of SC2.4.1 should be improved. The assessment of mussel seed fishery should be based on scientific evidence from other ecosystems and related to the the Wadden Sea ecosystem. Alternatively, the certification process should be postponed until information from the PRODUS project are available, and can be included in the assessment.

AT and SGS response: The AT accepts the observation and has added text in paragraph 3.3 and in the scoring comment table (2.4.1). The AT has reviewed additional scientific evidence available from the EVA II research project and the appropriate assessments in the framework of Natura 2000. The impact of the mussel seed fishery on bottom habitat (Habitattypen 1110.) was further evaluated and described in the report. The additional scientific evaluation supports the conclusion that the fishery of seed is unlikely to reduce habitat structure and function to a point where there would be no serious or irreversible harm and therefore the score of 60 on performance indicator 2.4.1 is maintained.

Specific comments

Page 5 The summary should be extended in more details. The summary addresses only selected criteria, and do not reflect the content of the report.

AT and SGS response: The summary contains the information that is prescribed in the FCM. A summary that would reflect the content of the report in more detail would have to be very long and much of the information in the report would then be repeated. Nevertheless the AT has added some extra lines to the summary with respect of the strength and weaknesses of the client operation.

Page 19 In the review of the biology of blue mussels it is stated that blue mussels attach to sand and mud. Mussels may form banks on soft bottom substrates by attaching to pebbles and shells and by forming attachment to other mussels. The pelagic phase is reported to 4-6 weeks. The pelagic phase is dependent on temperature, amount of food and available substrate and is normally not longer than 2-4 weeks (as also stated in Fig. 2 in the assessment).

AT and SGS response: These observation are correct and the text on page 19 has been amended.

Page 20. The review report that suspended mussels can grow up to 9 % per day. It should be stated that this is growth in Dry weights, as the next two sentences state that it last 2.5 year for bottom mussels to grow to 4.5 cm.

AT and SGS response: The text on page 20 is amended accordingly.

Page 22. The text state, that the landing in the past 20 year was between 25.000 to 80.000 tons, whereas Table 1 shows landing ranging from 25.000 to 100.000 tons.

AT and SGS response: The text on page 22 is amended accordingly.

Page 24. The descriptions of the mussel farming activities is rather superficial, and could be supplemented with a table showing the process, the number of times a mussel are dredged and transplanted to an another area. More details should be given on the fishing gear (dredge, sorting advices, and suspended seed collectors). The informations are critical for the evaluation of Principle 2

AT and SGS response: Several lines of text are added to the description of the culture process. More details are provided on the mussel dredge and the rigging of mussel seed collectors (MZI). Two photos showing a mussel dredge and the rigging of an MZI are included in the report.

Page 25. The review of the international policy framework should include Natura 2000 legislation, Water Framework Directive, Marine Strategy Directive, legislation for transfer of organisms.

AT and SGS response: A description of Natura 2000, the Water Framework Directive and the Marine Strategy Directive have been added to this paragraph.

In the review of the monitoring the mussel stocks, the regulation with VMS (black boxes) aboard all mussel vessels is a key tool. The frequency of position recordings should be given.

AT and SGS response: The frequency of black box registrations is every 6 seconds when the vessel is moving. This information is included in the text.

Page 26 The assessments of the mussel stocks are comprehensive and need some more details. A table could show the timing of the different activities. The mussel seed harvest is monitored by use of a specialised vessel. It is not clear from the text how the actual seed catches is controlled.

AT and SGS response: Extra information on the mussel surveys have been added to the text. The control procedure used by personnel of the Fish Product Board is described.

Details on the stock assessment are given, by no data or time series of actual stock sizes are given. Data on stock sizes should be available in relation to evaluation of Principle 1.

AT and SGS response: A figure (fig 5b and c) of mussel stock size in spring and autumn is added to the report.

Page 28. The assessment report that both crabs and starfish are within biological safe limits according to DYFS survey. The statement is not documented and there is no reference.

AT and SGS response: The comment is correct and the wording of the statement is altered.

Page 29 Oosterschelde is appointed as a Natura 2000 area including Natura 1160. The assessment report that bottom culture change sediment characteristics. The assessment should address how culturing activities impact eelgrass density and recovery.

AT and SGS response: Eelgrass is only present in intertidal areas in the Waddenzee and the Oosterschelde. No effects on eelgrass beds are expected from this fishery. Several lines explaining this have been added to the text.

Page 29 and 33 The assessment report that the impact of mussel culture include removal of seed from mussel beds, but that these mussels have a better chance of production (+15%). A part of the mussels are moved to the Oosterschelde. In this area only a few eiders is recorded. In practice the harvest of seed mussels for mussel culture, may reduce the amount of mussels available for the eiders.

AT and SGS response: Van Stralen (2006b) has evaluated the consequences of the removal of mussels from the Waddenzee on the food availability of eider ducks. The findings of van Stralen have been included in the text. Van Stralen concluded that when certain conditions are met no significant effect on food availability is expected.

Page 33 and 35 In the review page 33 of the national legislation the regulation “Reglement Mosselvisserij and Reglement afdoening overtredingen” clarify that the PO regulate the mussel seed fishery, by setting the quantity and period. Furthermore at page 35 it is stated that the Dutch Government has delegated the

responsibilities for the allocation of quotas and the management of the seed mussel fishery to the PO. This management process and the link to scientific advice should be described in details .

AT and SGS response:

The management process of the mussel seed fishery is described in more detail in paragraph 4.2. The link between the mussel surveys and the fishery is also described in more detail.

Principle 1

SC 1.2.3 The review states that sufficient relevant information is available including fleet composition and other data. Fleet composition is not relevant and other data should be specified.

AT and SGS response: Fleet composition is mentioned in the scoring guidepost of this performance indicator as a relevant piece of information to support the harvest strategy. The words “other data” are replaced by “fishery removals and environmental information”.

SC 1.2.6 Condition applicable to UoC1-4. The genetic effect of the fishery may be of minor importance. The increased area of substrate at seed collectors should be scaled and related to the area of hard substrates at dikes, harbours. It is in the assessment argued, that due to the long pelagic stage of the larvae, the exchange rate of mussels with other areas in the region is high, and consequently there will be no genetic long-term effect. A preliminary evaluation of production conditions should be conducted in order to analyse if the mussel fishery have the potential to affect genetic characteristics of the populations.

AT and SGS response: . Total hard substrate surface in the Oosterschelde is estimated to be 10 km² (Leewis et al, 1994). Seed collector surface is less than 1 km² (Kamermaans & Smaal, 2009). This remark is added in par 2.1

Principle 2 UoC1 and UoC2

SC2.2.1 to 2.2.3 It is argued that all species is returned to culture plots. No data is given on transport conditions and survival.

AT and SGS response: The assessment team has qualified the by-catch in the suspended seed collection as minor by-catches as described on page 46 of the FAM. They are not considered main by-catch species because the species comprise less than 5 % of the total catch and are not considered of particular vulnerability. The MZI can be considered as an extra substrate for species (like Tunicates, Barnacles and Slipper limpets) that may well be limited by available substrate like dikes and other structures. Populations supported by the natural habitat structures will not be affected. (These last two sentences have been added to 2.2.1.)

SC2.4.2 Activity may prevent recovery of eelgrass.

AT and SGS response: The activity takes place in subtidal areas whereas eelgrass beds solely exist high in the intertidal areas.

Principle 2 UoC3

SC2.2.1 to 2.2.3 It is argued that all species is returned to culture plots. No data is given on transport conditions and survival.

AT and SGS response: See comments above.

Starfish is known to be within biological safe limits. This conclusion is not documented in the report. How is the limits defined.

AT and SGS response: The sentence has been changed. Starfish (*Asterias rubens*) are a very common species in the North Sea and the North East Atlantic. They are found in very large numbers on the mussel beds in the Wadden Sea.

SC2.3.1 It is argued that the seed mussels are kept within the fishery area indicating that food for birds are not reduced. In the review it is stated that only a few eiders occur in the Oosterschelde. Consequently, transfer of mussels from the Wadden Sea to the Oosterschelde may reduce the amount of mussels available for eider.

AT and SGS response: Van Stralen (2006b) has evaluated the consequences of the removal of mussels from the Waddenzee on the food availability of eider ducks. The findings of van Stralen have been included in the text. Van Stralen concluded that when certain conditions are met no significant effect on food availability is expected. Some changes have been made in the text in the scoring table 2.3.1. Not all mussel

seed is kept within the fishing areas but management measures are in place to guarantee that food availability for birds is not significantly affected.

SC2.4.1 See comments on page 1.

AT and SGS response: *AT and SGS response: The AT accepts the observation and has added text in paragraph 3.3 and in the scoring comment table (2.4.1). The AT has reviewed additional scientific evidence available from the EVA II research project and the appropriate assessments in the framework of Natura 2000. The impact of the mussel seed fishery on bottom habitat (Habitattype 1110.) was further evaluated and described in the report.*

SC2.5.1 See comments on SC2.3.1

AT and SGS response: The observation is correct and the scoring comment of 2.5.1 is amended.

Principle 2 UoC4

SC2.2.1 to SC2.2.3 shore crabs and starfish is likely to be within biological safe limits. The DFYS data is not presented in report.

AT and SGS response: A reference to a website where abundance data on starfish and shorecrabs from the Demersal Fish Survey (DFS) are published on the internet is added to the text. From these data it is obvious that crab and starfish abundance is very high.

(<http://www.surveyswageningenimares.wur.nl/UK/Survey+list/flatfish+surveys/Demersal+Fish+Survey+%28DFS%29/DFS+survey+results/>)

SC2.3.2 Scoring comment only relevant in relation to UoC3

AT and SGS response: The observation is correct and the scoring comment has been adapted.

SC2.4.1 It is argued that "The mussel beds have been operating over two hundred years and the habitat has historically been changed to a farmed habitat". This text indicate that the activity induce long-term impact on the ecosystem.

AT and SGS response: The observation is correct and the reference to farmed habitat has been deleted. The mussel culture creates additional habitat that can be regarded semi natural.

SC2.4.2 See SC2.4.1

AT and SGS response: The scoring comment has been changed. See also the previous response.

SC 2.5.1 See 2.3.1

AT and SGS response: The observation is correct and the scoring comment of 2.5.1 is amended. See also the response to SC 2.3.1.

SC 2.5.2 The transition in seed production is not relevant for UoC4

AT and SGS response: The observation is correct and the text of the scoring commend has been amended.

Principle 3 UoC3

SC 3.1.2 see comment to page 33 and 35

AT and SGS response: See response to the comment to page 33 and 35.

Peer review report B.

Producenten Organisatie voor de Nederlandse Mosselcultuur UA:: Dutch Blue Shell Mussel Fishery, Waddenzee and Zeeuwse delta dredge and suspended seed mussel collectors, culture, catch and grow Peer review of the MSC Certification report

Within the constraints set by the time and resources allotted to the peer review process, I have the following comments to the assessment:

In general I find that the Dutch blue mussel production is a highly regulated fishery/production with extended procedures for keeping adverse effects of the fishery under control. The production is well managed and there is an important and very interesting consulting process with NGOs to ensure social acceptance of the fishery. With my present, however limited, experience with MSC certification, I'm sure that the fishery/productions merits a certification. But the presented Main Assessment is not without problems and I think that relevant issues are not addressed properly and what existing knowledge makes possible. A problem in this context is that most of the cited references are not accessible (at least to a foreigner) because they are written in Dutch. So it is difficult to check if the statements in the scoring comments are valid. The Main Assessment could thus benefit from a more elaborate review of existing knowledge on ecosystem effects, using figures and tables and more detailed description of the work carried out on effects of the fishery. As it stands now, it is an extremely brief summary of knowledge that is not entirely focussed. The most obvious example of this shortage is the discrepancy of on one side the common stakeholder agreement to use spat collectors instead of seed fishery and on the other side the almost negligible effects of the seed fishery apparent from scoring comments in relation to Principle 2: If the seed fishery is (almost) beneficial to the mussel stock and hence bird foraging why phase it out and introduce spat collectors? I see no general description of the considerations and anticipated impacts of the seed fishery in the ecosystem description that can substantiate arguments for a change in way of production, as will be the case from 2020.

AT and SGS response: The AT accepts the observation and has added text in paragraph 3.3 and in the scoring comment table (2.4.1). The AT has reviewed additional scientific evidence available from the EVA II research project and the appropriate assessments in the framework of Natura 2000. The impact of the mussel seed fishery on bottom habitat (Habitattype 1110.) was further evaluated and described in the report.

Principle 1. I fail to understand the rationale behind Condition 1. It is stated that at the farm level there is solid evidence for harvest of seed from collectors, as these are reported to LNV. Hence, the amount of seed mussels from suspended collectors that are transferred to mussel plots should then be known and well documented. As the suspended seed collectors will provide an increasing amount of the seed according to the plan, fishery for wild seed will accordingly be reduced and this should be possible to control within the existing system. Seed collected on suspended collectors is not necessarily a part of the same population as bottom seed in the sense that the suspended collectors compete with natural settling substrates for a limited amount of seed. In contrary the increasing settling substrate offered to the larvae with introduction of suspended collectors probably increase overall recruitment. It is thus not obvious to me why additional validation for suspended seed collection is required and this should be explained.

AT and SGS response: As the data are critical for both impact assessment and progress in the transition process, and farmers may have conflicting interests in estimating the amount of seed they have collected with the MZI's it is important to have a reliable and independent estimate of the harvested amounts; this text is added to condition 1

Principle 2. As it is stated on page 24 in the section on Development of MZI's: "The mussel seed fishery may cause some disturbance of the sea bottom...." and it could be added that relay on mussel plots in e.g. the Oosterschelde or the handling and harvesting on the grow-out plots also will cause disturbance of the sea bottom. Irrespective of other effects like increased survival of spat all of the mentioned activities will cause an effect and this is not very well described in the chapters on ecosystem effects or reflected in the scoring comments. From what is described it can be deduced that the new mussel beds "....do not necessarily enhance production or biomass of associated fauna, but provide a habitat for particular species that

otherwise could not exist in the surrounding bare soft-bottom environments” (page 30). I.e. the production of mussels replace one type of habitat with a completely different, which can never be a negligible effect on the ecosystem when it as in the Oosterschelde constitutes a substantial part of the total area. I thus strongly support Condition 3 and Condition 4. Further, I think that there is not adequate background description in the present text to substantiate the statement: “The fishery is unlikely to reduce habitat structure and function to a point where there would be serious or irreversible harm”. It may very well be so, but it is not documented. Further, it seems as the focus of the current and future data collection is on carrying capacity rather than on benthic impact. A specific issue in this connection is that mussel beds in Natura 2000 context are about to become biogenic reefs and this needs to be addressed in the scoring comments.

AT and SGS response: See previous response to SC 2.4.1. The assessment team has added a review of scientific conclusions concerning the effect of the seed fishery and the relay of mussels on bottom habitat. The comment in the scoring comment table 2.4.1. has been completely rewritten.

Principle 3. The Dutch management system is, as it is described, very adequate for the task and there is a high degree of confidence with the management system. There is one small problem. The Marine Strategy Framework is mentioned under section 3.2.4 in the scoring tables but there is neither here nor elsewhere in the text mention of the EU Water Framework Directive. The EU WFD have benthic fauna as a biological indicator and it is surprising that there is no mention of the potential conflict between standards set by the WFD and the dredging and relay operations involved in the mussel production. I agree in Condition 5.

AT and SGS response: A paragraph on the Marine Strategy Framework is added (page 30). As it is agreed that mussel seed dredging will be phased out in time a potential future conflict between the EU WFD and mussel dredging is not likely.

Minor comments: It is stated that a number of bird species have mussels as preferred food but there is no description of population sizes, food demand and calculations that substantiate that the existing population is benefitting from the production activities as it is also stated.

AT and SGS response: The main species involved is the eider duck. Van Stralen (2008a-b) has evaluated trends in the population size of eider ducks. The evaluations showed that although the total populations size of eider ducks in the Netherlands declined the population inside the Waddenzee and thus in the area where mussel culture takes place does not show such a trend. He concluded that there is thus no relation between mussel fishery or culture and the decline in the total population. A figure showing the trends in the eider duck population has been included in the report on page 37.

In scoring comment 2.4.1 it is stated that “empirical and modelling exercises did not show impact of suspended mussel culture on sediment and benthic biota....” but this is in contrast to most other published studies and the statement needs to be further substantiated.

AT and SGS response: The absence of measurable impact is ascribed to the relatively dynamic conditions that prevail at the sites of the MZI's, preventing local accumulation of biodeposits, in combination with the relatively limited scale at which the MZI's are in use at present. Therefore a recommendation (2.4.3.) and a condition (2.5.3) have been formulated to address benthic impacts in when upscaling will be carried out. This text was added to 2.4.1.

It would be very enlightening if the Main Assessment included a map of the relevant areas with indication of areas of seed fishery, grow-out plots etc.

AT and SGS response: A figure with the location of culture lots in the Waddenzee and a figure with the fishing locations of a mussel seed fishery have been included in the report (page 23 and 27).

On page 25 (section 2.3 Monitoring and Stock Size) it is stated that there is a considerable social control that is supposed to secure quotas. But social control operates both ways and can both reveal and disguise unlawful behaviour. It is thus not necessarily an argument for a healthy system

AT and SGS response: The social control is an additional guarantee that the quota that are set for the group and the individual fishermen are respected. When a possible trespass is reported the black box data will be evaluated and these will show whether someone has fished outside the official fishing time or areas.

It puzzles me why the last handling, i.e. the rewatering of commercial sized mussels is not included in the certification as it involves activities with potential impact on the marine environment. Or is it included in UoC 4?

AT and SGS response: Indeed rewatering is included in UoC 4. A footnote with this respect has been included on page 9.

APPENDIX I: STAKEHOLDER COMMENTS (INCLUDES ALL WRITTEN AND VERBAL COMMUNICATION)

Received from 'Zeeuwse Milieu Federatie' on 19 may 2010
Mr G. Van Zonneveld

De ZMF is bijzonder verheugd dat de mosselsector met een aanvraag de stap heeft gezet om te komen tot een MSC-certificering van zowel de bodem- als de hangcultuur. Dit kan wederom een belangrijke stap worden in economische en ecologische verduurzaming van de mosselsector. Graag maakt de ZMF gebruik van de mogelijkheid om als stakeholder enkele punten rond de MSC certificering van de kweek van mosselen naar voren te brengen. We maken daarbij één reactie voor zowel bodem- als de hangcultuur.

1. Feiten en omstandigheden

MSC certificaten kunnen alleen afgegeven worden voor '*wild captures*'. Omdat de mosselkweek waarschijnlijk kan voldoen aan de criteria voor '*enhanced fishery*' gaan wij er voorsnog vanuit dat certificering conform de MSC regelgeving mogelijk is.

Net als SGS en de aanvrager gaan wij ervan uit dat de definitieve aanlanding, het moment waarop de consumptiemosselen de handel in gaan, het eind markeren van het proces waarvoor certificering is aangevraagd.

Mytilus galloprovincialis en *Mytilus trossulus* komen in de Europese wateren voor, maar worden niet als inheems voor de Oosterschelde beschouwd. De inheemse mossel voor de Zuidwestelijke Delta is *Mytilus edulis*. Voor deze soort is de aanvraag ook gedaan. Wij onderschrijven die keuze.

In de Oosterschelde komen geen litorale mosselbanken voor. Met uitzondering van de percelen in de Zandkreek worden alle mosselen sublitoraal gekweekt. Dat betekent niet automatisch dat dit een natuurlijke situatie is. Het is het gevolg van de interactie van cultuur en natuur in de Oosterschelde. Wij zien mogelijkheden om samen met de sector en wellicht gecombineerd met maatregelen om de veiligheid tegen overstromingen te vergroten, mosselbanken in de Oosterschelde te creëren.

Mosselkweek wordt gezien als '*Enhanced fishery*'. Daarvoor gelden specifieke voorwaarden die zijn opgesteld door de Technical Advisory Board opgesteld (TAB Directive D-001). Een belangrijke voorwaarde is dat de gebruikte vis inheems moet zijn . Aan de verplaatsing van vis ("translocation") worden voorwaarden gesteld. De risico's van de verplaatsing moeten in beeld worden gebracht en effecten op de omgeving geminimaliseerd. Zie verder TAB Directive D-001 (v2), bijvoorbeeld pagina 3 en 5.

MSC vereist dat “*translocation of fish in enhanced fisheries should ensure that fisheries maintain the diversity, structure and function of the ecosystem on which they depend while minimising any adverse effects that are caused.*” In paragraaf 7.6.3 van MSC Fisheries Assessment Methodology and Guidance to Certification Bodies wordt bovendien aangegeven dat onder andere ook gekeken moet naar draagkracht, samenstelling van de populatie, veranderingen in biodiversiteit en genetische diversiteit.

Naar aanleiding van de hierboven genoemde feiten en omstandigheden willen wij nog een aantal punten naar voren brengen die nadere aandacht vragen bij de MSC-certificering.

2. Exoten

Uit de *FAM modification announcement* van 29 maart 2010 kunnen wij opmaken dat u nadrukkelijk aandacht wil besteden aan de mogelijke effecten van het transport tussen Waddenzee en Oosterschelde. Wij stellen dat op prijs.

Tot op de dag van vandaag maakt geïmporteerd kweekmateriaal uit het buitenland een substantieel onderdeel uit van het geproduceerde volume mosselen in Nederland. Deze manier van kweken is mogelijk nog veel meer bepalend voor de duurzaamheid van de mosselkweek dan het transport tussen Waddenzee en Oosterschelde.

Mosselzaad, halfwas- en consumptiemosselen zijn voor 1993 redelijk ongereguleerd en na 2006 gereguleerd vanuit het buitenland in de Oosterschelde gebracht. Op die manier is levend materiaal (mosselen met ‘meeliftende’ organismen afkomstig uit gebieden reikend van Griekenland tot in ieder geval Denemarken) in de Oosterschelde beland. Hierdoor komen in de Oosterschelde, maar ook in de Waddenzee, opvallend veel exoten voor. Meer dan 25% van de exoten die nu in de Oosterschelde voorkomen worden direct in verband gebracht met schelpdierimporten.

In het verleden is het argument aangevoerd dat de importen van schelpdieren niet tot ecologische problemen hebben geleid en daarom veilig zijn. Het feit dat al decennialang schelpdieren worden geïmporteerd, betekent echter niet dat het risico van onbedoelde introductie van invasieve exoten gebagatelliseerd kan worden. Ook de verlening van een vergunning in het kader van de Natuurbeschermingswet is in onze ogen onvoldoende om te onderbouwen dat voldaan wordt aan de MSC-criteria, ook omdat de scope van MSC breder is. Hoewel de kans op de insleep van invasieve soorten klein is, kan het gevolg niet minder dan desastreus en vaak onomkeerbaar zijn. Aangezien een risico gedefinieerd als *Kans x Gevolg*, is het risico van importen naar onze mening erg groot.

Een complicerende factor daarbij is dat de regelgeving rond import niet internationaal geharmoniseerd zijn. Zo is in Schleswig-Holstein de import van mosselen uit de Ierse wateren tot nu toe toegestaan. De import naar de Waddenzee is verboden. Transport tussen Holstein en de Waddenzee is toegestaan. Hierdoor is het systeem letterlijk en figuurlijk niet waterdicht. Alvorens tot MSC-certificering over te gaan, dient de praktische organisatie sluitend te zijn.

Dat exoten werkelijk een probleem vormen, wordt nog eens extra onderstreept door het recente verbod op mosselen van de Oosterschelde naar de Waddenzee te transporteren vanwege geconstateerde contaminatie met voorheen onbekende schadelijke exoten. Ook het probleem met het herpesvirus in Oesters dat vorig jaar voorkwam in de Franse wateren, toont aan hoe kwetsbaar ecosystemen kunnen zijn.

Wij zijn van mening dat de manier waarop de translocatie tot nu toe wordt uitgevoerd ingrijpende gevolgen kan hebben voor de deltawateren. Het destijds opgestelde deskundigenoordeel over exoten en notitie van professor W.J. Wolff van 5 februari 2005 over exoten, onderschrijven dat.

3. Inheems

Om in aanmerking te komen voor MSC certificering moet het kweekmateriaal inheems zijn. Het is de vraag wat binnen de Nederlandse bodem- en hangcultuur inheems is. Zijn halfwas mosselen uit de Ierse en Scandinavische wateren "*native*" conform de *Scope criteria for enhanced fisheries* en daarmee passend binnen de *MSC Environmental Standard for Sustainable Fishing*? Centraal in deze discussie zal staan of de Nederlandse mosselkweek zal kunnen voldoen aan de TAB Directive D-001 en wat '*Species are native to the geographic region of the fishery*' voor onderhavige aanvraag betekent.

De aanvraag is gedaan voor de kweek met *M. edulis*. Wij willen aandacht vragen voor behoud van de eigenheid en (genetische) diversiteit in de Zuidwestelijke Delta. Wij hebben al genoemd dat de verplaatsing van mosselen, het importeren uit diverse Europese kustwateren een essentieel onderdeel van het huidige systeem is. Door (vooral) de translocatie van schelpdieren is vastgesteld dat *edulis* zowel in de Oosterschelde als in de Waddenzee de afgelopen jaren in contact is gekomen met *galloprovincialis* en *trossulus*. Dit contact heeft geleid tot hybridisatie.

Wat de consequenties hiervan zijn, dient te worden beoordeeld. De introductie van uitheemse schelpdieren brengt in ieder geval een aantal risico's met zich.

* De genetische eigenheid van Nederlandse kustwateren wordt bedreigt door vermenging met andere mosselsoorten.

* De hybridisering beïnvloedt het voortplantingssucces. Hybriden zijn in het algemeen minder vruchtbaar. Hierdoor komt de reproductie van de mosselen, zowel wild als gecultiveerd, onder druk. Zolang *galloprovincialis* of *trossulus* wordt aangevoerd, kan de reproductiecapaciteit (negatief) worden beïnvloed^{4[1]}.

De verminderde reproductie heeft overigens wel als voordeel dat wanneer de import van *galloprovincialis* en *trossulus* wordt gestopt, de *edulis* een concurrentievoordeel heeft en zich als inheemse soort kan herstellen. Of deze hypothese stand kan houden moet echter nog wel bewezen worden.

* Het is bekend dat *galloprovincialis* sterkere hechtdraden heeft dan *edulis*. Hierdoor is de

^{4[1]} Misschien is het wel een signaal dat enige tijd geleden werd geconstateerd dat 80% van de mossellarven in de Oosterschelde was misvormd.

galloprovincialis in het voordeel in hangcultuur. Daarmee kan de hangcultuur zorgen voor selectie waarbij galloprovincialis in het voordeel is ten opzichte van edulis. De vraag is wat daarvan de consequenties zijn in relatie tot hetgeen hierboven gemeld is en de aanvraag die alleen betrekking heeft op edulis.

Vanwege de risico's en de wens om de inheemse Nederlandse (Zeeuwse) mosselen in stand te houden, is die importen van mosselen niet wenselijk.

4. Gecertificeerde naast niet gecertificeerde mosselen

Het hebben van een MSC mossel betekent ook dat er niet gecertificeerde mosselen zijn. De *MSC Chain of Custody Standard* vereist dat gecertificeerde mosselen gedurende het gehele productieproces gescheiden blijven van ongecertificeerde mosselen én van MSC mosselen uit een andere bron. Wij vragen speciale aandacht voor de praktische kant van deze opgave. De opslag vindt in Zeeland plaats op verwaterpercelen. Het zal niet eenvoudig, zo niet praktisch onmogelijk zijn, om uitwisseling tussen percelen te voorkomen. Hierbij moet in ogenschouw genomen worden dat door stroming en storm verspreiding van mosselen optreedt. Bovendien moet er rekening mee gehouden worden dat een kwart van de mosselen op de percelen niet opgevist kan worden. Een mosselkor laat een flink aantal mosselen op de bodem achter. Zo kunnen MSC- en niet-MSC-mosselen door stroming gemakkelijker vermengd raken.

5. Draagkracht

De draagkracht van het ecosysteem in de Oosterschelde (en de Waddenzee) wordt voor een belangrijk deel aangewend voor het kweken, verwateren van grote hoeveelheden mosselen die bij de oogst ook aan het systeem worden onttrokken. De benutting van de productiecapaciteit van het ecosysteem wordt daarmee voor een belangrijk deel bepaald.

In de Oosterschelde komen daardoor grotere aantallen mosselen voor dan het ecosysteem zelf had kunnen voortbrengen (Smith, J.; Shackley, S.E., 2004, *Effects of a Commercial Mussel Mytilus edulis Lay on a Sublittoral, Soft Sediment Benthic Community, Marine Ecology Progress Series*, Vol. 282: 185–191, 2004). Het is uit onderzoek van IMARES gebleken dat de 'omloopsnelheid' van nutriënten in de Oosterschelde bijzonder hoog is en dat het ecosysteem daardoor kwetsbaar is. Wij willen dit aspect graag betrekken bij de beoordeling van aanvraag voor MSC-certificering.

6. Controle en handhaving

Het is van groot belang dat de MSC-voorwaarden in de praktijk zorgvuldig worden nageleefd. Andere certificeringen in het kader van MSC maar ook bijvoorbeeld FSC laten zien dat er meer gecertificeerd product wordt verkocht dan aangeleverd (kan) worden. Om de kwaliteit van de mosselen werkelijk te borgen, is het van essentieel belang dat de controle en handhaving goed en transparant wordt vorm gegeven. In het MSC traject zal uiteengezet moeten worden op welke wijze dit wordt geborgd, zowel inhoudelijke als ook financieel.

Naar aanleiding van de door ons nu naar voren gebrachte punten hebben we het gevoel dat voor de certificering nog enkele belangrijke keuzen gemaakt moeten worden. Het onderscheiden van de duurzaam gekweekte Zeeuwse mossel als een hoogstaand kwaliteitsproduct staat daarbij in onze ogen centraal.

Wij willen ons graag onze steun uitspreken voor een MSC-gecertificering van de mosselcultuur en hier waar mogelijk een bijdrage aan leveren. De certificering biedt de kans om de duurzaamheid van de mosselkweek te laten zien.

APPENDIX J: REGISTERED COMPANIES/VESSELS

Company name	Register	Aderess	Post code	City
FIRMA JOHS. DE WAAL-JUMELET	BRU-5	RIJKSSTRAATWEG 9	4311 RH	BRUINISSE
B.W. SCHOT BV	ZZ-4	REGENBOOGSTRAAT 34	4301 BV	ZIERIKZEE
N.L. PRAET EN ZONEN B.V.	ZZ-5	OUDE ZANDWEG 11	4327 SH	SEROOSKERKE SCHOUWEN
J. SCHOT B.V.	ZZ-7	ANNA VAN SAKSENLAAN 3	4303 AD	ZIERIKZEE
S.L. SCHOT BV	ZZ-9	KORTE BLOKWEG 98	4303 AT	ZIERIKZEE
CHR SCHOT BV	ZZ-10	NIEUWE HAVEN 83	4301 DK	ZIERIKZEE
L. NIEUWENHUIZE EN ZN BV	YE-157	ERICALAAN 1	4401 HP	YERSEKE
MOSELBANK B.V.	YE-71	POSTBUS 25	4400 AA	YERSEKE
MOSELKWEEK GEBROEDERS STEKETEE B.V.	YE-70	DAMSTRAAT 75	4401 AK	YERSEKE
MOSELBEDRIJF C.P. VAN IJSSELDIJK B.V.	YE-82	POSTBUS 106	4400 AC	YERSEKE
GEBR NIEUWENHUIZE YERSEKE BV	YE-57	ERICALAAN 1	4401 HP	YERSEKE
JAN PRINS ZEEUWSCHE BANIER B.V.	YE-96	POSTBUS 5	4400 AA	YERSEKE
FIRMA BOUT	BRU-26	WERKHAVENWEG 2	4311 NK	BRUINISSE
MOSELKWEKERS VAN DER ENDT	YE-1	BREEWEG 90	4401 BS	YERSEKE
GEBROEDERS VAN STEE B.V.	YE-38	FREGATSTRAAT 66	4401 JD	YERSEKE
W. BOM B.V.	BRU-27	T HOEFJE 10	4311 EZ	BRUINISSE
SIMOS B.V.	YE-62	NICOLAES MAESLAAN 2	4401 AE	YERSEKE
MOSELBEDRIJF TEN BOKKEL EN KOOIJ BV	TH-48	BINNENKAMER 48	4691 DG	THOLEN
JAC. MEIJAARD B.V.	YE-55	BREEWEG 130	4401 BS	YERSEKE
MOSELKWEEKBEDRIJF ENTLO B.V.	YE-116	FREGATSTRAAT 2-A	4401 JD	YERSEKE
VAN DER ENDT RIEDIJK	YE-1	BREEWEG 90	4401 BS	YERSEKE
W.D. VAN DEN BERG BV	BRU-6	STEINSTRAT 19	4311 BH	BRUINISSE
MOSELKWEEKBEDRIJF W. OKKERSE B.V.	BRU-68	DELTA STRAAT 21	4311 GL	BRUINISSE
MOSELKWEEK STEKETEE-BOM BV	YE-170	BREEWEG 120	4401 BS	YERSEKE
J.D. VERSCHUURE MOSELKWEEKBEDRIJF B.V.	YE-18	DAMSTRAAT 108	4401 AT	YERSEKE
DE ROOIJ MOSELKWEEK B.V.	YE-79	POSTBUS 22	4400 AA	YERSEKE
PH. SINKE MOSELKWEEK B.V.	YE-83	POSTBUS 100	4400 AC	YERSEKE
MOSELKWEEKBEDRIJF I. JUMELET EN ZN BV	BRU-23	DORPSWEG 53	4311 RL	BRUINISSE
FA D. & J. DE KONING EN ZONEN	BRU-62	DORPSWEG 39	4311 RL	BRUINISSE
VAN DAMME MOSELKWEEK B.V.	YE-58	MOLENPOLDERWEG 9-A	4401 NP	YERSEKE
MOSELKWEEKBEDRIJF JAC. VAN DE PLASSE EN ZN B.V.	YE-57	ERICALAAN 1	4401 HP	YERSEKE
SLAAK B.V.	YE-82	POSTBUS 106	4400 AC	KRUIJNINGEN
GEBR. VETTE B.V.	YE-83	POSTBUS 100	4400 AC	YERSEKE
JOH. ZOETEWIJ EN ZONEN B.V.	YE-183	POSTBUS 22	4400 AA	YERSEKE
MOSELKWEEK BARBÉ B.V.	YE-56	POSTBUS 61	4400 AB	YERSEKE
PRINS & DINGEMANSE MOSELKWEEK B.V.	YE-96	POSTBUS 63	4400 AB	YERSEKE
DE DRIE GEBROEDERS DE WAAL B.V.	BRU-90	PRINSES WILHELMINALAAN 8	4311 BP	BRUINISSE
GEBROEDERS KOUIJZER CV	ZZ-6	NIEUWE HAVEN 43	4301 DJ	ZIERIKZEE
VERSPOR B.V.	BRU-48	MEEKRAPSTRAAT 1	4311 EP	BRUINISSE

FIRMA GEBR. SCHOT-DE JONGE	ZZ-3	GRUTTOSTRAAT 22	4302 WE	ZIERIKZEE
VISKWEKERIJ NEELTJE JANS B.V.	ZZ-7	FAELWEG 1	4354 RB	VROUWENPOLDER
FA. GEBR. A.J. SCHOT	TH-4	MEANDERLAAN 175	4691 LJ	THOLEN
J.C. SINKE-WISSE MOSSELKWEEK BV	YE-55	BREEWEG 130	4401 BS	YERSEKE
MOSSELKWEKERIJ A.M. VERSCHUURE B.V.	YE-20	VROONLAND 34	4401 JV	YERSEKE
FA C. OTTE EN ZN	BRU-14	ROGGESTRAAT 19	4311 CX	BRUINISSE
V.O.F. MOSSEL- EN KOKKELVISBEDRIJF KIK	BRU-33	DORPSWEG 4-A	4311 AH	BRUINISSE
DE RONDE B.V.	BRU-27	MOSSELSTRAAT 3	4311 GJ	BRUINISSE
MOSSELBEDRIJF HOOGSTRATE BV	YE-46	VIOLENLAAN 19	4401 HS	YERSEKE
FA GEBR DE JONGE	TH-48	BINNENKAMER 48	4691 DG	THOLEN
HOGERHEIDE-ELENBAAS B.V.	BRU-24	MAISSTRAAT 16	4311 CV	BRUINISSE
SCHOT-NIEUWENHUIZE B.V.	YE-89	ERICALAAN 1	4401 HP	YERSEKE
HUGO BOL & ZONEN MOSSELKWEEK B.V.	YE-86	KATTENDIJKSEWEG 4	4465 BM	GOES
MOSSELKWEKERIJ DE RONDE V.O.F.	BRU-26	OESTERSTRAAT 8-A	4311 GH	BRUINISSE
D. VAN DEN BOSCH MOSSELKWEEK B.V.	YE-69	INDUSTRIEWEG 5	4401 LA	YERSEKE
MOSSELKWEEKBEDRIJF A.P. RIEDIJK B.V.	YE-87	PUTHOEKSEWEG 4	4414 RJ	WAARDE
MOSSELKWEEK STEKETEE-PHILIPSE B.V.	YE-72	DE OMMEGANK 14	4415 AM	OOSTDIJK
DE WAAL-STOUTEN B.V.	BRU-9	DORPSWEG 27-A	4311 AG	BRUINISSE
ZOETWEIJ MOSSELKWEEK B.V.	YE-161	MOLENDIJK 1	4401 NL	YERSEKE
DE KONING MOSSELKWEEK B.V.	BRU-2	DELTA STRAAT 23	4311 GL	BRUINISSE
MARINECULTUUR OOSTERSCHELDE B.V.	BRU-5	POSTBUS 177	4645 ZK	PUTTE
H.J. JUMLET	BRU-39	SCHIPPERSLAAN 2	4311 CD	BRUINISSE
MOSSELKWEEKBEDRIJF P.F. DE BRUIJN & ZOON	HON-14	NARCISSTRAAT 31	4587 BB	KLOOSTERZANDE
MOSSELKWEEK J. STEKETEE & ZONEN B.V.	YE-72	DE OMMEGANK 14	4415 AM	OOSTDIJK
DE WAAL PADMOS B.V.	BRU-50	STELBERGSTRAAT 19	4311 GD	BRUINISSE
L.J. HOGERHEIDE	BRU-24	POSTBUS 45	4310 AA	BRUINISSE
MOSSELHANGCULTUUR LANDA B.V.	BRU-5	POSTBUS 177	4645 ZK	PUTTE
M.T.D. VEERHOEK	BRU-6	ABEELSEWEG 21	4335 JW	MIDDELBURG
MOSSELKWEEKBEDRIJF BARBÉ BV	YE-56	POSTBUS 61	4400 AB	YERSEKE
MOSSELBEDRIJF BARBÉ B.V.	YE-56	POSTBUS 61	4400 AB	YERSEKE
BARMOS B.V.	YE-27	POSTBUS 61	4400 AB	YERSEKE
BRU 40 B.V.	BRU-36	MAISSTRAAT 2	4311 CV	BRUINISSE
MOSSELKWEEKBEDRIJF DHOOGHE B.V.	YE-30	GRINTWEG 64	4401 NG	YERSEKE
MEIBLOEM B.V.	WR-10	POSTBUS 5	4400 AA	YERSEKE
MOSSELTEELT TERRA B.V.	YE-116	FREGATSTRAAT 2-A	4401 JD	YERSEKE
JAC. SCHOT EN ZOON B.V.	ZZ-10	NIEUWE HAVEN 83	4301 DK	ZIERIKZEE
BARBÉ'S MOSSELKWEEKBEDRIJF B.V.	YE-56	POSTBUS 61	4400 AB	YERSEKE
GEBR. P.A.M. EN L.M. DE BRUIJN	HON-14	KAREL DOORMANSTRAAT 12	4587 EG	KLOOSTERZANDE
GEBRS. VERSCHUURE B.V.	YE-18	DAMSTRAAT 108	4401 AT	YERSEKE
PRINS MOSSELKWEEK B.V.	YE-96	POSTBUS 63	4400 AB	YERSEKE
MOSSELKWEKERIJ T ENGELSGAT B.V.	YE-62	Nicolaes Maeslaan 2	4401 AE	YERSEKE
TEXEL 55 B.V.	TX-55	LOODSSINGEL 11	1792 BG	OUDESCHILD
FIRMA OTTE EN ZN.	BRU-12	MEEKRAPSTRAAT 3	4311 EP	BRUINISSE
FIRMA C.L. VERSPOOR EN ZOON	BRU-4	OUDESTRAAT 9	4311 AV	BRUINISSE

BRU 36 B.V.	BRU-36	MAISSTRAAT 2	4311 CV	BRUINISSE
MOSELKWEKBEDRIJF J. MEIJAARD B.V.	YE-55	BREEWEG 130	4401 BS	YERSEKE
C.M. DE KOSTER-VAN DEN BOSCH B.V.	YE-69	INDUSTRIEWEG 5	4401 LA	YERSEKE
BRANDING B.V.	YE-161	MOLENDIJK 1	4401 NL	YERSEKE
MOSELKWEKBEDRIJF J. DE WAAL BV	BRU-25	STELBERGSTRAAT 19	4311 GD	BRUINISSE
BRU 8 BV	BRU-8	MEEKRAPSTRAAT 13	4311 EP	BRUINISSE
VISSERIJBEDRIJF BARBÉ B.V.	YE-110	POSTBUS 61	4400 AB	YERSEKE
J. DE RONDE	BRU-26	OESTERSTRAAT 8-A	4311 GH	BRUINISSE
FIRMA DE KEIJSER	BRU-19	OESTERSTRAAT 8	4311 GH	BRUINISSE
VERWIJS NIEUWENHUIZE B.V.	YE-57	ERICALAAN 1	4401 HP	YERSEKE

APPENDIX K: OBJECTION TO DETERMINATION