Marine Strategy

for the Dutch part of the North Sea

2012-2020

Part 3

MSFD programme of measures

Appendix 5 to the National Water Plan 2016-2021

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Disclaimer: In all cases the Dutch version of this publication prevails.

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Summary

The Marine Strategy for the Dutch Part of the North Sea 2012-2020 (Part 3) encompasses the programme of measures for a healthy sea with sustainable use.

The European Marine Strategy Framework Directive (MSFD) obliges EU member states to develop a strategy to achieve and/or maintain a good environmental status in their part of the sea (i.e. the Dutch part of the North Sea for the Netherlands) by 2020 and to implement measures that ensure fulfilment of the objectives set to this end. The building blocks for this strategy are the policy frameworks already in existence and the measures arising from these. Where these prove insufficient, the member states are to formulate additional measures. Moreover, the directive mandates international cohesion and cooperation in the north-east Atlantic region, and more specifically with the North Sea countries.

Integrality
In essence, the MSFD is a guiding and task-setting directive that integrates several, diverse fields of policy within the compass of environmental policy, ecosystem policy and all policy geared towards sustainable use. The integrating effect of the MSFD is reflected in the wide-ranging spectrum of the eleven descriptors, on the basis of which the good environmental status is ascertained and the actual environmental status can be assessed. They pertain to the topics of biodiversity, non indigenous species, (commercial) fishing stocks, food webs, integrity of the seabed, hydrography, pollutants and eutrophication, litter and underwater noise.

A single tripartite strategy
The MSFD dictates that member states flesh out their national Marine Strategy in three parts:

Marine Strategy Part 1 encompasses the initial assessment of the current environmental status and describes the good environmental status to be achieved by 2020 as well as the environmental targets with corresponding indicators. This part also comprises the resultant policy tasks up to 2020. In 2012 the Cabinet established part 1 of the marine strategy for the Dutch part of the North Sea and reported this to the European Commission.

Marine Strategy part 2 is the MSFD monitoring programme. It presents a general description of the monitoring cycle, and for each environmental target and for each indicator it looks specifically at the monitoring strategy and efficient collection of reliable measurement data for the purposes of the ultimate assessment. This part of the Marine Strategy was completed in 2014 and presented to the European Commission. The monitoring programme is adjusted each year on the basis of new insights and international harmonisation within the compass of OSPAR and ICES.

Marine Strategy part 3 describes the measures required to achieve the good environmental status and environmental targets by 2020. The programme of measures was available for public inspection during the first six months of 2015 and was adopted at the end of 2015. It forms part of the National Water Plan 2016-2021. The programme has been incorporated into the Policy Document 2016-2021 on the North Sea, which also forms part of the NWP 2016-2021 as an appendix. The emphasis within the MSFD programme of measures is on cooperation with neighbouring countries, making usage sustainable, an area-based approach to the most significant sources, species policy and creating opportunities for active ecosystem recovery. Monitoring the developments is important as a basis for adaptive management. The MSFD programme of measures will be reported to the European Commission no later than the end of March 2016.

Fundamental principles of Dutch effort
The marine strategy for the North Sea is founded on a vision of the future that involves a clean, healthy and productive sea, as elaborated in the draft Policy Document on the North Sea 2016-

2021. The ecosystem will function optimally and will be resilient, the water will be clean and use of the North Sea will be sustainable. This will ensure that the North Sea provides prospects both for nature and the environment and for human use and economic sectors. The ecosystem approach and the precautionary principle constitute the starting point for the policy to enable a good environmental status to be achieved and maintained in the face of increasing usage of the North Sea.
The Cabinet has opted for a pragmatic approach to achieve and/or maintain a good environmental status. The emphasis is on 'doing what is necessary' so as to get the marine ecosystem back in shape and 'making the most of opportunities' to ensure that sustainable economic growth and a healthy ecosystem go hand in hand. The Cabinet wishes to encourage cooperation between leaders in sustainable development, as in the case of the green deals for reducing litter.

Cross-border approach
The Cabinet seeks to further extend international harmonisation and cooperation. After all, the quality of the ecosystem and the marine environment in those parts of the North Sea belonging to different nations are inextricable. For that reason, the MSFD obliges member states to adopt a regional approach. Also within the compass of OSPAR, international cooperation and the coordinated approach to the marine strategy are given additional weight. The Netherlands is actively supporting initiatives for international cooperation within the compass of OSPAR, the EU and other relevant international frameworks. International harmonisation and cooperation between the OSPAR countries with respect to measures for the various MSFD descriptors so far will be laid down in early 2016 in the 'OSPAR Joint Documentation on Coordination of Measures (MSFD)'. This document will also contain an agenda of possible additional topics for strengthening cooperation and coordination.

Three starting points for policy
The MSFD programme of measures is based on three starting points:

1. *Rendering use sustainable*

For the purposes of issuing permits for activities at sea, the government uses a comprehensive framework of assessment, proceeding from the ecosystem approach and the precautionary principle. Within the scope of the IMO and Common Fisheries Policy, the Cabinet seeks to make the shipping and fishery industries sustainable. With respect to reducing pollution from land-based sources, the Cabinet proceeds from the existing environmental policy and the implementation of the Water Framework Directive.

2. *Area-based and species-oriented approach*

Using an area-based approach, the Cabinet aims to safeguard the protection of vulnerable ecological species and areas, such as the Natura 2000 areas and the additional protection in the Frisian Front and the Central Oyster Grounds. These measures stem from the obligation arising from the BHDs and MSFD to make progress towards achieving a good environmental status of the marine ecosystem and to contribute to a coherent and representative network of protected marine areas by protecting certain ecological/habitat areas in the Dutch part of the North Sea. The fundamental principle is area-based regulation or suppression of certain forms of use that disrupt the natural and biodiversity values to be protected or restored by the MSFD

3. *Creating additional opportunities for ecosystem recovery*

The MSFD programme of measures includes a number of exploratory studies that have the ultimate potential to lead to actions and measures to restore ecosystems that have disappeared or been damaged. An example is exploring the possibility of reintroducing more hard substrate into the North Sea by encouraging the return of oyster beds or by using wind turbine foundations.

Concrete measures
The measures contained in the MSFD programme of measures are categorised according to eleven descriptors, four of which have been merged due to their interconnectedness. A concise overview is provided below.

Marine ecosystem measures
The policy's aim up to the year 2020 is to reverse the trend in the state of the marine ecosystem from deterioration to recovery. Measures geared towards achieving this objective relate to the determining descriptors of biodiversity, commercial fishing stocks, food webs and seabed integrity. The ultimate aim is a situation where habitats and species are in harmony with the prevailing physiographic, geographic and climatological circumstances. These objectives fit in with the Cabinet's vision of the future focused on a North Sea ecosystem that is resilient and functions optimally.

Measures pertaining to the biodiversity, food web and seabed integrity (areas and species) descriptor
Existing measures
- In relation to OSPAR a variety of recommendations have been accepted for the purposes of protecting threatened and declining species and habitats. Sixteen species and five habitat types are relevant in the case of the Netherlands, such as porpoises, sharks and rays. In 2003 OSPAR accepted a recommendation to create a coherent European ecological network of marine protected areas. The Netherlands has registered five marine protected areas (designated under the Birds Directive and Habitats Directive) with OSPAR. These are the Natura 2000 areas North Sea Coastal Zone, Voordelta, the Raan Flats, Dogger Bank and Cleaver Bank.
- Management plans have been drawn up for the Natura 2000 areas Voordelta, the Raan Flats and North Sea Coastal Zone. Activities are regulated by way of conditions for exemption, permit conditions for coastal/beach sand replenishment, cables and pipes and fishing, and mitigating measures such as codes of conduct and the temporary closure of areas.
- The Natura 2000 areas Cleaver Bank and Dogger Bank are partly protected from fishing that disturbs the seabed (in accordance with the Habitats Directive), and for several months a year the Frisian Front is closed to fishing by means of standing rigging (in accordance with the Birds Directive).
- The Haringvliet Locks Management Decree (Kierbesluit, 2011) has resulted in the Haringvliet locks being 'left ajar' if the water level in the Haringvliet is lower than sea level. This is important for international fish migration.

Additional measures
- With a view to protecting seabed ecology and biodiversity, protection is being provided for the seabed ecosystem in the areas of the Frisian Front and the Central Oyster Grounds in addition to the existing measures in Natura 2000 areas. In coordination with stakeholders and EU member states engaged in fishing activities here, measures will be fleshed out in 2016 for the purposes of mitigating the effects of fishing that disturbs the seabed in these protected areas.

Measures regarding the commercial fish descriptor
As regards fishing measures, the EU has exclusive competence and the European Commission has the right of initiative. The Common Fisheries Policy should contribute to the protection of the marine environment, to managing all commercial species sustainably and to bringing about a good environmental status by 2020.
National policy with regard to coastal and shellfish fishing is contributing to the development of ecosystem-based management. In time this will have to result in a stable and sustainable basis for fishing that matches economic, social and employment opportunity objectives, and which contributes to the food supply.

Existing measures

- The target is to manage stocks wherever possible at the level of maximum sustainable yield (MSY) by 2015 or by 2020 at the latest. The Dutch government is committed to producing management plans that enable better harmonisation of objectives for each species and actual catch composition.
- Another priority is minimising unwanted by-catch by introducing the landing obligation. This obligation will have considerable consequences for the sector, individual firms, the market and future methods of fishing. The Dutch government's commitment is a landing obligation that can be implemented, enforced and complied with. In June 2015 the member states around the North Sea submitted recommendations to the European Commission for the introduction of the landing obligation in the 2016 - 2018 period.
- In 2014 a scientific experiment was launched using pulse fishing to study the extent to which this type of fishing can contribute to the implementation of the landing obligation and to the reduction of by-catch and disturbance of the seabed.
- Sustainability Certificates (such as that of the Marine Stewardship Council, MSC) can help increase support from society and make the sector more sustainable. The European Commission is looking into the possibility of developing criteria for an eco label for fishing and aquaculture that applies to the Union as a whole.

Measures regarding the non indigenous species descriptor

A good environmental status for non indigenous species is achieved if non-indigenous species introduced as a result of human activities do not cause any changes within the ecosystem. It is anticipated that with the current policy on non indigenous species, as formulated in the Policy Document on Invasive Exotic Species, the risk of new introductions of such species will have fallen drastically by 2020.

Existing measures

- When it comes to transporting shellfish for aquaculture and live shellfish to Natura 2000 areas, the transfer of invasive non indigenous species must be prevented. This is possible by, for example, laying down conditions in permits issued under the Nature Conservation Act. The management programmes for the Natura 2000 areas include measures geared towards preventing the import of non indigenous species and combating the presence of invasive non indigenous species.

The convention for the control and management of ships' ballast water and sediments (Ballast Water Management Convention) has not yet come into effect, but its implementation is already laid down in Dutch laws and regulations. The Convention obliges shipowners to purify ballast water. By means of protocols, OSPAR facilitates the work processes for exemptions from the Ballast Water Management Convention, subject to conditions, for vessels sailing in the HELCOM/OSPAR regions. In 2012 the International Maritime Organisation (IMO) adopted the (voluntary) Hull Fouling guidelines. The guidelines will be evaluated during the 2013-2017 period with respect to its effectiveness or whether mandatory measures will be necessary in the future.

Measures regarding the eutrophication descriptor

Eutrophication is to the detriment of biodiversity, has adverse effects on the ecosystem and causes harmful algal blooms and oxygen deficiency in the layers of water near the seabed. Consequently, efforts are focused on reducing the concentrations of nutrients.

Causes of eutrophication in the North Sea are sources at sea, the supply of nitrogen and phosphates by rivers and atmospheric deposition from sources on land and at sea. The approach to sources at sea is governed by IMO frameworks. Measures for sources on land form part of the updated River Basin Management Plans for the Rhine, Meuse, Scheldt and Eems. These plans for the purposes of implementing the Water Framework Directive (WFD) form an integral part of the National Water Plan.

Existing measures

- Marine pollution caused by shipping is regulated in the International Convention for the Prevention of Pollution from Ships, or MARPOL Convention, drawn up by the IMO. MARPOL regulates emissions of substances and chemicals into the air and water as well as the discharge of domestic waste.
- The Cabinet introduced mandatory manure processing on 1 January 2014. This measure obliges livestock farmers to have a percentage of surplus manure production processed, with this percentage being determined by the government. Measures pertaining to agriculture have been incorporated into the Fifth Action Programme for the Nitrates Directive.
- In addition to the Fifth Action Programme for the Nitrates Directive, the agriculture and horticulture sector drafted the Delta Plan for Agricultural Water Management. The sector is working with water managers on a cohesive, integrated approach in order to devise customised solutions to fulfil objectives for nutrients, plant protection products and water quantity.
- The Netherlands has implemented the EU directive on urban waste water and fulfils the minimum area output requirements for phosphorus and nitrogen. All water boards have been fulfilling these minimum area output requirements since 2007.
- Water boards are planning to improve, or are already engaged in improving, purification efficiency at regional level in a substantial proportion of sewage treatment plants. This will be done prior to 2021.

Measures regarding the Hydrographic properties descriptor

Large-scale interventions in the North Sea may result in changes in hydrographic properties. The policy is geared towards preventing permanent large-scale negative effects and towards ensuring conservation of a good environmental status where new activities are underway. In the Netherlands, the EU directive governing environmental impact assessments for such projects has been implemented in the Environmental Impact Assessment Decree. The effects of large-scale developments, such as the creation of Maasvlakte 2 and the Sand Engine in the recent past, will have to be studied by way of environmental impact assessments. Relatively limited interventions, such as sand replenishments and dredging work, are regulated by way of permits or exemptions; generally, an environmental impact assessment is mandatory for new activities. If the environmental impact assessment reveals that the effects will not change the ecosystem permanently and irreversibly on a large scale, then no further action will be required. Adverse effects on the marine ecosystem have to be mitigated. The procedure under the Nature Conservation Act (alternative solutions, imperative reasons of overriding public interest, mitigation and compensation) applies in the case of significant effects on species and habitats. Thus the seabed protection measures in the Voordelta area are compensation for the construction of Maasvlakte 2 in this Natura 2000 area.

Measures regarding the pollutants descriptor

Efforts are geared towards reducing concentrations of pollutants in the sea and preventing the contaminating effects of substances such as TBT, which is used to combat hull fouling.
The most significant sources of pollutants are marine sources, such as shipping and offshore mining, and sources on land, such as industry, transport and agriculture.
EU regulations, agreements made within the framework of OSPAR and agreements made within the framework of the IMO have resulted in huge falls in concentrations of pollutants in the marine environment since the 1970s.
A sizeable proportion of the measures has been incorporated into the programmes of measures for the river basins pursuant to the Water Framework Directive (WFD). These measures also help reduce pollution in the North Sea. One matter that will require attention over the next few years is the potentially growing threat posed to the marine environment by the presence of medicines in surface water.

Existing measures

- Discharges from offshore installations in the Dutch part of the North Sea are regulated under the Mining Act, by way of such things as conditions attached to the issuance of permits for mining activities.
- The significance of the MARPOL Convention in terms of combating discharges caused by shipping has already been stated under 'eutrophication'.
- Marine pollution with TBT caused by shipping has been reduced by means of the International Convention on the Control of Harmful Anti-fouling Systems on Ships (2008).
- The change of shipping routes in 2013 in the Dutch part of the North Sea is increasing shipping safety, thereby also reducing the risk of adverse environmental effects from accidents.
- The Bathing Water Directive was implemented by way of the Swimming Facilities Hygiene and Safety Act. This established standards that must be fulfilled in terms of bathing water quality, including bathing water in coastal waters.
- Under the Ships' Waste (Rhine and Inland Waterways) Decree, a ban on discharging domestic waste water into surface water has been in place for passenger vessels and cabin vessels since 1 January 2012.
- The EU Directive on Industrial Emissions has been implemented by way of the Environmental Licensing (General Provisions) Act, the Environmental Management Act (Activities Decree) and the Water Act.
- The implementation of Seveso III in the Major Accidents (Risks) Decree limits the consequences of major accidents for humankind and the environment.
- The EU Directive on the sustainable use of pesticides has been fleshed out in the Netherlands to form the Sustainable Plant Protection Action Plan. National policy stemming from the Directive has been laid down in the 2nd Sustainable Plant Protection Document.
- The main preparation, cooperation and coordination agreements for disaster control and incident response at sea are laid down in the North Sea Emergency Plan (as part of the Incidents Prevention Plan), the Cooperation Agreement for Combating Coastal Pollution and the Cooperation Plan for dealing with Oil-soaked Birds. There is also international cooperation by way of the Bonn Agreement on cooperation on combating pollution in the North Sea.

Measures regarding the contaminants in fish descriptor

Current levels of contaminants found in fish and fish products do not exceed the standards of national and international legislation. The measures described in the sections on eutrophication and contaminants are contributing factors in this regard. This means that in the current situation the environmental status is good. It is expected to remain so. If policy remains unchanged, the Netherlands will be able to maintain the status quo until 2020 and beyond.

Measures regarding the litter descriptor

There is a growing awareness worldwide of the problem of plastics and other litter at sea causing harm to the coastal and marine environment. The programme of measures presents a set of measures to considerably reduce the volume of litter in and along the North Sea, including breakdown products such as microplastics.

Existing measures

- Initiatives such as *Supporter van Schoon* ('Supporter of Clean'), the *Landelijke Opschoondag* or Keep it Clean Day are geared towards positively influencing behaviour in terms of litter. The Plastic Heroes campaign increases awareness among Dutch consumers of the importance of collecting plastic packaging waste separately.
- The site *Duurzaam Doen* ('Sustainable Action') seeks to prompt citizens and entrepreneurs to make their activities sustainable, doing so by way of inspiring examples, for example.
- Stakeholders and coastal communities are ensuring that the Netherlands' North Sea beaches are made clean and kept clean. Initiatives and campaigns such as the Cleanest Beaches contest (instigated by the Netherlands Clean Foundation) and MyBeach (instigated by the North Sea Foundation) are helping to increase awareness among beach goers.

- SchoneMaas Limburg is a partnership comprising of more than 25 parties. In addition to annual campaigns which see a sizeable proportion of the banks of the Meuse banks being cleaned, awareness and agenda-setting are integral parts of the programme.
- The Netherlands enshrined the EU Directive on port reception facilities for ship-generated waste and cargo residues in legislation in 2005.
- Proper port reception facilities are available in all Dutch ports. The revised Annex V of the MARPOL Convention from the IMO came into force on 1 January 2013. The revision takes as its point of departure an outright ban on ships discharging waste, with the exception of food waste.
- On the initiative of the Netherlands, it was agreed in the IMO that the marine environmental awareness course would become a mandatory component in maritime training throughout the world.
- Since early 2000 participation in the Fishing for Litter project has grown to 90 vessels and more than 3,000 tonnes of waste have been removed from the North Sea. The Fishing for Litter project is coordinated and implemented primarily by KIMO Netherlands and Belgium.
- The policy for waste/litter is based on directives and agreements such as the Waste Framework Directive, Packaging Framework Agreement 1, National Waste Management Plan 1 & 2, Packaging Management Decree, and the landfill ban. Domestic and industrial waste are collected separately, processed and reused in a sustainable way. Ambitions with respect to closing raw material chains and the transition to a circular economy have been established.
- Cosmetics companies in the Netherlands are voluntarily replacing plastic microbeads in cosmetics products, resulting in a reduction in emissions of microplastics into the water.
- The goal of the programme Van Afval Naar Grondstof ('From Waste to Raw Material' or VANG) is to halve the quantity of waste dumped or incinerated within a decade. The aim is to transition to a sustainable economy in which production and consumption cycles are closed. The following elements are relevant to reducing litter:

* Packaging Framework Agreement with manufacturers, to reduce and to recycle packaging. 20 million euros per annum are available to municipalities for the purposes of additional tackling of the litter problem.
* National litter policy in collaboration with municipalities and the business community; this policy includes an action plan for pilots with a bonus or a reward system for returning small PET bottles and tins and possibly other packaging materials as well.
* Plastic Cycle Chain Agreement with companies, knowledge institutions and NGOs to jointly take up measures from the VANG programme and the Marine Strategy Framework Directive.
* The Landelijk Afvalbeheerplan ('National Waste Management Plan', or LAP2) contains national targets for separated waste collection and general principles for tools such as permit issuance and enforcement.

- A ban on giving away carrier bags for free comes into force on 1 January 2016. This ban is part of a broad approach for reducing the use of all carrier bags as an interpretation of the EU guideline. Exceptions will be made for extremely thin plastic bags necessary for food hygiene and to prevent food wastage.

Additional measures

It is anticipated that, despite policy efforts and many initiatives, the volume of litter in the Dutch part of the North Sea will not decrease. Presumably, pollution by microplastics will increase. For that reason, supplementary measures have been formulated for 2020.

- Tackling the problem of litter and the 'plastic soup' in curricular strands and teaching packages and promoting the subject among teaching and education professionals.
- Coastal communities, entrepreneurs, volunteers and civil society organisations have signed the Green Deal Clean Beaches to reduce the volume of litter on beaches by means of such things as clean-up campaigns, cleaning and removal facilities at the beaches and the Green Key label for beach-based catering establishments.
- The Ministry of Infrastructure and the Environment is disseminating knowledge at local level, also among water managers, on the importance of reducing litter in the river basins.

- The successful approach of SchoneMaas Limburg is being scaled up to include other river basins and water systems. In tandem with this, the Litter Collection Scheme of Rijkswaterstaat (Directorate-General for Public Works and Water Management) is being rolled out across the Netherlands.
- In order to close the chain of plastic waste from ships, the Maritime Waste Chain Green Deal has been signed by port authorities, shipowners, ship chandlers, managers of port reception facilities, the North Sea Foundation and the central government. The goal is that ships will produce less waste when taking on supplies and will dispose of separated waste in ports where it will be recycled or converted into fuel.
- The Green Deal Fishing in Support of a Clean North Sea sees the fisheries sector joining forces with other parties (the Ministry of Infrastructure and the Environment, ports, waste processing firms, etc.) to seek ways to close the waste cycle by removing and depositing domestic waste as well as nets and cables, by collection facilities in ports and by recycling nets.
- ProSea has set up an education pathway within the fisheries sector to increase awareness of the waste problem.
- Two actions in the sphere of product development and more sustainable, more efficient use of plastics are: pushing back the release of balloons and working towards an EU ban on microplastics in cosmetics and detergents.
- On 28 June 2014 the OSPAR Regional Seas Convention adopted the Regional Action Plan Marine Litter. The Netherlands is leading the development of the following OSPAR measures: regional coordination of implementation of the directive on port reception facilities and improving the implementation of ISO standards; reducing the impact of dolly rope; exchanging best practices to reduce waste in rivers; tackling microplastics in cosmetics products and other sources; and reinforcing Fishing for Litter agreements.

Measures pertaining to the introduction of energy, including underwater noise descriptor
The aim is to prevent the harmful effects of noise caused underwater by human activity. As soon as more knowledge is available, it will be possible to set more detailed objectives in 2018 for background noise and accumulation of effects on populations or the ecosystem.

Existing measures
- The licensing procedure for wind farms has been revised with the coming into force of the Wind Energy at Sea Act as of 1 July 2015. The Plot Decrees for the planned wind farms stipulate maximum permissible noise levels depending on the construction season and the number of piles required.
- Since 1 January 2014, carrying out seismic surveys at sea in the EEZ often requires a permit under the Nature Conservation Act and/or an exemption from the Flora and Fauna Act. The procedure provides for an appropriate assessment (under the Nature Conservation Act), species protection review (Flora and Fauna Act) and corresponding mitigating measures to prevent or minimise possible harmful effects of underwater noise.
- The IMO adopted guidelines in 2014 for reducing underwater noise caused by commercial shipping.
- The use of active sonar is regulated in Naval Forces Command regulation MWC 320 'Responsible use of active sonar,' which aims to prevent or minimise the harmful effects on marine mammals of anti-submarine sonars.
- The code of conduct for explosive ordnance disposal sets out measures and a framework for assessment for disposal of explosive ordnance, with the aim of preventing potentially significant effects.
- Agreements are being made in consultation with the offshore industry regarding the voluntary guidelines as established in OSPAR for reducing the effects of lighting on platforms.

Tax measures
Aside from all the measures cited above, tax incentives also help achieve a good environmental status on the Dutch continental shelf. The MIA scheme (offering a tax refund on environmental

investment) and the Vamil scheme (providing arbitrary depreciation of environmental investments) encourage investment in environmentally friendly technologies. These schemes are already underway to support measures in terms of fisheries, non indigenous species, eutrophication, pollutants and litter. In addition to Vamil and MIA, there are also other tax/economic tools in place to reduce emissions.

Analysis of the package of measures in terms of comprehensiveness
Using model calculations and expert opinion (ODEMM model), an analysis has been made of the extent to which the measures of the MSFD programme have any bearing on human activity and the effects thereof on the marine ecosystem. This is important to be able to ascertain whether the package of measures is sufficiently comprehensive or whether any additional measures are necessary. The analysis reveals that the package of measures covers virtually all relationships between use and effect. In other words, it shows that this MSFD programme of measures is potentially capable of reducing all the impact of human activities on the ecosystem satisfactorily so as to bring about a good environmental status. 'Potentially' because the actual reduction will depend on the extent of fulfilment and implementation of measures.

Achieving a good environmental status
Existing and proposed policy will allow a good environmental status to be achieved for a great many elements. This holds for reducing pollution, eutrophication, developing healthy fish stocks, excluding non indigenous species, and mitigating and compensating for hydrographic interventions. This underscores once more the importance of implementing policy in these respects. It is anticipated that existing and new nature conservancy and anti-litter measures will make it possible to reverse the trend and ensure ecosystem recovery and a reduced volume of plastic in the sea.

Despite these manifold efforts and positive expectations, it is not possible at present to ascertain the precise condition the Dutch part of the North Sea will be in by 2020. This is down to the dynamic nature of the North Sea, the multifarious elements that collectively determine the good environmental status and the diversity in activities that influence this status. Hence it is not possible to predict the extent to which, and how swiftly, an affected ecosystem will respond to measures. This also holds for the lag effects of a number of substances and plastics that have accumulated in the North Sea in the past. Additionally, further research is required into factors on which the available knowledge is still scant, such as microplastics and underwater noise accumulation.

Exploratory studies and opportunities for the future
The ambition to create a healthy sea and ensure a sustainable use calls for unfaltering alertness to opportunities to enhance the sustainable use of the North Sea, to further limit pressure on the marine environment and the ecosystem, and, where possible, to actively foster recovery of the North Sea ecosystem. Based on this line of approach to making the most of opportunities and solving problems (potential or actual), a number of enquiries have been formulated. The results of these enquiries will feed the objectives and measures for the second MSFD cycle commencing as of 2018.

Sustainable use
- Project designed to find an alternative to dolly rope (litter as a result of wear and tear of the plastic protection for fishing nets).
- By way of the networking event iSea, Rijkswaterstaat aims to encourage people with ideas, entrepreneurs, investors, experts and policymakers to collectively develop new initiatives for sustainable use of the sea.
- An exploratory study into the possibility of preventing bottom fishers getting their rigging caught up in standing rigging.
- An exploratory study into the possibility of a green deal for reducing the use of lead in recreational fishing.

- An exploratory study into possibilities at bilateral, OSPAR and EU levels to reduce emissions of microplastics by land sources.
- The North Sea countries have invited the Baltic countries to submit an application to the IMO for both the Baltic and the North Sea to be declared NOx Emission Control Area (NECA) for shipping. HELCOM is considering this request.
- Given the importance of the sea for the food supply, various studies and pilots are carried out to ascertain whether or not ideas surrounding aquaculture and mariculture are technically and economically feasible.

Area-based and species-oriented approach
- The aim is to arrive at a package of mutual agreements between stakeholders (code of conduct) for activities in and around wrecks.
- Towards the end of 2015 the Cabinet will have drawn up an action plan for the recovery of vulnerable sharks and rays in the North Sea.
- In 2011 the Cabinet drew up a Porpoise Protection Plan for the Dutch part of the North Sea. The plan aims to contribute to the salubrious conservation targets for the porpoise and for that reason it is also to be taken up at international level within the framework of OSPAR and ASCOBANS (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas). Attention is pointedly being given to research into the disruptive effects of fishing activities and loud impulsive noise.
- In 2016 a decision will be made as to whether Brown Ridge is to be designated a Natura 2000 area (Birds Directive). Borkum Reef Ground will not be designated as a Natura 2000 area. This area will be included in the evaluation of the network of marine protected areas as part of the update of the assessment of the environmental status of the North Sea in 2018 (update to Marine Strategy part 1).

Active ecosystem recovery
- Pilots aimed at restoring the oyster banks in the North Sea (pilot in the Voordelta) and reintroducing the Atlantic sturgeon will be implemented.

Knowledge agenda and research programming

Knowledge development is required for a number of topics within the marine strategy. This is the case for both existing and new measures. Areas for attention include sources and effects of litter and underwater noise, protection of species (porpoise, shark and ray), seabed integrity and the cumulative effects of human activity on the quality of the ecosystem. In order to chart the knowledge-related questions and steer research, the Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs have drawn up a knowledge agenda, which is updated every year. Furthermore, the Netherlands is participating in the international knowledge networks for identifying important knowledge-related questions in connection with OSPAR and the EU. The important knowledge topics from the MSFD are presented below:

Litter

Within the compass of OSPAR, the central government is contributing to the development and use of common indicators, including an indicator for waste lying on the seabed. In addition, knowledge is being accumulated around prevention, the origins and effects of microplastics in the marine ecosystem. In partnership with the international Rhine Commission and Meuse Commission, knowledge is being amassed on the quantity of litter (including microplastics) entering the sea via rivers.

Underwater noise

Research into underwater noise will have to provide greater insight into the scale of the problem. The aim is to set environmental targets for background noise and accumulation of effects by 2018, and to develop and implement systematic monitoring. Where possible, this research should be international, enabling an assessment at regional level and allowing policy objectives to be drawn up by 2018 if possible.

Protected areas
Cooperation with other North Sea countries on the further development of criteria for the evaluation of the intended coherent and representative BHDs and MSFD network of protected areas in the North Sea is an important topic, one the Netherlands is taking up within the compass of OSPAR and the EU.

Cumulative effects of human use
Within the compass of OSPAR, the Netherlands is investing in testing and applying methods for evaluation of cumulative effects. This subject is high on the OSPAR agenda.

Nature and biodiversity
Investments are continuously being made in MSFD policy research and monitoring in the policy areas of nature and biodiversity and fishing. Examples include the research associated with investigating an action plan for sharks and rays and the Porpoise Protection Plan. In addition, investments are being made in increasing the understanding of the function of the marine ecosystem's resilience, the development of research tools to implement protective measures for the seabed in the Frisian Front and the Central Oyster Grounds, and the development of common indicators for biodiversity within the compass of OSPAR. For the purposes of fisheries, knowledge is being developed on sustainable fishing methods, such as pulse fishing, and healthy fish stocks. Furthermore, contributions are being made to developing common indicators for commercial fishing stocks within the compass of ICES.

Long-term developments
Within the scope of OSPAR, the central government is helping to effectively monitor acidification so as to gain a better understanding of changes in the ecosystem against the background of global long-term processes such as climate change. In the Netherlands, the National Water and Climate Knowledge and Innovation Programme was launched to bring together the knowledge challenges in this field.

1. Reason and goal

1.1 Marine Strategy Framework Directive (MSFD)

The EU Marine Strategy Framework Directive (MSFD[1]) requires member states to draw up a strategy for their marine waters to achieve a good environmental status by 2020 and to take the necessary measures to actually achieve or maintain that good status. The directive covers the full environmental and ecosystem policy and the sustainable use. It comprises the themes of biodiversity, non indigenous species, habitat, hydrography, pollutants and eutrophication, litter and introduction of energy (including underwater noise). The starting points are the ecosystem approach and the precautionary principle. The Minister for Infrastructure and the Environment has lead responsibility for the implementation of the MSFD. In conformity with the Dutch Water Act, the Minister for Infrastructure and the Environment shares this responsibility with the State Secretary for Economic Affairs, because of the latter's responsibility for the policy areas of biodiversity, nature and fishery.

The Marine Strategy for the Dutch part of the North Sea comprises three steps:

Marine Strategy Part 1 (MSFD Articles 8, 9, 10)
Part 1 of the Marine Strategy for the Dutch part of the North Sea 2012-2020 was adopted by the Cabinet in 2012[2] and reported to the European Commission. This part contains the initial assessment of the current environmental status, the description of the good environmental status to be achieved by 2020 and the set environmental targets and corresponding indicators (see Appendix 1 for an overview). Part 1 of the Marine Strategy also contains the Cabinet's vision on the implementation of the MSFD and provides an analysis of the effectiveness of the policy. The policy task was formulated on the basis of this vision and the Cabinet has chosen three focal points for additional measures which, together with the measures within the current policy frameworks, ensure that a good environmental status will be achieved or maintained. Part 1 also contains priorities for knowledge programming.

Marine Strategy Part 2 (MSFD Article 11)
Part 2 of the Marine Strategy, the MSFD monitoring programme, was reported to the European Commission in October 2014[3]. It describes how the Netherlands meets the requirement to monitor the environmental status in its own part of the North Sea and how it monitors the implementation of the Birds and Habitats Directive at the same time. The point of departure is the current monitoring practice stemming from national and international obligations (such as the WFD, BHDs/Natura 2000, Common Fisheries Policy, IMO, OSPAR). The programme is updated each year on the basis of the most recent developments and new insights and international harmonisation in connection with OSPAR[4] and the International Council for the Exploration of the Sea (ICES).

Marine Strategy Part 3 (MSFD Article 13)
This part 3 of the Marine Strategy sets out the practical aspects of Article 5, paragraph 2(b) of the MSFD, which requires member states to draw up a programme of measures by 2015, aimed at

[1] Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive)
[2] Dutch House of Representatives, 2012-2013 session, 33450, no. 1
[3] The Ministry of Infrastructure and the Environment, *Marine Strategy for the Dutch part of the North Sea 2012-2020, Part 2, MSFD Monitoring Programme* (2014)
[4] Convention for the Protection of the Marine Environment of the North-East Atlantic, 1992. OSPAR is named after the original Oslo and Paris conventions ('OS' for Oslo and 'PAR' for Paris).

achieving or maintaining a good environmental status, in conformity with Article 13. Marine Strategy Part 3 describes among other things the development process of the programme of measures and the analyses that were performed to this end. The document explains the content and the expected effectiveness of the measures. Lastly, it provides an insight into the processes of the public consultation procedure and the international cooperation and how these processes have contributed to a coherent programme of measures.

Marine Strategy Part 3, the MSFD programme of measures, is part of the National Water Plan 2016-2021 (NWP) and the associated Policy Document on the North Sea 2016-2021. Appendix 1 of this programme of measures contains the descriptions of the good environmental status, environmental targets for 2020 and the corresponding indicators. The Cabinet adopted and reported these to the European Commission in 2012. They are also a part of the NWP 2016-2021. Based on the Water Act, the National Water Plan is also a framework vision for the spatial aspects. The NWP is a self-binding plan for the Central Government.

The second implementation cycle of the MSFD will commence during the planning period for the National Water Plan (NWP) until 2021. In 2018 Marine Strategy part 1 will be reviewed, including a progress report on the programme of measures. Marine Strategy part 2 will be reviewed in 2018.

1.2 Objective and context

The objective of the MFSD programme of measures, namely 'to take the necessary measures so as to achieve or maintain a good environmental status in the Dutch part of the North Sea by 2020', fits into the Cabinet's vision of the future as described in the Policy Document on the North Sea 2016-2021. This means that one day the North Sea will be clean, healthy and productive, with an optimal and resilient ecosystem, whilst sustainable use is made of the sea. A North Sea as described here will offer opportunities for acceptance and development for both nature and the environment and for economic sectors.

The Dutch North Sea policy, as set out in the Policy Document on the North Sea (an appendix to the National Water Plan 2016-2021), is a comprehensive policy. It contains all the goals and ambitions for the Dutch part of the North Sea. The marine strategy integrates preconditions and ambitions in terms of nature, the environment and sustainable economic development, and where necessary supplements these so as to achieve or maintain the good environmental status. This structure is in line with the European policy context in which the MSFD is the environmental pillar of the integrated maritime policy (IMP). The measures of the MSFD programme of measures are therefore also a part of the Policy Document on the North Sea. The MSFD programme of measures was adopted at the same time as the Policy Document (at the end of 2015).

The integration within the Marine Strategy pertains in part to policies that are implemented at a national level on the basis of international frameworks, such as the nature policy (Birds and Habitats Directive, the policy on species and the policy regarding non indigenous species, the water quality policy, environmental aspects of the shipping policy, sustainability of fishery and ensuing measures for protecting areas within the context of marine spatial planning[5].

By promoting opportunities for restoring and enriching the marine ecosystem and the sustainable use of the North Sea, the MSFD programme of measures also aims to contribute to the Dutch North Sea strategy in the long term. The Cabinet's commitment in this respect is described in Chapter 6 'Exploratory studies and opportunities for the future'. The Cabinet's commitment is also testimony to its close collaboration with the business community and civil society, such as in the research

[5] Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning

programme and the development and compilation of a technically feasible, cost-effective, affordable and sustainable programme of measures.

International context
The MSFD programme of measures takes into account the relevant measures on the basis of, among other things, the Common Fisheries Policy, the Water Framework Directive (WFD), the Nitrates Directive, the Urban Waste Water Treatment Directive, the Bathing Water Directive and the Directive on environmental quality standards for priority hazardous substances, as well as international agreements on an OSPAR or IMO level. Furthermore, the MSFD programme of measures is geared to the international biodiversity agreements ensuing from the Convention on Biological Diversity (CBD) and the European Birds Directive, Habitat Directive and Biodiversity Strategy. This relates for example to the goals of the joint European and international policies to halt the loss of biodiversity by 2020 and to reinforce the Natura 2000 policy. Furthermore, the MSFD programme of measures relating to biodiversity depends on international agreements, such as for the conservation of small cetaceans (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas, ASCOBANS).

Collaboration in the four international Rhine, Meuse, Scheldt and Eems river basins on the revision of the River Basin Management Plans and the related programmes of measures under the Water Framework Directive (WFD), produces a fundamental contribution to the MSFD programme of measures, for instance, for achieving the MSFD targets for eutrophication, pollutants, migratory fish, and for achieving a good environmental status in coastal waters.

1.3 Process description

This section describes how the programme of measures was developed, both on a national and an international level. Within the Netherlands, all products of the MSFD implementation are geared to the Interdepartmental Directors North Sea Consultative Body (IDON). Coordination with social (stakeholder) organisations occurs in the Infrastructure and Environment Consultation (IEC). The MSFD Core Group, a specific stakeholder consultation, was established through this IEC in 2010 and meets three times a year on average. The core group discusses in detail the various intermediate stages of the implementation and of the produced drafts prior to the IEC and the official deposit for inspection, thus contributing significantly to formulating the Dutch Marine Strategy.
A substantial part of this MSFD programme of measures ensued from other frameworks than the MSFD, such as the IMO, OSPAR and the EU. Social parties and the business community also proposed measures. If necessary, measures were added in accordance with the policy task in Marine Strategy Part 1, such as for the 'protection of the seabed' and 'reduction of litter' objectives. Civil society organisations were consulted on the draft MSFD programme of measures during the IEC of 25 September 2014. The Water Steering Committee discussed the draft MSFD programme of measures as part of the draft NWP2 on 8 October 2014 at managerial level with the Ministry of Infrastructure and the Environment, the Association of Provincial Authorities (IPO), the Association of Water Boards, the Association of Netherlands Municipalities (VNG) and the Association of water companies in the Netherlands (Vewin).

International
The EU member states and the European Commission jointly determined, under the Common Implementation Strategy, the guidelines for establishing an MSFD programme of measures. Stakeholders also contributed to these guidelines. They were admitted as observer organisations to the Marine Strategy Coordination Group and its working groups.
The guidelines and/or recommendations pertain to the design and the contents of the MSFD programme of measures and to describing the 'exceptions' as intended in Article 14 of the MSFD, if the environmental targets or a good environmental status cannot be achieved (in good time).

As a regional platform, OSPAR plays an important part in the international alignment of the contents of the MSFD programme of measures. Since the early 1970s the Netherlands has cooperated within OSPAR and the European Union with fifteen other countries to protect the marine environment of the north-eastern part of the Atlantic. This collaboration also includes non-EU countries, such as Norway. It started in 1972 with the Oslo Convention against dumping hazardous substances into the sea from ships and aircraft. In 1974 the Paris Convention expanded the protection with stipulations pertaining to sources of pollution on land and in the offshore industry. The two conventions were later merged, updated and expanded, resulting in the OSPAR Convention in 1992. Since 1998, agreements are also made under OSPAR on biodiversity, ecosystems and human activities that can have an adverse effect on the sea other than pollution. Over the past 40 years these international agreements have clearly helped to improve the functioning of the ecosystem in the North Sea. It is only logical then that ever since the MSFD came into effect, the Netherlands has worked closely with the other OSPAR countries to draw up a well-coordinated, coherent programme of measures.

International coordination and cooperation between OSPAR countries with respect to measures for the various MSFD descriptors to date will be recorded in early 2016 in the 'OSPAR Joint Documentation on Coordination of Measures (MSFD)'. This document will also contain an agenda of possible additional topics for reinforcing cooperation and harmonisation. The OSPAR countries can refer to this joint documentation document in their national MSFD programmes of measures and in their reports to the European Commission. No changes were called for after the draft MSFD programme of measures was deposited for public inspection in the neighbouring countries.

If necessary, the MSFD programme of measures will refer to the 'acquis' of existing coordination and cooperation as set down in the OSPAR Joint documentation document.

Creation of new measures
Work on the new measures in the MSFD programme of measures started in 2012 and ended once they were adopted. These measures pertain to the additional policy tasks for seabed protection and litter. In addition to the IEC and the MSFD core group, two stakeholder processes geared to those tasks were launched. Stakeholders were consulted in the 'litter' process to come up with joint proposals for measures and alternatives that expedite the environmental targets and hence the good environmental status and which are also feasible and affordable for those who are to implement them. The stakeholders in this process have also been active on an international level. For instance, in April 2013 they took part in a conference in Berlin organised by the European Commission and Germany. They also attended several OSPAR working group workshops and meetings to flesh out the Regional Action Plan Marine Litter, which the OSPAR Committee approved in 2014. This Regional Action Plan was developed in close interaction with the set of additional national measures for reducing marine litter.

In the process pertaining to 'additional seabed protection in the Frisian Front and the Central Oyster Grounds' the relevant stakeholders helped to formulate preconditions and fundamental principles for fleshing out the measures in more detail.

An environmental impact assessment, a preliminary evaluation based on the Nature Conservation Act and an appropriate assessment were drawn up for the measures contained in the Policy Document on the North Sea, including this MSFD programme of measures. The Options for Delivering Ecosystem-based Marine Management (ODEMM) methodology was used to analyse the impact of the measures on the (chains of) effects of human activities on the ecosystem.
Social cost-benefit analyses were performed for the new MSFD measures; attention was paid to sustainable development and in particular to the social
and economic consequences of the measures under consideration. The measures were also discussed with the stakeholders to ensure they are technically feasible and cost-effective.

Consultation procedure 2015
This Marine Strategy Part 3, the MSFD programme of measures, was determined by the Minister for Infrastructure and the Environment and the State Secretary for Economic Affairs along with the corresponding Memorandum of Reply and the entire National Water Plan 2016-2021. The draft copy of Marine Strategy Part 3 was made available to the public for inspection between 23 December 2014 and 22 June 2015 as part of the NWP. More than 50 opinions were submitted on the NWP and its appendices. Eight opinions were received on the MSFD sections in these documents[6]. Forty-five sub views were distilled from these opinions. Comments were addressed in the Memorandum of Reply and have in some cases led to textual clarifications in this document.

Official amendments
Compared to the draft text of Marine Strategy Part 3, the text has been updated in various places partly because announced research results have become available and because of progress made in discussions and decision-making concerning various policy areas and in international forums. Texts relating to litter and underwater noise and the various regional processes such as Seabed protection in the Frisian Front and Central Oyster Grounds have been changed. Where relevant, the text also addresses the exceptional situations based on Article 14 of the MSFD. Appendix 2 includes the operational targets for each measure. Appendix 3 contains a table which addresses specific questions posed by the European Commission regarding additional measures.

Reporting to the European Commission
Within three months of adopting the MFSD programme of measures, in the spring of 2016 a report will be submitted to the European Commission.

[6] No. 3. private individual; 7. Ministry of Health, Food Chain Safety and Living Environment, Belgium; 15. Water Sports Association 24. KIMO; 30. Port of Rotterdam; 42. Netherlands Sport Fishing; 45. Netherlands Wind Energy Association (NWEA); 47. VisNed

2. The Dutch Marine Strategy for the North Sea

In its Policy Document on the North Sea 2016-2021, the Cabinet presents its vision on the future of the North Sea as a clean, healthy and productive sea. The ecosystem will function optimally and be resilient, the water will be clean and use of the North Sea will be sustainable. This will ensure that the North Sea provides opportunities both for nature and the environment and for economic sectors.
The sea also has important sociocultural and historical significance for the Netherlands, and is a source of knowledge. The essence of the new policy for the North Sea is: to aim together with social parties for a use that is beneficial to ecology and the economy in terms of space and time, as well as to continue to develop the natural potential of sea and shore. The central government strives to achieve the highest possible level of functional combinations. If necessary, functions will be kept separate or will be separated, for instance for reasons of safety aspects or vulnerable ecology.

The policy task is to achieve (international) goals for the quality of the marine environment and the marine ecosystem. To this end, comprehensive policies must be formulated and measures must be decided on in order to protect marine biodiversity, to create a network of marine protected areas and to reduce pollution. The ecosystem approach and the precautionary principle are key components of the comprehensive policy. The nature and environmental policy gives direction to sustainable use, in order to have and to preserve a clean and healthy sea.

This MSFD programme of measures is a result of this policy task. The programme integrates the wide range of measures the Cabinet takes in various policy fields. Cooperation with stakeholders and neighbouring countries is given special attention in this respect. The main policy starting points are: sustainability of use, area-based and species-oriented approach and promoting the restoration of the ecosystem. Policy and management will be adjusted periodically (adaptive management) on the basis of the monitoring results.

Do whatever is necessary and make the most of opportunities
In Marine Strategy Part 1, the Cabinet describes the 'good environmental status' as follows: The North Sea is clean, healthy and productive, the ecosystem is functioning optimally and is resilient, and use of the North Sea is sustainable. As such, the North Sea offers prospects for both nature and sustainable use by economic sectors.

In the Marine Strategy, the Cabinet has opted for a pragmatic approach to achieve and/or maintain the good environmental status. In short: 'do whatever is necessary' to restore the marine system and 'make the most of opportunities' so that the development of a healthy system and sustainable economic growth can go hand in hand. More specifically: the Cabinet aims to combine human activities wherever it can with the interests of the ecosystem, while protecting the ecosystem where it needs conserving. The Cabinet aims to stimulate leaders in sustainable development. This emphasis is indicative of the shift to a North Sea policy with a development-oriented character.

This change requires stakeholders to adopt a new role. The government will need to take a more active stand to protect nature, to support sustainability efforts within economic sectors and, by means of customisation, to tailor legislation to the new policy. Working together with other users provides opportunities for North Sea users and related market parties. They can also make proposals if policy is lacking. Knowledge institutions and non-governmental organisations can connect closer with market parties to exploit the multifaceted potential of the sea as well as to conduct research into the effects on the marine environment.

In accordance with the risk approach principle and the precautionary principle, the MSFD programme of measures focuses on the greatest (potential) threats and the related designated uses. The policy is geared towards influencing the direction and scope of the use as effectively as possible so as not to exceed the capacity of the ecosystem (ecosystem approach). This approach requires a sound knowledge base fed by monitoring results and research programmes.

Three reasons for a good environmental status
The Cabinet bases the Marine Strategy on three starting points for achieving the good environmental status:

Rendering use sustainable
Measures for rendering the use of the North Sea sustainable are necessary in order to keep the condition of the marine environment and biodiversity from deteriorating. This involves a variety of activities at sea, on the coast or on land and their impact on the condition of the marine environment. The Marine Strategy focuses on all the links in the so-called DPSIR cycle[7]of activities, pressure, change of status, consequences and measures. In this respect, the Cabinet aims for sustainable combinations of economy and ecology, such as stimulating 'building with nature'. This can create synergy between ecological importance and designated uses such as wind energy, sand extraction and fishing. The North Sea 2050 Spatial Agenda is a source of inspiration for this[8].

Area-based and species-oriented approach
The Cabinet aims to safeguard the protection of vulnerable ecological areas and species (if required) by means of an area-based approach. This applies, for instance, to the Natura 2000 areas and the new Frisian Front and Central Oyster Grounds MSFD areas. A targeted level of protection will be achieved for these areas by means of regulation (including partial closure for certain types of use) or other measures that prevent the natural values requiring conservation from being jeopardised.

Active ecosystem recovery
By means of the marine strategy, the Cabinet aims to reinforce the intrinsic natural robustness and resilience of the sea. That gives the sea not only greater intrinsic value, but also more social significance. To that end, exploratory studies are included in the MSFD programme of measures which might ultimately lead to actions and measures for restoring ecosystems (see Chapter 6).

International efforts
Neither the ecosystem of the North Sea, nor the various designated uses observe the boundaries between the territories of the North Sea countries. Individual countries cannot solve all the problems in their part of the North Sea by themselves, or they do not always have their country's authority or full authority to do so. Take, for instance, the shipping and fishery policies.
It is partly for this reason that the MSFD obliges the EU Member States to take a regional approach, with an explicit coordinating role set aside for the existing regional sea conventions, such as OSPAR. For that reason and also because some North Sea countries are non-EU members, the Cabinet is strongly committed to more international policy coherence with a coordinated approach an on OSPAR level.

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[7] DPSIR: driver – pressure – state – impact - response

[8] Ministry of Infrastructure and the Environment, *Noordzee 2050 Gebiedsagenda. Verslag van een gezamenlijk onderzoek naar de potentie van de zee en kustgebieden op lange termijn, vertaald in een visie, ambities, kansen en opgaven, en in kaarten (2014) (North Sea 2050 Spatial Agenda Report on a joint investigation into the potential of the sea and coastal areas in the long term, translated into a vision, ambitions, opportunities and tasks, and into maps (2014))*. Appendix to the Dutch House of Representatives, session 2013-2014, 33450, no. 24

European and international frameworks that are material to MSFD measures in this respect concern reducing discharges by shipping, offshore mining, industry, agriculture and urban agglomerations, biodiversity, Natura 2000 and the fishery policy.

Adaptive management
The developments in the North Sea environment are closely monitored. To that end, the MSFD monitoring programme (Marine Strategy Part 2) contains a comprehensive package of monitoring activities for the indicators with which the condition of the North Sea environment and the effectiveness of the measures can be assessed. The Marine Strategy can be evaluated on the basis of the monitoring results. The first evaluation will take place in the period 2017 and 2018 at the start of the second implementation cycle of the MSFD, in which the initial assessment will be updated (MSFD Art. 8). This programme of measures will also be evaluated at that time (pursuant to MFSD Art. 18). The aim is to have this revised assessment done within the regional context of the OSPAR Intermediate Assessment in 2017, which is based on the monitoring results of common indicators established for the North Sea Region within the compass of OSPAR. The next logical moment for adjusting the Marine Strategy is when the initial assessment is updated in 2024, or sooner in 2020 (the year in which according to the directive the good environmental status must have been achieved).

This approach to keep a finger on the pulse by means of the monitoring programme, in parallel with focusing on reducing the main sources of pressure on the North Sea environment, makes it possible to intervene if the environmental status improves too slowly or moves in the wrong direction or to reconsider measures if they have no effect. The second MSFD cycle, starting in 2018, provides the framework for this.

European Commission assessment of Marine Strategy Part 1

In the spring of 2014 the European Commission assessed, under MSFD Article 12, the first products of the directive's implementation process: the initial assessment of the current condition of the marine environment (MSFD Article 8), describing the good environmental status by 2020 (MSFD Art. 9) and setting environmental targets with corresponding indicators (MSFD Art. 10). In the Netherlands these products are recorded in the Marine Strategy for the Dutch Part of the North Sea 2012-2020, Part 1. In addition, the Commission examined the extent to which international harmonisation has led to regional coherence.

In the next step in the process, the Commission will focus on improving coherence within the four marine regions in Europe. The Netherlands' region is the North-East Atlantic marine region (OSPAR Convention). Agreements have been made between the Commission and the parties to the OSPAR convention and set down in the regional plan. The agreements encompass working on common indicators, monitoring, assessing and filling knowledge gaps, coordinated preparation of descriptions of the good environmental status and environmental targets, and coordination in drafting and implementing measures.

The European Commission assesses few aspects of the manner in which the Netherlands has elaborated the MSFD in a technical sense in Marine Strategy Part 1 as 'adequate'. In comparison with the countries that score well, the difference can partly be traced back to the fact that the Netherlands interprets the terms contained in Articles 8, 9 and 10 differently than the Commission currently wishes, although the interpretation is in line with one of the procedures the Commission and member states agreed on in 2012 (Common Understanding Document). Generally speaking, the countries that quantified more visibly and in more detail, score higher. Succinctly summarising analyses with references to and providing underlying quantitative data, as the Netherlands did, does not appear to be sufficient.

Commission Decision 2010/477/EU on establishing criteria and methodological standards concerning the good environmental status of marine waters will be revised in 2016. This will provide the necessary clarity regarding the manner in which the good environmental status, environmental targets and indicators are to be technically achieved when the Marine Strategy is updated in 2018. The Netherlands is already providing input. The outcome of this revision is still uncertain. It therefore makes little sense to adjust the descriptions of the good environmental status and the goals in, for instance, the NWP 2 in the interim. In addition, the Commission generally had doubts about the Netherlands' ambition in implementing the Marine Strategy.

The (pro)active role the Netherlands plays on both an OSPAR and an EU level is noticed and highly valued by the Commission. This effort will be continued.

Practical implications of the Commission's assessment of Marine Strategy Part 1 for this MSFD programme of measures are: providing a better and more explicit impression of the ambitions and actions in current and supplementary policies that contribute to the good environmental status and sustainable use, possibly by means of operational goals, concretising the knowledge task, and strengthening the commitment to regional coordination and collaboration.

See also: Dutch House of Representatives, 2013-2014 session, 33450, no. 22; OSPAR Commission, *Regional Plan to improve adequacy and coherence of MSFD implementation* (2014).

3. Socio-economic importance of the North Sea

3.1 Updating data on socio-economic use of the North Sea

The pressure on the marine environment (in terms of emissions into water, fishing pressure, etc.) is largely determined by the volume of economic and social activities on and along the North Sea and their anticipated future developments. This is an important consideration because these developments may have an effect on the degree to which the anticipated environmental status differs from the current situation. Furthermore, the analysis of the future developments give an impression of the interests and developments in the various sectors. Insight into the capacity of the various sectors and of the support for possible additional measures is highly important in consultations with stakeholders.
These considerations are relevant to the assessment process, to mobilising the necessary attention to sustainable development, and not least to a clear idea of the social and economic consequences of the measures under consideration. All these factors are connected with the development of a broad-based, feasible and affordable programme of measures.

The initial assessment in 2012 included a preliminary socio-economic overview based on data up to 2008 (Marine Strategy Part 1). But economic growth has declined significantly since 2008, more significantly and longer than in our surrounding countries, the OECD[9] and EU average. This is mainly due to sluggish domestic demand[10]. All of this means that the development of the economic sectors in the recent past and the projected developments deviate substantially from what is described in Marine Strategy Part 1. This is why more recent information was provided in the 'Economic Analysis of the use of the North Sea' section in preparation of the MSFD programme of measures. A brief summary of this new information is provided below.

3.2 Socio-economic description for the Dutch part of the North Sea

Table 3.1 contains an overview of the development of the socio-economic importance in terms of production value, added value and employment for the 2005-2011 period for sectors in the Dutch part of the North Sea as well as land-based sectors that have a direct relationship with the sea. The table shows that oil and gas extraction, ports and shipping are of great economic importance to the Netherlands.

The total added value of the use of the Dutch part of the North Sea (including its coastal zone and seaports) amounted to over 23 billion euros in 2011. That is a decrease of more than 3.5 billion euros compared to 2008. The added value of the activities in the North Sea in 2011 amounted to an approximate total of 5.4 billion euros. That is a decrease of over 2.5 billion euros compared to 2008. The decrease is largely due to the financial and economic crisis. On average, the North Sea economy was under greater pressure than the rest of the Dutch economy (see opposite page).

[9]Organisation for Economic Co-operation and Development (OECD)
[10] OECD, *OECD Territorial Reviews: Netherlands* (2014)

Economic development over the years (Source: Statistics Netherlands, 2014)
The North Sea economy was relatively hard hit by the financial and economic crisis. After 2008 there was an above-average drop in employment and added value.

2005-2008: 'Period of prosperity'
Between 2005 and 2008 the added value of the North Sea economy grew by 9 per cent in real terms (i.e. adjusted for inflation). Nominal growth was 18.1 per cent as a result of price increases during that time. The Dutch economy as a whole grew by 9.7 per cent in real terms in that period. The North Sea economy therefore grew at approximately the same rate during that time of economic prosperity. The number of people employed in the North Sea economy grew by 6.8 per cent.

2008-2010: 'Financial and economic crisis'
During the financial and economic crisis (2008-2010) the added value of the North Sea economy dropped by 4.7 per cent in real terms, while the Dutch economy shrank by 1.7 per cent in that same period. So the North Sea economy was relatively hard hit by the economic crisis. Employment in the North Sea economy dropped by 5.2 per cent, while employment on a national level (employees and self-employed people) dropped by 1.7 per cent.

2010-2011: 'End to the crisis?'
Between 2010 and 2011 employment in the North Sea economy increased by 1.7 per cent. During that time, growth in real terms amounted to -1.3 per cent for the North Sea economy and +1.2 per cent for the Dutch economy. On average, the economic activities in the North Sea economy during that time were under greater pressure than those in the rest of the economy.

Oil and gas extraction has the highest added value of all designated uses in the Dutch part of the North Sea (over 4.7 billion euros in 2011). Although the production of oil and gas fell between 2005 and 2011, the production value and added value did not. The rise in oil prices in 2008 offset the decrease in production volume. Employment in this sector remained fairly stable between 2005 and 2011 (see also Table 3.1).

The shipping industry is also of great economic importance to the Netherlands; however, the industry's added value dropped significantly between 2008 and 2010. The prices for shipping services have been under pressure since 2009, as has the volume of the activity (less volume to be transported). There was, after all, less international trade as a result of the economic crisis. In 2011 the added value of the shipping sector came to 616 million euros.

Sand extraction, fishery and wind energy are of relatively little economic significance compared to oil and gas extraction and shipping. Sand is extracted for coastal defence purposes and for infrastructure and/or land reclamation projects. The economic crisis has had no apparent impact on the demand for sand for coastal defence purposes; however, the demand for fill sand has dropped, as projects have been delayed or postponed as a consequence of the economic crisis.

The Dutch fishing industry is highly regulated by the European Common Fisheries Policy (CFP). Sole, plaice, herring and mackerel are of particular importance to Dutch fishermen. The added value of the commercial fisheries sector has decreased compared to 2005[11]. This is partly due to higher fuel prices, social pressure to fish sustainably and competition from cheaper, imported fish.

Wind energy has increased slightly in economic importance in recent years. This sector is expected to grow rapidly in the coming years (see next section and Table 3.1).

The economic turnover of sea sport fishing (which falls under the recreation, culture and sports category in the statistics) amounted to around 110 million euros in 2012[12]. This is largely consistent with a study conducted by IMARES in 2013, which estimated the number of saltwater anglers at around 550,000 and suggested that the anglers spend an average of 202 euros per year[13].

The total added value of directly sea-related land-based economic activities amounted to approximately 17.8 billion euros in 2011. This is a decrease of approximately 1 billion euros compared to 2008. The economic importance rose again after 2010 (see Table 3.1). Of all land-based activities directly related to the North Sea, the seaports are of major economic interest. Just over half the added value of seaport-based activities is generated in the port of Rotterdam. Moreover, the Dutch seaports are hubs for international goods flows and a seat for industry and services.

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[11]Fishery figures relate to the economic importance of the fisheries sector in the Dutch part of the North Sea only. The added value of the entire Dutch fishing fleet, i.e. including fishing activities in the rest of the North Sea, the North-East Atlantic, the Pacific and the African waters, amounted to 140 million euros in 2013. Employment in that year came to approximately 2,000 FTEs. Source: Scientific, Technical and Economic Committee for Fisheries (STECF) (in prep), *The 2014 Annual Economic Report on the EU Fishing Fleet (STECF-14-05)*. Publications Office of the European Union, Luxembourg, EUR 26158 EN, JRC 84745 (2015)

[12] CBS, *Economic description of the North Sea for the Netherlands, 2005-2008-2010-2011, edition 2014* (2014)

[13] Van der Hammen, T. en De Graaf, M., *Recreational fishery in the Netherlands: demographics and catch estimates in marine and fresh water*. Imares report C147/13 (2013). The estimate of the economic values presented here is a (slight) underestimate, due to the exclusion of activities undertaken by foreign recreational fishermen, etc.

The economic importance of other activities in the coastal zone, such as tourism and recreation[14], has also declined in recent years. There were fewer international tourists, and hotels, restaurants and cafés saw a drop in sales. The economic crisis did not impact the number of beach visits or the recreational fishing industry.

Many economic activities are more directly dependent on the North Sea, particularly inland shipping and other transport activities, but also the fish processing industry, the trade in ship components, and so on. This indirect value, about 50% of the direct value[15], is not included in Table 3.1.

[14]Water sports count as 'Recreational, cultural and sporting activities' in the statistics of Statistics Netherlands and are therefore included as coastal activities. Statistics Netherlands does not present any figures for water sports in the North Sea as such (Statistics Netherlands, personal communication M. van Rossum, 2014).

[15] Vuik, J. and Van Rossum, M., *Economic description of the North Sea for the Netherlands*, Statistics Netherlands (2011)

Table 3.1: Economic importance of the Dutch part of the North Sea (2005-2027
Employment x 1,000 FTE, production value and added value x €1,000,000

		2005	**2008**	**2010**	**2011**	**2015**	**2021**	**2027**
Shipping	Employment	8.0	7.7	8.7	8.6	5.5	5.0-5.4	4.6-5.4
	Production value	4913	4876	3885	3885	3134	3098-3604	3002-4048
	Added value	1337	1211	727	616	602	595-693	577-778
Fishery	Employment	0.61	0.56	0.54	0.52	0.4	0.4	0.3-0.4
	Production value	100.4	105.7	93.4	90.3	100	85-93	75-85
	Added value	41.5	32.5	26.3	23.0	23	19-22	17-21
Oil and gas extraction	Employment	2.5	2.9	2.3	2.7	2.5	2.1-2.2	1.5-1.8
	Production value	5673	8477	5389	6004	5409	4483-4694	3186-3857
	Added value	4196	6834	4099	4748	4277	3546-3711	2519-3050
Sand extraction	Employment	TBD	TBD	TBD	TBD	0.2	0.2	0.2-0.6
	Production value	TBD	TBD	TBD	TBD	133	91	91-314
	Added value	TBD	TBD	TBD	TBD	31	21	21-72
Wind energy	Employment	-	0.1	0.1	0.2	0.5	1.5	2.2
	Production value	-	54	55	66	254	779	1146
	Added value	-	31	29	35	76	233	343
Total sea-based	Employment	11	11	12	12			
	Production value	10686	13512	9423	10046			
	Added value	5575	8109	4882	5422			
Seaports	Employment	118	126	118	120			
	Production value	63199	85761	82592	95904			
	Added value	15857	17305	15017	16436			
Coastal zone	Employment	32	35	34	34			
	Production value	2537	2946	2755	2745			
	Added value	1318	1451	1367	1350			
Total land-based	Employment	150	161	151	154			
	Production value	65736	88707	85348	98649			
	Added value	17175	18756	16384	17786			
Total sea- and land-based	Employment	161	172	163	166			
	Production value	76422	102219	94770	108695			
	Added value	22749	26865	21266	23208			

Sources: The figures for the 2005-2011 period are taken from Statistics Netherlands, *Economic description of the North Sea for the Netherlands, 2005-2008-2010-2011, edition 2014 (2014)*; the 2015-2027 figures are taken from Ecorys, *Baseline Scenario Marine Strategy Framework Directive* (2013)**.**
Note: The figures for the 2015-2027 period regarding oil and gas extraction have been recalculated based on Ecorys indices.

3.3 Expected development in the use of the North Sea

Ecorys has made an estimate of the expected socio-economic developments between 2015 and 2027 and looked ahead to 2050 based on the latest information on the national socio-economic developments and on the basis of four long-term scenarios drawn up by the Netherlands Bureau for Economic Policy Analysis (CPB)[16]. Between 2012 and 2027 the economy is expected to grow by 11 to 36%. Productivity linked to technological improvements will contribute the most to that expected growth. By 2027 employment in the Netherlands will have changed by -5% to +4% compared to 2012.

The oil and gas sector will be of lesser socio-economic importance in the future. Expectations are that most extractions will cease between 2020 and 2050 as fields become depleted, whereas much is expected of offshore wind energy in the coming years. The Energy Agreement stipulates that by 2023 4,450 MW of offshore wind energy will be operational[17] (by way of comparison: off-shore operational capacity in 2012 was 228 MW). Furthermore, several Dutch companies are actively developing and testing other forms of 'Ocean Energy', such as tidal power, wave power and osmotic energy. These kinds of energy production could be economically viable in the long term. In the transition to fully sustainable energy management, the CO_2 that is released during industrial activities can be captured and then stored in the depleted oil and gas fields beneath the North Sea floor. CO_2 is currently only stored on a small scale at test sites, but large-scale storage will possibly be implemented after 2020.

The importance of the shipping sector can both rise and fall between 2012 and 2027. This uncertainty has to do with the large margin in the expected development of the transshipment of goods in the Dutch seaports. It is assumed that the transshipment of goods in Dutch seaports will keep pace with the global transit. The port of Rotterdam expects to transship 575 to 740 million tonnes per year by 2030. Especially the transshipment of containers is expected to increase substantially as a result of Maasvlakte 2 (50 to 200% growth up to the year 2040). In the coming years shipping will also need to adapt to measures aimed at reducing operational pollution, such as more stringent limits on emissions (such as nitrogen and sulphur oxides) from ships. The transport and the use of alternative fuels such as LNG and biofuel will increase.

The economic importance of sand extraction depends on the demand for sand for coastal sand replenishments and for infrastructure projects. The Delta Decision on Sand [18] proposes an annual coastal sand replenishment of 12 million m^3 for the coming years so as to maintain the basic coastline and to conduct additional research into the necessity of letting the coastal foundation rise as well. A required increase of up to 25 million m^3 per year of sea sand as fill sand is also taken into account. Meanwhile, technical developments have enabled the extraction of sand from deeper lying beds.

The future of the Dutch fishing industry is highly uncertain due to the many changes awaiting the sector (Table 3.1). A further decline in the sector's economic importance should be taken into consideration. The fishing industry is currently transitioning to a high sustainability level. The sector faces huge challenges to become more sustainable, especially with regard to reducing discards and developing new techniques such as pulse and sumwing fishing, which will continue to

[16]Ecorys, *Baseline Scenario Marine Strategy Framework Directive* (2013)
[17] Dutch House of Representatives, 2012-2013 session, 30196, no. 202; Socio-Economic Council, *Energy agreement for sustainable growth* (2013)
[18] Ministry of Infrastructure and the Environment, Delta programme Coast, *No sand, No land! 'Sand Decision' proposal: Adaptation agenda for sustainable preservation of the coast* (2014)

supplant traditional beam trawling in the coming years[19]. Furthermore, the development of the main fish stocks in the North Sea will influence the importance of the sector in the future. Climate change figures in this respect as well. The warming of the North Sea is shifting populations to the north, causing some species to migrate away (cod, plaice) and others to potentially increase in number (mullet, sea bass). Market developments also affect the sector's economic significance. The vast majority of the fish caught in Dutch waters is exported to countries within the EU. Competition from farmed fish has increased sharply in recent years. In addition, the use of space by especially wind farms and protected areas in the North Sea is increasing substantially. That might lead to displacement effects to the detriment of the available fishing grounds[20].

The Netherlands tourism policy has three cornerstones: to attract an increasing number of tourists to the Netherlands, entrepreneurship and sustainability. As a result of the economic developments and demographic changes (ageing), tourism is expected to grow substantially. The coastal area offers opportunities for accommodating this growth. Water sports are practised there too. The number of yachts (and marinas) and sports fishing boats in the territorial waters is expected to increase. The number of divers is also expected to increase and the Netherlands is becoming increasingly popular as a cruise destination.

[19] Kuhlman, J.W., and Van Oostenbrugge, J.A.E., *Bodemberoerende visserij op de Noordzee; Huidige situatie, recente ontwikkelingen en toekomstscenario's (Seabed-disturbing fishing techniques in the North Sea; Current situation, recent developments and future scenarios)*, Agricultural Economics Institute (AEI) Wageningen University & Research Centre (WUR), AEI Report 2014-024 (2014)

[20] AEI, *How to achieve good environmental status in North Sea: Framework for cost effectiveness and cost-benefit analysis for the MSFD*, AEI Wageningen UR, AEI report 2011-036 (2012)

4. Measures

4.1 Introduction to this chapter

The MSFD programme of measures consists largely of measures previously established under EU regulations or under other international agreements, such as within the context of OSPAR, IMO or the international river commissions. These measures address sources at sea, or the release of pollutants from land and coast (promoting sustainable use). Other measures in the MSFD programme of measures are spatial measures or measures that focus on specific species (area-based and species-oriented approach).
The MSFD programme of measures includes exploratory studies aimed at sustainable use, conservation and recovery of species and areas and at creating opportunities for restoring ecosystems. These exploratory studies anticipate possible steps at a later date, or they are conducted based on the expectation of ecology and economy possibly going together or on the expectation of more sustainability. The exploratory studies are described in Chapter 6. This approach dovetails with the three focal points for the marine ecosystem, as described in Chapter 2.

The measures are divided into four categories in accordance with a recommendation drawn up at EU level[21].

Existing measures

- *Category 1a:* Measures important for the achievement an maintenance of a good environmental status, adopted and implemented under other policies.
- *Category 1b*: Measures important for the achievement an maintenance ofa good environmental status, that have been adopted under other policies, but not yet (fully) implemented.

Additional measures

- *Category 2a:* Measures important for achieving and maintaining a good environmental status that build on existing implementation processes of other EU legislation or international agreements, but that go beyond what is already required in those frameworks.
- *Category 2b*: Measures important for achieving and maintaining a good environmental status that do not build on existing implementation processes of other EU legislation or international agreements.

This subdivision into types of measures is important for the degree of detail in the report on the various measures: Category 1a measures have been described elsewhere and only need to be briefly summarised in the programme of measures, whilst Category 2b measures are completely new and are therefore described in more detail in the programme of measures (with the other two types in between).

The measures are classified by descriptive element (or: descriptor) as contained in Appendix 1 of the MSFD:

Descriptor 1	Biodiversity
Descriptor 2	Non indigenous species
Descriptor 3	Commercial fish and fish products
Descriptor 4	Food webs

[21]European Commission, *Programmes of Measures under MSFD Recommendations for establishment /implementation and related reporting* (2014)

Descriptor 5	Eutrophication
Descriptor 6	Sea floor integrity
Descriptor 7	Hydrographical conditions
Descriptor 8	Contaminants
Descriptor 9	Contaminants in fish
Descriptor 10	Litter
Descriptor 11	Introduction of energy, including underwater noise

In view of their interrelation, descriptors 1, 3, 4 and 6 are combined in Section 4.2 'Marine ecosystem measures'.

The measures are listed as much as possible in order of source or cause per descriptor, for example: economic sectors. The measures are categorised per source or cause as indicated above (1a, 1b, 2a, 2b).
A summary of the policy task, focusing on the good environmental status, the environmental targets and the current situation is provided per descriptor prior to discussing the individual measures. After discussing the existing measures (Categories 1a and 1b) and in relation to the (expected) development of the environmental status and the policy task, a conclusion is provided in relation to the need for additional measures (Categories 2a and 2b) for bridging the gap between the current status and the desired status. The indicators that will be monitored are also listed. The indicators and their monitoring are elaborated in more detail in the MSFD monitoring programme (Marine Strategy Part 2).

Under Article 14 of the Marine Strategy Framework Directive, member states must indicate in their programme of measures the instances in which the good environmental status cannot be achieved or cannot be achieved in all respects by 2020 by means of the measures taken. This can be due to: measures or the lack of measures for which the member state is not responsible; natural causes; force majeure; change in physical characteristics of marine waters; and natural conditions that do not allow a timely improvement of the status of marine waters. The MSFD prescribes that member states need not take action if the marine environment is not significantly at risk, or if the action is disproportionately costly given the risk to the marine environment, and provided there is no further deterioration. Where appropriate, these situations are addressed in the relevant section. [22]

The measures can differ greatly in value from each other. For instance, a measure can be a single, specific activity or technical measure, but it can also be a set comprising various related measures. Many measures ensue from laws and regulations, often based on international agreements and rules. Occasionally, however, they are activities and obligations that a party imposes on itself, or agreements between government and private parties to develop joint activities in order to achieve certain goals. Examples of the latter are covenants or 'green deals'. Measures can also comprise financial and economic incentives.

The measures relate to activities that are carried out or have an effect in the Netherlands or in the Dutch part of the North Sea. As many measures ensue from EU legislation or international conventions, it is obvious that similar measures have been or will be taken in other North Sea countries or countries through which the river in question flows. The Netherlands strives on an international level (OSPAR, IMO, EU and river commissions) for joint action or coordinated action where it is most effective. Insofar as relevant, this Chapter describes these international (coordinated) measures and the Dutch efforts for arriving at a coherent programme of measures for the North Sea. The agreements on measures within the compass of OSPAR and other

[22] See also: European Commission, *Reporting on Programmes of Measures (Art. 13) and on exceptions (Art. 14) for the Marine Strategy Framework Directive* (2015)

international forums are quite abstract. All current OSPAR-level agreements on measures will be recorded in early 2016 in the 'OSPAR Joint Documentation on Coordination of Measures (MSFD)'. This document will also contain an agenda of possible additional topics for strengthening cooperation and coordination. The effort on the part of the Netherlands for international agreements comprises the measures included in this document. The description of these measures is a more detailed explanation and elaboration of the internationally agreed measures.

The programme of measures was drawn up in close consultation with the relevant stakeholders. In the event of additional policy tasks, cost-effective and technically feasible measures were sought in an iterative and interactive process. Constant attention was given to sustainable development and in particular to the environmental effects and social and economic impact of the proposed measures. An impact assessment, including a cost-benefit analysis, was performed for the additional measures for reducing litter. In order to develop additional measures for protecting the North Sea floor, a social cost-benefit analysis was carried out, including an assessment of the environmental and social consequences. This resulted in a technically feasible, cost-effective and affordable programme of measures that contributes to sustainable development.

The Options for Delivering Ecosystem-based Marine Management (ODEMM) methodology was used to analyse the impact of the measures on the (chains of) effects of human activities on the ecosystem (see Section 4.11). The effects of the additional MSFD measures were included in the Strategic Environmental Assessment and in the Preliminary Evaluation of the Nature Conservation Act 1988 for the National Water Plan 2016-2021 (see Section 4.12).

Chapter 8, Section 8.2, describes the financial consequences of the MSFD programme of measures.

4.2 Marine ecosystem measures (descriptors 1, 3, 4, 6)

The Marine Strategy combines descriptors 1 (biodiversity), 3 (commercial fish and fisheries products), 4 (food webs) and 6 (seabed integrity) into one integrated descriptor: 'marine ecosystem'. This descriptor is related to the other seven descriptors and therefore takes up a pivotal position. The policy for the other descriptors contributes directly or indirectly to the good environmental status in accordance with the 'marine ecosystem' descriptor.

4.2.1 Policy task

According to the objective of the Marine Strategy, the good environmental status in the marine ecosystem is achieved when biodiversity is maintained or improved, populations of commercial species of fish, crustaceans and shellfish remain within safe biological limits, all elements of the marine food chains occur in normal densities and diversity, and the integrity of the seabed safeguards the structure and functions of ecosystems.

In the Policy Document on the North Sea 2016-2021, the good environmental status is positioned within the context of the Cabinet's future vision on an optimally functioning and resilient ecosystem of the North Sea[23]:
'Within this vision of the future, the North Sea has a characteristic diversity of species in, on and above the water, with a balanced composition in terms of age. There is ample room for a diversity of robust, resilient marine habitats within a coherent network. In a large proportion of the North Sea, vulnerable seabeds will not be disturbed, or will be disturbed less, as a result of which life on

[23] Ministry of Infrastructure and the Environment, *Policy Document on the North Sea 2016-2021* (2015)

the seabed will have been able to recover. In some places, organically formed hard bottom substrates, such as shellfish banks and tubeworm reefs, will arise. These will present a fertile (breeding) ground and opportunities for settlement for other species (returning or otherwise). The nutrient and food supply will ensure a varied food web, from seabed creatures to top predators such as sharks, harbour porpoises and seals. Enabling barriers to be passed and effecting gradual transitions from salt water to freshwater will have increased the number of migratory fish (like salmon, eel and sturgeon) migrating between sea and rivers.
Sustainable use of the natural resources of the North Sea will not put strain on the ecosystem.'

The environmental status of the North Atlantic Ocean and the European seas falls short and does not yet meet the European agreements on the good environmental status of the sea. This is also true for the North Sea. This not caused by one single biggest threat, but by the sum of the effects of human activity on the natural system. The fact that this system has not yet been properly scrutinised figures in this respect; however, it is clear that especially vulnerable communities on the seabed are largely affected by activities that disturb the seabed, especially traditional beam trawling that emerged in the 1960s.

The species of fish are not as diverse as before due to the pressure of fishing in the recent past. Big fish have become rare and in some species even extinct. Populations of vulnerable species such as sharks and rays have declined significantly. Other species, such as the Atlantic sturgeon, blue skate and the flat oyster, have disappeared. A high percentage of by-catch in fishing and the low survival rate after discarding have severely damaged various marine species for years. The revised European fishery policy aims to limit by-catch to a minimum.

Marine mammal populations are still vulnerable to disruptions caused by recreation and by noise from pile-driving activities for wind turbines. Non indigenous species, which were introduced through ballast water or via ships' hulls (like jackknife clams) or specifically for breeding purposes (like the Japanese oyster) have an impact on the ecosystem – if they have been able to adapt. The marine environment in the coastal zone is also under pressure from the effects of past large-scale hydrographic interventions, after-effects of pollution in the past and the cumulative disruption caused by combinations of various human activities along the coast. The initial assessment (Marine Strategy Part 1) provides no evidence of new cumulative effects occurring on the marine ecosystem between 2012 and 2020 as a result of (the increase in) the various activities in the Dutch part of the North Sea. The appropriate assessment for the National Water Plan 2016-2021[24] within the compass of the Nature Conservation Act indicates that the NWP2 and the policy task included therein for the North Sea are feasible.

The good environmental status can (still) not be exactly determined. This is due to the number of factors that have led to the present status, the lack of historical data and the lack of necessary knowledge to establish an exact link between measures and their effects within the complexity of the ecosystem. Especially vulnerable species (including sharks and rays) and habitats with long-living, slow-reproducing species possibly need 15 years or more before the first signs of recovery can be seen. Those situations call for an interim target that specifies the desired direction in a qualitative sense. Marine Strategy Part 1 sets the following interim target: To reverse the trend of degradation of the marine ecosystem due to damage to seabed habitat and to biodiversity towards a development of recovery. This constitutes a first step towards a situation in which the marine ecosystem in the Dutch part of the North Sea can (in part) recover in the long term. In several instances, quantitative conservation goals have been formulated for birds on account of the Birds

[24] Arcadis, *Passende beoordeling Natuurbeschermingswet 1998 bij Nationaal Waterplan 2016-2021 (Appropriate assessment of the Nature Conservation Act 1998 as a part of National Water Plan 2016-2021) (NWP2)* (2014)

Directive. A quantitative target has also been set for the areas where disturbance of the seabed is negligible.

Under Article 13.4 of the Marine Strategy Framework Directive, the EU member states are required to achieve a coherent and representative network of marine protected areas. These are areas that fall under the Birds and Habitats Directive, but other areas can also contribute to the desired diversity of the constituent ecosystems.
The MSFD requirement supports the objective as expressed by the contracting parties in the Convention on Biological Diversity (CBD), namely that 10% of coastal and marine areas, especially areas that are important for biodiversity and ecosystem services, are to be protected by 2020.[25] This ambition was confirmed by the General Assembly of the United Nations in Rio de Janeiro in 2012.[26]

4.2.2 Existing measures

Biodiversity (descriptor 1)

According to the Marine Strategy, the good environmental status for biodiversity is achieved if the biological diversity is preserved and if the presence and quality of habitats and the distribution and density of species are consistent with prevailing physiographic, geographic and climatic conditions. The sub-targets for Birds Directive species are in line with the national targets of the Birds Directive. The targets for marine mammals covered by the Habitats Directive (common seal, grey seal and porpoise) are the same as the national targets under the Habitats Directive. Another sub-target is that the demographic characteristics of fish, bird and
marine mammal populations are indicative of resilient populations.

Cat. 1a: Measures that have been adopted and implemented

Assessment of (large-scale) interventions and their compensation.
Interventions (especially large-scale interventions) in the North Sea such as land reclamation, sand extraction, sand replenishment and dredging require a permit. Generally, an environmental impact assessment is mandatory, effects on the environment must be mitigated or – if that is not possible – compensated for (see also the Sections 4.5 and 5.2).

Expansion of the scope of the Nature Conservancy Act and the Flora and Fauna Act
The scope of the Nature Conservancy Act 1998 and the Flora and Fauna Act has been expanded to include the Exclusive Economic Zone (EEZ), for which the central government remains the competent authority. Consequently, the Natura 2000 areas outside the territorial waters that have already been put forward can actually be designated and management plans for those areas can be created. These steps ensure that the assessment framework for granting a permit for activities at sea, the Birds and Habitats Directive and the protection of species have a greater impact.

Restriction on fishery in the coastal zone
Seabed-disturbing fishing techniques in the Natura 2000 areas of Voordelta, the Raan Flats and the North Sea coastal zone are subject to restrictions to prevent and mitigate significant impact on habitats and species under the Birds and Habitats Directive. The seabed protection in the Voordelta is linked to the compensation obligation for the construction of Maasvlakte 2. The measures in the

[25] Convention on Biological Diversity, COP 10 Decision X/2, 2010
[26] United Nations Resolution 66/288, *The future we want* (2012)

Raan Flats and the North Sea coastal zone ensue from the so-called VIBEG (Fishing in Protected Areas) agreement [27]. An important term of this agreement is that fishing with tickler chains in the North Sea coastal zone and on the Raan Flats will be terminated if the European ban on pulse fishing is lifted. These measures contribute to the restoration of the natural age composition of fish populations and benthic fauna and help restore order for marine mammals (porpoises and seals) and birds (seaducks). In April 2014 an amendment to the Implementing Regulation for Fisheries closed about 12% of the Raan Flats to all types of seabed-disturbing fishing techniques, including shrimp fishing, for the sake of research (reference area),

BOX: Nature Protection Act
The new Nature Protection Act will integrate the Nature Conservancy Act 1998 and the Flora and Fauna Act. It cannot be said with any certainty yet when the new Nature Protection Act will come into force, but the central government is aiming for the spring of 2016. This will depend on the progress of the parliamentary process. Furthermore, the aim is to merge the Nature Protection Act into the new Environmental Planning Act in 2018.

Zoning and phasing of activities along the coast
The management plans for the Natura 2000 areas along the coast stipulate that the presence of nesting locations must be taken into account during coastal (beach) sand replenishment, maintenance on cables and pipelines, and beach management. This is to prevent and mitigate significant impacts on species and habitats under the Birds and Habitats Directive. The work area is then zoned and the activities are to be performed outside the breeding season. Continuing dynamic coastal management and the current sand replenishment policy on the Wadden islands provide important basic conditions (supply of sand, sand-drift) – provided they do not cause disturbance – for the creation of (potentially) suitable breeding habitats for such birds as seaducks.
Zoning and phasing should help to improve the quality of the habitat for birds and seabed habitats.

Regulation of other activities in the coastal zone
Activities in the coastal zone can be regulated by means of exemption conditions, permit conditions and mitigating measures such as codes of conduct. Areas can also be temporarily closed - partially or entirely - to activities. These measures help to restore the natural age composition of fish populations and benthic fauna and to restore order for marine mammals and birds.

Permits
Activities whose effects on Natura 2000 conservation objectives cannot be precluded will still require permits. This applies for instance to new discharges, emergency abatement drills (including the use of helicopters), events with powerboats and other speedboats, shell extraction, cable and pipeline maintenance, and aviation in the approach routes to Den Helder. The permits for these activities are subject to regulations. It is also possible that certain activities require permits under laws and regulations other than nature legislation.

Codes of conduct
Some activities, such as certain kinds of water and beach recreation, fishing, shipping, civil aviation and certain defence activities are not subject to permits and require regulation under codes of conduct yet to be agreed. These 'agreements' based on good communication with and understanding of users can, if properly observed, guarantee that birds are left in peace (especially in promising breeding locations). Other activities that do not require a permit can continue

[27] VIBEG, *Vissen binnen de grenzen van Natura 2000. Afspraken over het visserijbeheer in de Noordzeekustzone en Vlakte van de Raan voor de ontwikkeling van natuur en visserij* (2011) *(Fishing within the boundaries of Natura 2000. Agreements on fishery management in the North Sea coastal zone and the Raan Flats for the development of nature and fisheries)* (2011)

unchanged and are not subject to specific conditions. Codes of conduct for specific activities, such as ongoing management and maintenance, can be introduced for the Flora and Fauna Act.

Closure
The temporary and permanent closure of areas is aimed at leaving seals and birds in peace in places where they nest and breed, shelter at high tide, sleep, moult and forage. Temporary closure applies during the breeding season from mid-March to mid-July/early August).

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

Implementation of OSPAR list of endangered animal species and habitats
In 2003 the List of Threatened and/or Declining Species and Habitats[28] was adopted under the OSPAR Convention. The list includes 5 invertebrates, 9 seabirds, 22 fish, 2 reptiles and 4 marine mammals. The list also contains 16 habitat types that (can) occur in or in parts of the OSPAR region. Based on this list, the OSPAR Commission accepted 44 recommendations during the 2010-2014 period, on the basis of which the Convention parties are to ascertain whether collective and/or national measures are required. These measures should contribute to the goal of OSPAR to protect the marine ecosystem and, if possible, to restore the marine areas by preventing and remedying pollution and protecting the marine area against harmful effects of human activities.[29] Sixteen species and 5 habitat types are relevant to the Dutch part of the North Sea. These species include porpoises, sharks, rays, and flat oysters. Plans for measures are being worked out within the framework of the Habitats Directive, ASCOBANS[30] (porpoises) and CFP (porpoises, sharks and rays). Also see Chapter 6.

BOX: Registration of protected OSPAR areas
In 2003 a recommendation was agreed to within the compass of OSPAR to come to an (ecologically coherent) network of marine protected areas[31]. By agreeing to the recommendation, the convention parties intend to register their designated marine protected areas with OSPAR and to draw up management plans for those areas. Areas registered before 2010 must be managed properly in accordance with the relevant management plan by 2016 at the latest. The Netherlands has thus far registered five marine protected areas (designated under the Birds and Habitats Directive) with OSPAR. That is about 14% of the Dutch part of the North Sea. These are the Natura 2000 areas North Sea Coastal Zone, Voordelta, the Raan Flats, Dogger Bank and Cleaver Bank.

Restriction on seabed-disturbing fishing techniques at cleaver Bank and Dogger Bank, and restrictions on fishing in the Frisian Front
In Natura 2000 areas Cleaver Bank and Dogger Bank (Habitat Directive areas in the EEZ) restrictions are proposed for seabed-disturbing fishing techniques. In the Frisian Front area seasonal closures are being implemented for fixed net and drift net fishing because of foraging guillemots (Bird Directive area in the EEZ). These FIMPAS (Fisheries Measures in Protected Areas) and Dogger Bank Agreements[32] will be implemented in combination with research and monitoring

[28] OSPAR Commission, *OSPAR List of Threatened and/or Declining Species and Habitats – correction 2014,* Reference Number 2008-6 (2014)
[29] OSPAR Commission, *The North-East Atlantic Environmental Strategy* (2010)
[30] Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (a Europe-wide treaty organisation for the protection of cetaceans)
[31] OSPAR Commission, *Recommendation 2010/2 amending OSPAR Recommendation 2003/3 on a Network of Marine Protected Areas* (2010)
[32] Dutch House of Representatives, 2013-2014 session, 32670, no. 90 with appendix.

for further knowledge acquisition. These area-based and species-oriented measures fit in with the current commitment to sustainability of fishery and changes to fish stock management.
Within the framework of the FIMPAS project, the Netherlands has developed proposals for the protection of birds in the Frisian Front and for the protection of underwater reefs on Cleaver Bank. To protect the sandbanks of Dogger Bank, the United Kingdom, Germany and the Netherlands have reached agreement on a system for closing a portion of the international part of Dogger Bank to all seabed-disturbing fishing techniques. The proposed measures for Dogger Bank, Cleaver Bank and the Frisian Front will come into effect after the European Commission has approved the measures and recorded them in a legal instrument (Article 11 procedure of the revised CFP[33], in which a proposal for measures to be made to the European Commission is drawn up together with third-party countries). This is planned for 2016. The designation decisions were proposed to the House of Representatives and the Senate in September 2015 in accordance with Article 10a, paragraph 6, of the Nature Conservation Act. The final designation of the areas is expected to take place in early 2016.

The Haringvliet Locks Management Decree for partial opening of the Haringvliet locks.
In 2011 the Haringvliet Locks Management Decree was issued for the benefit of fish migration. As from 2018 the Haringvliet locks will be 'set ajar' when the water level in the Haringvliet is lower than that of the sea. This will enable migratory fish that spend a large part of their lives in the sea, such as salmon, sea trout and twaite shad, to pass through the locks and swim upstream to their spawning grounds. This measure is important for international fish migration. This complies with requirements of the Habitats Directive and the Water Framework Directive. Keeping the locks ajar also turns the western part of the Haringvliet more or less into a transitional area between fresh water and salt water. This creates opportunities in the western Haringvliet for the return of plant and animal species that are characteristic of transitional waters. The measures do not affect the safety of the hinterland; the locks are closed when necessary.
Because the Haringvliet Locks Management Decree also stipulates that sufficient fresh water is to remain in the area, compensatory measures are required to facilitate agriculture and the supply of drinking water. In June 2014 the Minister for Infrastructure and the Environment, the Hollandse Delta District Water Board and Evides Water Company signed cooperation agreements for the implementation of such measures. Compensatory measures must be implemented before Rijkswaterstaat gradually sets the locks ajar in 2018.

Commercially exploited fish, shellfish (descriptor 3)

The good environmental status for (commercial) fish is achieved when populations of all commercial fish, crustaceans and shellfish remain within safe biological limits and, in terms of age composition and size, demonstrate the characteristics of a healthy stock.

The sub-targets for fish are:
- Improvement of the size, quality and distribution of populations of vulnerable fish species;
- The fishing mortality rate for all commercial fish, crustaceans and shellfish remains at the same level as or below the Maximum Sustainable Yield (MSY) value;
- The Spawning Stock Biomass (SSB) of commercial fish, crustaceans and shellfish is above the precautionary level Bpa.
- Minimisation and, ultimately, elimination of discards from fishing.

[33] Regulation (EU) no. 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the common fisheries policy, amending Council Regulations (EC) no. 1954/2003 and (EC) no. 1224/2009 and repealing Council Regulations (EC) no. 2371/2002 and (EC) no. 639/2004 and Council Decision 2004/585/EC (2013)

Only the EU has the authority to implement fishing measures, with the European Commission having the right of initiative. The Common Fisheries Policy (CFP) was revised in 2013[34]. When this EU regulation was revised, the Netherlands aimed for better coordination between the objectives of the MSFD and the CFP and of the course the Netherlands is taking to turn its fishery into a sustainable industry. The objectives formulated in Marine Strategy Part 1 are therefore to be considered in that context.

Fishery measures must ensure that fishery and aquaculture activities contribute to ecological, economic and social sustainability in the long term. This means that they spare the marine environment, that the stocks of all commercial species are managed sustainably and that a good environmental status is achieved for these species by 2020. This requires an ecosystem-oriented approach to fisheries management. In addition, it is advisable to limit the environmental impact of fishing activities and to prevent and minimise by-catch where possible.

National policy for coastal and shellfish fishery is aimed at promoting responsible fishing and a balanced exploitation of fish stocks, at balancing the fishery interests and the importance of nature, and at greater responsibility on the part of the industry. National policy contributes to the primary objective of the Common Fisheries Policy, which is to develop management based on ecosystems.

The policy should be simple, effective, practicable and enforceable so as to open up prospects for a socially accepted, stable and sustainable fisheries sector that fills a significant demand for food in a manner that meets economic, social and employment objectives.

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

The European Commission is in the process of deciding on the following measures within the scope of the Common Fisheries Policy and will specify the Netherlands' efforts.

Catch management within commercial fishing
European fishery policy has three cornerstones: stock management, fleet management and technical measures. This policy is supported by scientific research, innovation and monitoring. The objectives for fish stocks and fleet capacity as set down in EU Regulation 1380/2013 take precedence.

A main objective is to manage fish stocks in 2015 at the same level as a maximum sustainable yield (MSY) with the corresponding maximum fish mortality rate (Fmsy). If this is not possible because of major economic and social consequences for the sector, it can be implemented in phases up to 2020.
Expectations are that stocks will eventually grow to a level at which they can produce MSY with corresponding size distribution and spread. The International Council for the Exploration of the Sea (ICES) advises (bi)annually on total allowable catches (fishing opportunities) based on MSY and adheres to the precautionary principle for commercial fish species for which this is not yet possible. The Dutch government aims to contribute to good scientific advice. The EU ultimately determines the Total Allowable Catch(es) (TACs) and quotas. For some North Sea fish stocks this is coupled to an agreement with Norway. Objectives regarding the MSY level in fishery are set down in management plans and further elaborated in their provisions. The European Commission will publish a proposal for a new long-term management plan for mixed fishery in the North Sea at about the same time as the publication of this Marine Strategy Part 3 (December 2015).

[34] Regulation (EU) no. 1380/2013

In its management plans, the Dutch government opts for mixed fishing. This can mean, for instance, taking an approach based on MSY ranges instead of fixed reference points, allowing better alignment between goals per species and actual catch composition.

For fleet management purposes, the balance between fleet capacity and the catch possibilities is reported on annually. In the event of systematic overcapacity, a plan is drafted to reduce that overcapacity, in accordance with EU Regulation 1380/2013. The fleet is currently also managed by restricting the number of days at sea. The Dutch government aims to abolish these restrictions where possible, as it is the amount of fish that matters, not the number of days at sea. This change will help to simplify the policy, which is what the Cabinet wishes. The Dutch government also wants the simplest possible system as regards technical measures. After all, with the introduction of the landing obligation, the restrictions on days at sea or specific EU rules pertaining to technical measures are no longer necessary to manage the fish stock, provided, of course, that the catches are properly documented and inspected.

Minimising and phasing out discards (landing obligation)

Deadlines have been set to minimise and ultimately phase out discards of by-catch. An approach aimed at specific kinds of fishery has been decided on. As from 1 January 2015, pelagic trawlers targeting horse mackerel, herring and mackerel must land their entire catch, including their (limited) by-catches of demersal species. Demersal fishery is subject to a tiered approach. As from 1 January 2016, the entire catch targeted by the fishery (such as cod, plaice and sole) must be landed; all by-catch must be landed by 2019 at the latest. The Common Fishery Policy allows for exceptions, for instance for species with a high survival probability or when in a specific situation the cost is disproportionate.

In June 2015 the member states around the North Sea submitted recommendations for the introduction of the landing obligation in the North Sea in the 2016-2018 period. The recommendations call for a phased introduction of the landing obligation with (limited) discard possibilities for fisheries that cannot be more selective or for which the landing obligation will involve disproportionate costs, and with exceptions for species of fish with a high survival probability.

The introduction of the landing obligation has major consequences for the sector, both for individual companies and for the market, but also for future fishing methods. In time, the volume and composition of the stocks can change. The Dutch government is committed to producing an implementable and enforceable landing obligation that is not difficult to comply with and fulfils the requirements of the Common Fisheries Policy. The focal points of the approach are: selectivity, survival, regulations, market and compliance. Priority is given to minimising unwanted by-catch. The diversity of the fleet is taken into account as well as the part specific kinds of fisheries play in the discards issue and the impact of the landing obligation on fleet and environment.

Encouraging alternative fishing gear

Alternative and innovative methods enabling more selective fishing and causing less damage are being or will be investigated. If possible, these methods will be put into practice. A scientific experiment with pulse fishing started in 2014 to investigate the extent to which this technique can contribute to implementing the landing obligation to reduction of by-catch and disturbance of the seabed.

A total of 82 fishermen, most of whom fish for flatfish, now have a pulse permit. Consequently, the pulse rig is the most commonly used gear for flatfish fishing in the Dutch fleet. Except for fishing flatfish, the pulse technique is also used for fishing shrimp, albeit on a smaller scale. Pulse fishing is still in the pilot phase, because fishing with electricity is in principle prohibited under EU legislation. A change to or an exemption from the EU ban on electric fishing is needed in order to continue using and developing the pulse technique. Twin rig trawling and fly shoot fishing (other techniques that cause less disturbance to the seabed) have overtaken the use of the traditional beam trawl.

Sustainable Seafood Certification

Market initiatives, such as sustainability certificates (e.g. Marine Stewardship Council, MSC), can help to increase public support for measures and sustainability of the sector. The European Commission is examining the possibility of developing and establishing criteria for a fisheries and aquaculture eco-label that will apply throughout the European Union, in preparation of which the Commission took soundings in 2015.

Food webs (descriptor 4)

All elements of the marine food webs, to the extent that they are known, occur in normal abundance and diversity and at levels capable of ensuring the long-term density of the species and the retention of their full reproductive capacity.

The sub-target for food webs is to reduce the impact of human interventions on interactions between different trophic levels.

In a healthy food web, the interplay of all flora and fauna is clearly visible under the right ambient conditions. This is a derivative of the good status of all ten other descriptors of the Marine Strategy. The functioning of a food web is the ultimate litmus test for achieving the good environmental status. A good environmental status of the food web can be achieved when all preconditions of a healthy ecosystem are met (reduced disturbance of biodiversity and habitat, curtailed risks of non indigenous species and reduced pollution).

The initial assessment in Marine Strategy Part 1 (2012) proved that physical disturbance of the habitat and (benthic) fauna is currently the most determining factor for the status of the marine ecosystem. This disturbance is therefore also decisive for the functioning of the food webs. Moreover, marine mammals are susceptible to underwater sound pulses.
The key measures for achieving the good environmental status of food webs are those described in this Section 4.2 (marine ecosystem: biodiversity, commercial fish and fish products, seabed integrity) and in Sections 4.3 (non indigenous species) and 4.9 (introduction of energy, including underwater noise). These measures combined should lead to more balanced and more robust food webs. The development is closely monitored by means of the MSFD monitoring programme. Additional research is needed to determine the influence of (the accumulation of) noise and (micro-)plastics (see Chapter 7).

Seabed Integrity (descriptor 6)

The good environmental status for the integrity of the seabed is reached when it safeguards the structure and the functions of the ecosystems and prevents benthic ecosystems in particular from being disproportionately affected.

The sub-targets for seabed conservation and seabed habitats in the Dutch part of the North Sea are:

- Improvement of the size, quality and distribution of populations of long-living and/or vulnerable (i.e. sensitive to physical disturbance) benthic species.
- More or less unchanged distribution and area of predominant habitat types.
- The national objectives of the Habitats Directive, only for the special habitat types that are protected under the Habitats Directive.
- In addition to this, improvement of the quality of the deeper lying silt-rich parts and deeper non-dynamic sandy seabeds. The quality of habitats relates to the physical structure, ecological function and the diversity and structure of the associated communities of species.
- Protection of 10 to 15% of the seabed area against significant disturbance by human activities.

The measures in Natura 2000 areas as referred to in this section and for sustainable fishery also help to protect the seabed.

4.2.3 Analysis of policy task

Biodiversity, fishery and food webs

Positive developments can be observed over the last fifteen years in the Dutch part of the North Sea. Much has been achieved under the Common Fisheries Policy (CFP) as from the early 21st century, such as the MSY status of plaice, herring, haddock and pollack (sole is on the verge of achieving MSY status). The downsizing of the fleet and rising fuel prices certainly played their part in this respect.

Under the new CFP, the Cabinet aims to offer the fishing industry a better future and have a better prospect of achieving the good environmental status in accordance with the objectives of the MSFD and the BHD. The new CFP will continue on the same sustainability course, featuring: fishing at MSY level; reducing by-catch (landing obligation, alternative fishing techniques); promoting alternative fishing gear that causes less disturbance to the seabed; and protecting vulnerable (non-commercial) species, including sharks and rays.

The policy of the Birds and Habitats Directive (BHD), Natura 2000 and the OSPAR Convention, and their applicability in the policy regarding permit requirements for maritime activities such as sand extraction and sand replenishment, wind energy and mining, minimise impacts on the ecosystem and safeguard active protection of species of seabirds and marine mammals. It should be noted here that the reduction of by-catch could lead to a decline in the population of pelagic seabirds, which is a natural consequence.

Area-based and species-oriented approach

In addition to sustainable use, the protection of species and areas is an important reason for achieving the good environmental status of a healthy and resilient marine ecosystem. With the implementation of the BHD and MSFD, the Cabinet aims to contribute to a coherent and representative network of protected areas. This is consistent with the requirements of Article 13.4 of the MSFD. This network consists of the Natura 2000 areas and other areas which, because they are protected, help to ensure that the desired diversity of the constituent ecosystems is sufficiently covered. The importance of protected areas is also reflected in the intention of the parties to the Biodiversity Convention to protect 10% of the coastal and marine areas. The European Commission and the member states are working on a report containing basic principles for a coherent network of protected marine areas. This is also being worked on in an OSPAR context.

Healthy seabed habitats in the shallow and nutrient-rich North Sea are a particularly crucial link in the proper functioning of the marine ecosystem. Given this importance and also in relation to the target of the Convention on Biological Diversity (CBD), the Cabinet has expressed in Marine Strategy Part 1 its ambition to ensure that by 2020 an area of 10 to 15% of the Dutch seabed will not be disturbed to any significant extent. The purpose of this ambition is to maintain and restore the integrity and quality of the seabed. To realise this ambition, the most fragile and valuable natural seabed ecosystems and their associated food webs must be protected. Examples of measures are an area-based approach, sustainable fishery (see Section 4.2.2) and – by means of permit requirements – minimum impact of sand, gravel and shell extraction (see Section 4.5).

Agreements have been or will be reached on measures for protecting the seabed in the Coastal Zone, Voordelta, the Raan Flats and parts of the Cleaver Bank and the Dogger bank, which are all

Natura 2000 areas (see Section 4.2.2). Restrictions on beam trawling with tickler chains are in place for each of these areas (see Table 4.1), due to the major impact of this type of fishing on the seabed ecosystem. By 2016 approximately 8% of the Dutch part of the North Sea will not be disturbed to any significant extent and all areas that fall under the Habitat Directive will be sufficiently protected.

Table 4.1 Measures for restricting fishing in Natura 2000 areas (Habitats Directive)

Area	Seabed area (km^2)	Protected against beam trawling with tickler chains	Share of the 58,855 km^2 of the Dutch North Sea
Coastal zone*	1445	1445**	2.5
Voordelta*	835	835	1.4
Raan Flats*	175	175**	0.3
Cleaver Bank	1539	808	1.4
Dogger Bank	4735	1373	2.3
Total Dutch part of the North Sea	58855	4636	7.9

* Shrimp fishing is permitted in parts of the Coastal zone, Voordelta and the Raan Flats as this type of fishing is considered acceptable because it barely disturbs the seabed. The effects of the measures in these areas are monitored.
**Fishing with tickler chains in the North Sea coastal zone and on the Raan Flats will be terminated if the European ban on pulse fishing is lifted.

The Cabinet's aim to keep 10 to 15% of the seabed in the Dutch part of the North Sea from being appreciably disturbed by 2020 requires additional area-based measures. Research into ecologically valuable areas in the Dutch part of the North Sea (the so-called Hotspot Research[35]) showed that some other areas besides the areas mentioned in Section 4.2.2 might qualify for the Birds and Habitats Directive (Brown Ridge and Borkum Reef Ground, see Section 6.3), and that the Frisian Front and the Central Oyster Grounds have a unique combination of ecosystem elements: a great variety and density of species; the presence of vulnerable, rare and long-living species; a large biomass; a specific distribution of species; and a balanced composition of benthic communities.

The ecosystems in the Central Oyster Grounds and the Frisian Front are representative of the deep silt-rich northern part of the Dutch part of the North Sea. Furthermore, the Frisian Front is where the southern nutrient-rich flow and the flow from the northern part of the North Sea mix along a diagonal profile. The combination of hydrographic processes and the resulting composition of seabed and fauna gives this area its unique character[36]. The Central Oyster Grounds constitute a relatively quiet sedimentation area where stratification can even occur in summer. The seabed system of this part of the North Sea is not yet protected. Based on the high biodiversity and the abiotic characteristics within the broader coherent marine ecosystem of the North Sea, Marine Strategy Part 1 has designated both areas for seabed protection measures under Article 13, paragraph 4, of the MSFD. The protection of these seabed habitats contributes to the Cabinet's aim to keep 10 to 15% of the seabed in the Dutch part of the North Sea from being disturbed to any significant extent by 2020.

Furthermore, spatial restrictions have been imposed on human activities in other areas in the North Sea, such as shipping lanes and the immediate surroundings of oil rigs, for reasons of safety and

[35] Bos, O.G. et al., *Biodiversity hotspots on the Dutch Continental Shelf. A Marine Strategy Framework Directive perspective*, IMARES Wageningen UR report no. C071/11 (2011)
[36] Lindeboom, H., Rijnsdorp, A.D., Witbaard, R., Slijkerman, D., and Kraan, M. *Het ecologisch belang van het Friese Front*. (The ecological significance of the Frisian Front) Imares report C137/15 (2015)

economic damage. Wind farms offer possible opportunities for actively restoring ecosystems in combination with sustainable forms of shared use and new non-seabed disturbing fishing techniques (see also Chapter 6, Exploratory studies and opportunities for the future). The Cabinet has therefore formulated in the Policy Document on the North Sea a policy that, under certain conditions, enables passage through and shared use in all operational off-shore wind farms as from 2017. These are artificial habitats and are not included in the Cabinet's objective to protect the valuable and vulnerable natural seabed habitats by keeping 10 to 15% of the seabed from being significantly disturbed.

Opportunities for restoring the ecosystem

The existing and proposed measures are aimed at current species and habitats. However, there is a chance that hard biogenic substrates that still occur on a small scale in certain areas will also recover (such as reef-building tube worms such as sabellaria or shell reefs). However, it is uncertain to what extent this recovery is likely, and the impression is that habitats that have fundamentally disappeared, such as oyster banks, can only be brought back by means of active reintroduction. The same applies to species of fish like the Atlantic sturgeon. Temporary artificial hard substrate such as the foundations of wind farms, offshore platforms and wrecks can play a part in this. Combinations with other uses are conceivable, such as sustainable types of food supply, recreation, cultural history and research. Chapter 6 describes exploratory studies in this field.

Conclusion

Achieving a good environmental status
As stated in Section 4.2.1, because of the complexity of the marine ecosystem and the lack of precise knowledge about references from the past and about the correlation between measure and effect, it is (as yet) impossible to precisely determine a good environmental status or to set precise targets. Likewise, it is uncertain whether the CFP will produce the desired sustainability. Also uncertain is how quickly the ecosystem will recover as a result of an overall reduction of fishing pressure and particularly as a result of the specific area protection. Many measures have only recently been implemented and a number of measures have yet to come into effect. It is a known fact that the effects of several measures will only be noticeable in the long term. Especially vulnerable species and habitats need a lot of time to recover, and this of course also applies to food webs as a whole.

It is not possible to estimate when the good environmental status is achieved nor what it will look like. For the above reasons it is not realistic to expect the good environmental status to be achieved by 2020 – no matter the effort. Therefore, the target for 2020 is at least to reverse the trend towards a restoration of the ecosystem. This general objective is supplemented by specific targets for the numbers and composition of species, the scale and quality of protected habitats and the characteristics of food webs that fit a healthy functioning ecosystem. A number of commercial fish stocks and marine mammals are recovering.

With the described package of measures the Cabinet aims to continue on the same course for other parts of the marine ecosystem and to notice via the indicators mentioned below an upward trend on the road to recovery. The revised CFP plays a crucial role in this. Additionally, the seabed of the Frisian Front and the Central Oyster Grounds requires protection. Chances of an active ecosystem recovery, whether or not in combination with sustainable use, will be explored (see Chapter 6).

Creation of a coherent and representative network of protected areas
With the implementation of the BHD and MSFD, the Cabinet aims to contribute to a coherent and representative network of protected areas. This is consistent with the requirements stated in Article 13.4 of the MSFD. Within the context of Natura 2000, sandbanks, natural hard substrates and

important areas for birds are protected, as are silt-rich areas with a relatively large and vulnerable biodiversity, in line with the MSFD. This will help protect parts of all natural habitat types that are relevant to the Dutch part of the North Sea.

It cannot as yet be determined whether a representative and coherent network of protected areas has been achieved by protecting all these areas together. Based on the ecosystem approach, it makes sense to answer this question on a regional scale with respect to all protected areas in the entire North Sea. However, doing so still requires an internationally accepted assessment framework. The key question here is: how do a representative and coherent network of protected areas and the achievement of a good environmental status, especially for the biodiversity and food webs descriptors, relate to each other? The terms 'representative', 'coherent' and 'network' must be defined based on their significance to that relationship. Criteria can then be derived from those definitions and used to assess the current and proposed protected areas in the North Sea as a whole.

The European Commission concludes in a report on the progress made in establishing marine protected areas that there is still no EU-wide method for assessing how consistent and representative the European networks are for marine protected areas[37]. The European Energy Agency has found that 5.9% of the European seas was designated as a marine protected area at the end of 2012; the percentage for the North Sea is close to 18%[38]. The international biodiversity strategy is aimed at protecting 10% of the coastal and marine areas, especially the areas that are important for the biodiversity and the ecosystem services, by 2020 (see Section 4.2.1).

The Netherlands is joining in with initiatives in the context of OSPAR and the EU to evaluate the coherence and representativeness of protected areas. This evaluation will be done in the Intermediate Assessment which will be published on an OSPAR level in 2017. In connection with these initiatives, the Cabinet is dedicated to a region-specific approach to the North Sea in conjunction with neighbouring countries, as outlined above. The aim is to be able to draw conclusions on this when updating the assessment of the environmental status of the North Sea in 2018. If necessary, the current policy for and management of protected areas will be adjusted after 2018.

As it is not yet possible to determine the good environmental status or identify which other additional measures are needed to achieve the good environmental status in the marine ecosystem and because it is not likely that this will be achieved by 2020 given the complexity of the ecosystem and its lead times, it is not really possible to specify an exception status under Article 14 of the MSFD. However, the development in the marine ecosystem will be monitored closely and the good environmental status and the environmental targets will be reassessed in 2018 (see also below). This assessment can give rise to additional policy that will be reflected in the next programme of measures (2021).

Monitoring
The environmental status of the marine ecosystem will be monitored closely by means of the following indicators:

- Distribution, occurence and condition of representatives of long-living benthic species and biogenic structures sensitive to seabed disturbance (aggregated indicator 1 of the MSFD monitoring programme);

[37]European Commission, *Report from the Commission to the European Parliament and the Council on the progress made in establishing the marine protected areas (as required under Article 21 of the Marine Strategy Framework Directive 2008/56/EC).* European Commission COM(2015) 481 final (2015)
[38]European Environment Agency, *Marine Protected Areas in Europe's Seas – An overview and perspectives for the future*. EEA Report No 3/2015 (2015)

- The mortality of commercially exploited fish or – if values are not available for this – the (change in) Catch per Unit of Effort (indicator 2).
- The spawning stock biomass of commercially exploited fish (indicator 3);
- Size distribution of stocks of both commercially exploited fish and vulnerable species (indicator 4);
- Aggregated indicators for population size, distribution and health of sharks, skates and rays, fish species demonstrating a prolonged negative trend and migratory fish (indicator 5);
- Fisheries discards (indicator 6);
- Distribution, size, health and future prospects of populations of vulnerable (endemic) bird species in the North Sea and the quality of the habitat (indicator 7);
- Distribution, size, health and future prospects of populations of marine mammal and the quality of the habitat (indicator 8);
- Share of large fish in catches of bottom species from the International Bottom Trawl Survey (IBTS) (indicator 10);
- Indicators for seabirds, marine mammals and sharks and rays as top predators (indicator 11);
- Food relationships of key species (indicator 12, still to be developed);
- Distribution and population size of common habitats (EUNIS level 3) and habitats under the Habitats Directive (indicator 13);
- Seabed area that is not disturbed (indicator 14);
- Indices for the composition of benthic communities (indicator 15);
- Indicators for the quality of the various habitats at EUNIS level 3 (indicator 16).

4.2.4 Additional measures

Cat. 2a: Additional MSFD measures within the scope of the CFP

Seabed protection of Frisian Front and Central Oyster Grounds

In addition to existing and planned policies, the following policy task has been formulated regarding additional seabed protection as announced in Marine Strategy Part 1: In addition to the implementation of the BHD and to generic commitment to make fishing more sustainable, protection will be offered to the seabed ecosystem in the areas of the Frisian Front and Central Oyster Grounds. These are considered search areas for spatial protection measures (see Figure 4.1). The following prerequisites apply:

- The ambition to protect 10 to 15% of the Dutch part of the North Sea against significant seabed disruption (including parts of the Dogger Bank, Cleaver Bank, North Sea Coastal Zone and the Raan Flats that already fall under the Habitats Directive) and
- minimisation of inconvenience on the fisheries sector.

On the basis of these preconditions and after consultation with fishery organisations and nature organisations (prior to the draft programme of measures and while the draft was deposited for public inspection), the central government formulated the following principles for developing a package of measures:

- The areas in the Frisian Front and the Central Oyster Grounds where seabed protection measures will apply comprise a minimum of 1,200 km^2 (at least 2% of the Dutch part of the North Sea) and a maximum 4200 km^2 (7%). In this area or in these areas, fishing that appreciably disturbs the seabed will no longer be permissible. The impact of the various seabed-disturbing techniques on vulnerable and slowly recovering structures and species

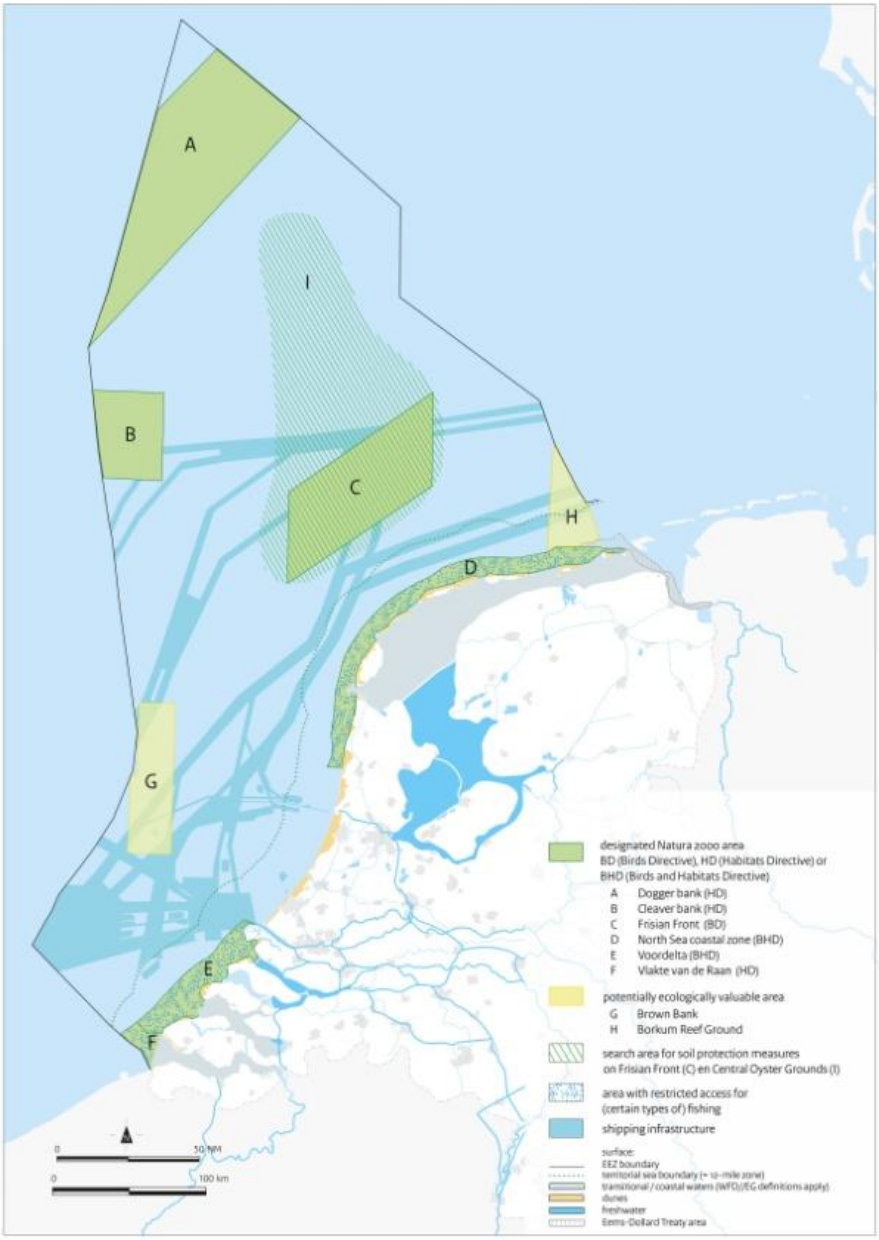
should generally be considered significant, rather than negligible [39]. The search area is shown in Figure 4.1.
- The measures are geared towards protecting the ecologically most valuable areas and, wherever possible, ensuring the recovery of the seabed ecosystem.
- One area or several areas will be designated within the search area for seabed protection measures; this will prevent fragmentation. Areas should be large enough to be ecologically valuable and be able to contain (as many) different habitats and gradients (as possible), such as in depth or silt richness; they must be effective and cost-effective in terms of monitoring; they must be effective and cost-effective in terms of maintenance.
- Within the area or areas where seabed protection measures apply, parts can be designated in which another management regime applies, enabling mutual comparisons of two protection procedures.
- The spatial implementation of the measures allows for the principle of minimal burdening of fisheries.
- When ascertaining the economic impact of measures, consideration will be given to various fishing technologies and the interests of Dutch and foreign fishermen. Current fishing data will be used in this process. Current and future interests of local fishermen and the development towards more sustainable fishing will also be taken into account.
- A social cost-benefit analysis will be prepared for the potential measure(s). Any effects (socio-economic, ecological) ensuing from the possible relocation of fishing activities will be also included, as will the local effects on fishing communities.

Other designated uses such as oil and gas extraction and cables and pipelines are considered activities that do not disturb the seabed to any significant extent. These activities can continue under the current conditions.

The government has developed a number of variants based on the above principles to assess the social costs and benefits. Stakeholders have responded to the central government's invitation to come up with their own alternatives as well. As a result, six alternatives have been assessed in the social cost-benefit analysis (SCBA): two variants put forward by the fisheries sector, one variant suggested by the nature conservation organisations and three variants developed by the central government.
In the SCBA, the variants have been assessed with respect to their ecological effects (benefits) based on the Eco points method and a qualitative assessment of broad ecosystem effects (geographical, food webs), direct economic effects such as loss of proceeds for both fishermen operating under Dutch and under foreign flag and relocation to other fishing areas, the indirect effects of declining industry and commerce, and social effects on employment and fishing communities. [40]

[39] For effects of fly shoot fishing, see Rijnsdorp, A.D., *Flyshoot visserij in relatie met de instelling van bodem beschermende maatregelen voor het Friese Front en de Centrale Oestergronden (Fly shoot fishing in relation to the implementation of sea-bed protection measures for the Frisian Front and the Central Oyster Grounds)*. Imares report C065/15 (2015)
[40] Van Oostenbrugge, H., Slijkerman, D., Hamon, K., Bos, O., Hintzen, N., Bos, E., Van de Wal, J.T., *Effects of seabed protection on the Frisian Front and Central Oyster Grounds. A Cost Benefit Analysis*. AEI Wageningen UR (2015)

Figure 4.1 Search area for seabed protection measures in the Frisian Front and Central Oyster Grounds



Only time will make the effect of a measure on the ecosystem visible and measurable. The ecosystem needs time to recover, for example by different interacting processes, biogenic substrates that possibly develop or the development of long-living species. It is therefore not realistic to expect that significant changes will be noticeable after one six-year MSFD cycle. This will require at least two to three six-year cycles. After close monitoring, conclusions will be drawn regarding the recovery or deterioration of the ecosystem and the effectiveness of the two protection regimes, but it might take until 2028 before a meaningful evaluation can be done. In accordance with the directive, this moment is coupled to the third update of the environmental status assessment in 2028-2030. This might lead to conclusions about the preferred protection regime, and the applicable measures will be adjusted (upward, downward or otherwise) if necessary. Any developments with respect to efforts to make the fishing industry more sustainable will be observed.

The progress in the seabed ecosystem in the Frisian Front and the Central Oyster Grounds is measured on the basis of the indicators as defined in the MSFD monitoring programme (12 specifically selected species for these areas attached to descriptor 1 biodiversity/6 integrity of the seabed[41]). A baseline measurement was made in 2015. The development of other species that are registered during the monitoring activities is also followed. If possible, the information on those other species is included in the evaluations of the protection procedure.

Aside from Dutch stakeholders, government authorities of other countries from which fishermen fish in the Frisian Front and Central Oyster Grounds will also be involved in the preparations for a proposal for a package of measures, as will stakeholders from these countries. The United Kingdom, Germany, Belgium and Denmark in particular have an interest in the Frisian Front and the Central Oyster Grounds. In consultation with other member states that have an interest in both areas, the Netherlands can, within the framework of the procedure under Article 11 of the Common Fisheries Policy, submit a joint recommendation for a measure to the European Commission. The European Commission will then adopt the measures. International consultation on a joint recommendation for measures in the Frisian Front and Central Oyster Grounds will be formally initiated during the course of 2016. Before the final proposal for protective measures is submitted to the European Commission in 2016, the Cabinet will submit its preferred variant – including the boundaries of the areas within which the spatial protection measures will apply – to the Dutch House of Representatives.

4.3 Measures pertaining to non indigenous species (descriptor 2)

4.3.1 Policy task

A good environmental status for non indigenous species is achieved if non-indigenous species introduced as a result of human activities do not cause any changes within the ecosystem. Non indigenous species are alien species that occur outside their natural range of distribution due to human activity, such as the American jackknife clam and Japanese oyster. These are species that did not occur naturally in the North Sea. In recent decades, new non indigenous species have been observed in the North Sea on regular occasions. They have arrived there mainly via ships' ballast water, fouling on hulls and anchor gear (biofouling) and shellfish transports. The environmental target is to minimise the risk associated with introducing new non indigenous species. In principle, this can only be achieved with preventative measures aimed at preferential introduction and distribution routes (so-called 'pathways') for the purpose of keeping out the invasive non indigenous species that pose a threat to native species and as such are considered problem species.

The initial assessment in Marine Strategy Part 1 shows that some negative effects of non indigenous species already occur, especially in the benthos in the coastal zone. The common scoter, for instance, only has a limited supply of food because the American jackknife clam has replaced its main food, spisula, and the Japanese oyster has taken the place of the flat oyster. It is virtually impossible to remove these populations and reverse their effects. These developments are

[41] Fey-Hofstede, F., and Witbaard, R., *Factsheets Kaderrichtlijn Mariene Strategieindicatoren van het Friese Front en de Centrale Oestergronden (Fact sheets pertaining to Marine Strategy Framework Directive Indicators for the Frisian Front and the Central Oyster Grounds)*, IMARES Report C185/13 (2013)

considered to be irreversible: it is generally impossible to combat successful, widely established non indigenous species in a cost-effective manner. Moreover, it might cause considerable damage to the ecosystem. Established non indigenous species can at most be combated in subareas, for example in vulnerable areas or in places where they bother recreational activities.

Acceptance of the effects of non indigenous species introduced into the ecosystem in the past implies that achieving the good environmental status boils down to preventing further changes in the ecosystem as a result of exotic species. The goal is therefore: to minimise the risk of new introductions, recent establishment and distribution of locally established species.

The Minister for Economic Affairs, Agriculture and Innovation (adopted the Policy Document on Invasive Exotic Species in 2007[42]. The policy is aimed at preventing, combating and managing new introductions of invasive non indigenous species in the Netherlands. When implementing the policy, attention is also paid to detecting new non indigenous species. The policy rules for relocating shellfish[43] prohibit the introduction and distribution of problem species in new areas.

The policy on invasive non indigenous species is embedded internationally and ensues from the agreement in the Convention on Biological Diversity (CBD)[44] to 'prevent the entry of non-indigenous species that threaten ecosystems, habitats or native species, or to control or eradicate them'.

EU Regulation (708/2007) regulates the use of non-indigenous and locally absent species for cultivation in aquacultures, with the aim of avoiding the introduction of (invasive) non indigenous species or problem species, especially in open aquatic systems.

The Convention on Biological Diversity promotes cooperation between the convention parties, among which the EU member states. Regional coordination occurs through CBD and OSPAR. The implementation of the policy is geared as closely as possible to other EU and international regulations, including the Birds and Habitats Directives and the EU Regulation on invasive non-indigenous species (1143/2014 / EU).

4.3.2 Existing measures

Nature Conservation Policy (Birds and Habitats Directive)

Cat. 1a: Measures that have been adopted and implemented

Conditions attached to permits to prevent the spread of non indigenous species.
EU Regulation (708/2007) concerning the use of alien and locally absent species in aquaculture has been implemented via the Nature Conservation Act. The permits issued by the Ministry of Economic Affairs contain conditions to prevent invasive non indigenous species from being transported along with shellfish destined for aquaculture (e.g. mussel transport from the Scheldt region to the Wadden Sea). Invasive non indigenous species may not be transported along with shellfish within the aquaculture sector, not to Natura 2000 areas too.

[42] Dutch House of Representatives, 2007-2008 session, 26407, no. 27
[43] Policy rules drawn up by the State Secretary for Economic Affairs, Agriculture and Innovation, of 6 June 2012, no. 267278, laying down policy rules regarding relocations of shellfish (Government Gazette 19 June 2012)
[44] UN Convention on Biological Diversity, Art. 8, paragraph 8

Management of Natura 2000 areas (non indigenous species)
The management programmes for the Natura 2000 areas include measures geared towards preventing the import of non indigenous species and combating the presence of invasive non indigenous species. The type of measures differs for each Natura 2000 area and depends on the nature objectives. The above-mentioned mussel transition policy, which aims to prevent the introduction of invasive non indigenous species that are harmful to the Wadden Sea, serves an example of this. Regular checks are carried out to enforce this measure. The administrator can intervene if invasive non-indigenous species are seen to be introduced.

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

Regulation pertaining to the prevention and management of invasive species
The European Union has adopted a regulation on the prevention and management of the introduction and spread of invasive alien species[45]. This regulation also applies to the marine area, including the territorial waters. This regulation pertains specifically to an unknown number of invasive non indigenous species for which the EU will issue a requirement to take preventative measures, to rapidly eradicate invasive species at an early stage of establishment, and to take measures to control widespread, established non indigenous species. The EU member states have a duty to set up an effective surveillance system for the early detection of non indigenous species that are of EU interest and of other, new non indigenous species. The Regulation also states that member states are to draw up an action plan to deal with the introduction routes of unwittingly introduced non indigenous species. This regulation came into force on 1 January 2015.

Shipping

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

Preventing the spread of non indigenous species via ballast water
Global cooperation within the framework of the IMO established the International Convention for the Control and Management of Ships Ballast Water and Sediments (Ballast Water Management Convention). The convention is designed to prevent the spread of non indigenous species via ships' ballast water and restrict the ecological and sanitary risks associated with a number of species. The Convention obliges shipowners to purify ballast water. The Netherlands ratified the convention in 2010, but it has not yet come into force (because not enough countries have signed it; the combined share in the total global shipping tonnage of those that have is too small). The policy will be implemented by the Ministry of Infrastructure and the Environment. The provisions of the Ballast Water Management Convention are already enshrined in Dutch legislation and regulations. These provisions take effect automatically once the Ballast Water Management Convention has come into force internationally.

Implementation of exemption protocols after the Ballast Water Management Convention comes into force.
Once the Ballast Water Management Convention becomes effective, shipowners of ships calling at ports in the OSPAR and HELCOM[46] regions have up to five years to install the necessary (certified) ballast water purification plants. The permit exemptions issued by the Ministry of Infrastructure

[45] Regulation (EU) on the prevention and management of the introduction and spread of invasive alien species (1143/2014)
[46] Helsinki Commission; administers the Convention on the Protection of the Marine Environment of the Baltic Sea Area.

and the Environment are subject to stricter requirements designed to minimise the risk of new non indigenous species being introduced in the ports. Regional organisations under OSPAR and HELCOM have protocols to facilitate the work processes for obtaining exemptions from the provisions of the Ballast Water Management Convention. The Ministry of Infrastructure and the Environment, the Ministry of Economic Affairs, the port of Rotterdam and the shipowners concerned jointly commissioned research into all organisms occurring in the port of Rotterdam. The outcome of this research was published in late 2014 and can be used by shipowners to apply to the Human and Natural Environment Inspectorate for exemption. As a result of the research, the OSPAR/HELCOM directives were adapted, making them much more suitable for research into non indigenous species in North Sea ports.

Implementation of Hull Fouling Guidelines for preventing fouling of non indigenous species on ships' hulls
The International Maritime Organisation adopted the Hull Fouling Guideline in 2011. This guideline restricts the introduction of non indigenous species via hull fouling. It is still a voluntary guideline. The measures are aimed at commercial and recreational craft.

These measures need to be coordinated with national policies for the prevention of invasive non indigenous species, the EU Invasive Exotic Species Regulation and the Convention on Biological Diversity. The IMO will evaluate the guideline between 2013 and 2017 to determine whether it is effective or whether binding measures are required in the future. The Netherlands is an active participant in the IMO deliberations on biofouling, not only because of their importance for a clean North Sea but also because biofouling is a major concern for the island territories of the Dutch Caribbean. The Anti-fouling Convention[47] drawn up by IMO oversees the ban on the use of organotin in anti-fouling systems.

4.3.3 Analysis of policy task

Because the current policy that is coming into effect addresses by far the largest controllable sources (shipping and aquaculture), the risk of new introductions of non indigenous species is expected to have fallen dramatically by 2020 and the good environmental status will come within reach. However, it cannot be guaranteed that the risk will drop to zero.

A close eye will be kept on the environmental status for non indigenous species by monitoring the following indicators:
- The number of invasive exotic species (indicator 17 in the MSFD monitoring programme);
- The number of new invasive exotic species per year (indicator 18);
- The ratio between densities or biomass of endemic species for a selection of specific species groups in Natura 2000 areas (indicator 19).

4.4 Eutrophication measures (descriptor 5)

4.4.1 Policy task

Eutrophication causes loss of biodiversity, ecosystem degradation, harmful algal bloom and thus oxygen deficiency in water near the seabed. To boost the good environmental status, the environmental targets are aimed at reducing the concentrations of nutrients. The good

[47] International Maritime Organisation, International Convention on the Control of Harmful Anti-fouling Systems on Ships (2001).

environmental status is achieved when human-induced eutrophication is kept to a minimum. This is the case where:

- The quantities of algae and chlorophyll-a concentrations (algae pigment as a eutrophication indicator) do not exceed the background value by more than 50%;
- Harmful algae blooms do not increase and oxygen deficiency caused by eutrophication does not occur.

Eutrophication of the North Sea is caused by emissions from sea-based and land-based sources. Sea-based sources are mainly ships. Nitrogen and phosphates from land-based sources reach the North Sea via open rivers and discharge sluices and via atmospheric deposition. Major land-based sources are: the effluent from sewage treatment plants plus predominantly diffuse sources such as fertilisers not absorbed by agricultural crops and vehicle emissions. Of the total of the river basins flowing into the North Sea, the share of agriculture in the eutrophication status of the coastal waters is more than 50%. The burden caused by fertilisers has remained virtually constant since 2005. In the entire Northeast Atlantic region, the share of atmospheric deposition from diffuse land-based and sea-based sources in eutrophication is approximately one third. The amount contributed by shipping is unknown.

4.4.2 Existing measures

Shipping

Cat. 1a: Measures that have been adopted and implemented

Implementation of Annex V of the MARPOL Convention

Reducing the pollution of the marine environment by ships is regulated in the International Convention for the Prevention of Pollution from Ships (MARPOL Convention), which was drawn up by the International Maritime Organisation (IMO). MARPOL lays down rules for the prevention of discharges of harmful substances into water and air. These discharges include mineral oils, harmful bulk liquids, sewage, flue gases and other emissions into the air, remnants of solid bulk materials and the discharge of domestic waste. The discharge conditions for harmful bulk liquids were tightened significantly in 2007. In principle, all discharge of domestic waste in the North Sea has been prohibited since 1 January 2013. In terms of hygiene, food waste may still be discharged albeit under strict conditions. For reasons of safety and in order to protect the marine environment, it is forbidden to blend different substances or perform other production processes at sea as from 1 January 2014.

The Netherlands aims for an optimal regulation of the classification of harmful solid bulk materials by harmfulness to help reduce the discharge of residuals of these substances within the compass of IMO.

River basins

The river basin management plans for the rivers Rhine, Meuse, Scheldt and Eems were updated in 2014 under the Water Framework Directive (WFD). These plans with appendices summarise measures which were already in place under other European directives and which they supplement with additional WFD measures.

The implementation of the programmes of measures as part of the river basin management plans is a big step towards achieving the WFD objectives and the goals under other EU directives. For more information on the measures listed below, see the River Basin Management Plans (see appendices to the National Water Plan 2 (NWP2))[48].

In the river basin management plans all transitional and coastal waters are designated as surface water bodies. The coastal waters of the Dutch part of the North Sea extend to 1 nautical mile off the coast. This is to prevent any overlap with the operation of the Marine Strategy Framework Directive and is in line with the approach taken in neighbouring countries. The measures defined in the river basin management plans apply to these bodies of water. For the good chemical status required by the WFD, a 12-mile zone from the coast's low tide line applies.

The Dutch part of the North Sea falls under the OSPAR Convention. The Netherlands is committed to the recommendations on the reduction target of 50% for discharges of the nutrients nitrogen and phosphate (88/2) as agreed to by OSPAR in 1988-1989 and to a coordinated programme for the reduction of nutrients (89/3).

The flow of nutrients from the rivers to the sea also originates in foreign countries. Therefore, coordination within the international river commissions is required to reduce this supply. These committees determine whether there is any residual problem.

The following measures help reduce eutrophication in the transitional and coastal waters and in the North Sea.

Agricultural measures

Cat. 1a: Measures that have been adopted and implemented

Mandatory manure processing
The Cabinet has introduced mandatory manure processing so as to achieve a balanced fertiliser market. This measure requires farmers to have a percentage of their surplus manure treated for sale outside the Dutch fertiliser market. This percentage is determined by the government. The amendment to the Manure Act, which regulates the mandatory treatment of manure, came into effect on 1 January 2014.

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

Fifth Nitrates Action Programme
The Fifth Nitrates Action Programme (2014-2017) fleshes out the Dutch manure policy for the purpose of achieving the quality objectives of the Nitrates Directive[49]. This action programme also helps achieve objectives in other directives and conventions regarding water quality, namely: the Water Framework Directive, the Groundwater Directive and the Marine Strategy Framework Directive/OSPAR Convention (including recommendation 92/7 for the reduction of the entry into the marine environment of nutrients originating from agriculture).

[48] The Ministry of Infrastructure and the Environment, *Stroomgebiedbeheerplan Rijn/Maas/Scheldt/Eems 2016-2021* (River Basin Management Plan for the Rhine/Meuse/Scheldt/Eems 2016-2021) (2015); The Ministry of Infrastructure and the Environment, *Samenvatting Maatregelprogramma Rijn/Maas/Scheldt/Eems 2016-2021* (Summary of Programme of Measures for the Rhine/Meuse/Scheldt/Eems 2016-2021) (2015).
[49] Dutch House of Representatives, 2012–2013 session, 33037, no. 63

Delta Plan for Agricultural Water Management

In addition to generic measures and on the initiative of LTO Netherlands, the agriculture and horticulture sector has drawn up the Delta Plan for Agricultural Water Management[50]. The Delta Plan provides opportunities by means of regional customisation for taking cost-effective additional measures that contribute to the WFD. To put the Delta Plan into practice, the sector is working with the water managers on a coherent, integrated approach. The intended results are customised solutions for achieving goals for nutrients, plant protection products and water quantity.

Urban waste water

Cat. 1a: Measures that have been adopted and implemented

Urban waste water treatment

The EU Urban Waste Water Treatment Directive protects the environment against the adverse effects of discharging urban waste water. This directive is particularly important for the Netherlands for the removal of nutrients. The removal of oxygen-binding substances by means of sewage treatment plants (STPs) was already common practice in the Netherlands when the directive was published in 1991.

The Netherlands fulfils the requirement of meeting the standard per management area: a minimum area output of 75% for total phosphorus (since 1996) and total nitrogen (since 2006). All district water boards have complied with this standard since 2007.

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

Improvement of purification efficiency of sewage treatment plants

The Netherlands and the individual district water boards meet the requirements and standards of the Urban Waste Water Treatment Directive[51]. The comparison of the purification performance among STPs shows that the latest 'state of the art' removal of nutrients is not applied in all STPs. An exploratory study shows that district water boards have the intention or are already working to further improve the purification efficiency of a substantial number of the relevant STPs before 2021. In many instances, these measures are part of an area-based policy under the WFD and lead to further improvement of the overall purification efficiency of the STPs.

4.4.3 Analysis of policy task

Between 1990 and 2013, the Dutch discharges of nitrogen and phosphorus decreased by 48 and 71% respectively[52]. Cross-border river cargo decreased in the same period by 20 to 40% for nitrogen and more than 50% for phosphorus. The main internationally agreed measures for achieving the nutrient targets ensue from the Nitrates Directive and the Urban Waste Water Treatment Directive. Water managers make an extra effort to enable many water treatment plants to achieve the objectives of the WFD. These are also basic measures under the WFD. Based on these measures, the river basin management plans assume that the nitrogen concentrations will continue to decline in many places but possibly not in areas that receive extra manure from surplus areas. Furthermore, the amount of phosphate in the soil in the surplus areas is increasing; only the speed at which it does so is decreasing.

[50] LTO Nederland (Dutch Federation of Agriculture and Horticulture), *Deltaplan Agrarisch Waterbeheer* (Delta Plan for Agricultural Water Management) (2013)

[51] Directive on the treatment of urban waste water (91/271/EEC)

[52] Percentages taken from the river basin management plans for the rivers Eems, Rhine, Meuse and Scheldt.

Besides the river basin management plans, the central government and the other authorities are working to set up a Clean Water Work Programme. This work programme is needed to monitor and to promote the proper implementation of the existing policy. The aim is to have a list of action points by 2016 with which to monitor the correct adherence to agreements on an annual basis.

Assuming that the WFD objectives are achieved, estimations are that the good environmental status for nutrients will be within reach in the years after 2020 in accordance with Marine Strategy Part 1. The fact that very few eutrophication phenomena occur in the Dutch sector of the North Sea shows that we are well on our way to sustainability.

Given the above, a policy task in addition to the current policy is unlikely. However, the evaluation of the Manure Act (under Section 46 of that Act) is an important benchmark with which to evaluate the measures contained in the Dutch Fifth Nitrates Action Programme in 2016. The following factors are to be taken into account: The release of phosphate from the seabed for quite some time after measures have been taken (in some cases up to 40 years), and accelerated and intensified removal of nitrogen during high-volume river discharges due to climate change. This means that it is difficult to establish an exact link between observed eutrophication phenomena and the effects of policy and management measures. The dependence on emission reducing efforts by upstream countries also figures in the eutrophication of transitional water in the Dutch estuaries. The goals are usually achieved at Lobith, but the pressure caused by fertilisers originating in upstream countries is greater than the national contribution. And then there is atmospheric deposition on which national measures have no or very little effect.

This programme of measures shows the maximum effort that can be made together with other countries to achieve the good environmental status for the eutrophication descriptor, with regard to both land-based measures (WFD implementation) and sea-based measures. No (additional) technical measures will be taken that can remove the presence of eutrophying substances in the Dutch part of the North Sea. Nor is there any immediate urgency for doing so, given the limited eutrophication effects that still occur in the sea. Consequently, this is an exceptional situation as referred to in Article 14, paragraph 4 (no significant risks and disproportionality of costs) of the MSFD.

A close eye will be kept on the environmental status for eutrophication by monitoring the following indicators:
- Nutrient levels: Area-specific average winter concentrations of dissolved inorganic nitrogen and dissolved inorganic phosphorus (indicator 20 in the MSFD monitoring programme);
- Concentration of chlorophyll-a during the phytoplankton growth season (indicator 21);
- Local oxygen deficiency in sedimentation areas and as a result of massive growth of nuisance algae (indicator 22).

4.5 Measures pertaining to Hydrographic properties (descriptor 7)

4.5.1 Policy task

The good environmental status is achieved when a permanent change of the hydrographic properties does not permanently adversily affect the marine ecosystems. A change of hydrographic properties, such as currents and waves, can influence the physical and chemical properties of the sea, such as transport of sediment, salinity and temperature. Such changes are relevant if they occur on a large scale. The environmental target is designed to ensure that human activities do not result in changes to hydrographic conditions that lead to permanent, large-scale negative effects on the marine environment.

Activities that can affect the hydrographic properties include the construction of coastal defences, land reclamation, damming of large rivers, construction of structures in coastal waters or in the open sea such as airports, large-scale aquacultures or wind farms and other installations for generating energy.

The initial assessment (Marine Strategy Part 1) states that the decline of the seabed ecosystem and of diadromous species of fish in the coastal zone can partly be explained as being the result of permanent hydrographical effects of the Delta Works and the construction of Maasvlakte 1. These works are of national importance and are considered irreversible, as is Maasvlakte 2. An advisory document has been drawn up within OSPAR on the hydrographic properties descriptor[53]. This document indicates that the largest permanent change in hydrographic conditions is associated with such major works. According to the advisory document, it is likely that a return to former conditions will involve a significant loss of invested capital and utility.

4.5.2 Existing measures

Assessment of hydrographic interventions and compensation of effects.
The effects of new large-scale hydrographic interventions should be examined in the procedures of environmental impact assessments, as is mandatory in Europe[54]. The Netherlands implemented this EU policy in Chapter 7 of the Environmental Management Act and the Environment Impact Statement Decree. If this shows that the effects of the intervention do not make any large-scale, permanent and irreversible changes to the ecosystem, no further action need be taken. In this procedure, the cumulative effects and effects outside the coastal waters must be carefully examined.
The requirements of the Water Framework Directive must be met in the coastal waters.
Large-scale sand extraction and the construction of wind farms are examples of new activities that, by accumulation, may have widespread effects on the marine environment. Adverse effects on the marine ecosystem have to be mitigated. Significant effects on species and habitats follow the procedure in the Nature Conservation Act: Searching for alternative solutions, indicating whether there are compelling reasons of major public interest and, when implementing the project, taking measures to mitigate and, if necessary, compensate for the effects.
Although it is not a new activity, the construction of Maasvlakte 2 is a good example of mitigating and compensating for the effects on the hydrographic conditions. The design is aimed at minimising the effect on the current along the coast. That is called 'mitigation'. In addition, measures were implemented in another part of the Voordelta to compensate for the loss of natural values in the Voordelta Natura 2000 area.

4.5.3 Analysis of policy task

The OSPAR advice on interventions with hydrographic effects recommends that the conditions for descriptor 7 are met if the permanent changes remain limited to the coastal waters, and that the conditions are also included in the Initial Assessment and incorporated in the measures of the Water Framework Directive. This means that descriptor 7 requires no further elaboration for changes in hydrographic conditions whose effects remain confined to the zone that the Water Framework Directive defines as coastal waters. Hydrographic interventions outside the coastal

[53] OSPAR Commission, *OSPAR MSFD Advisory Document on Good environmental status - Descriptor 7: Hydrographical conditions, A living document - Version 17 January 2012,* OSPAR Committee of the Environmental Impact of Human Activities (EIHA) (2012)
[54]Directive 2011/92/EU of the European Parliament and the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment (2011)

waters or interventions whose (cumulative) effects extend beyond the coastal waters are subject to the assessment framework set out in Chapter 5.

Assuming that negative effects resulting from permanent changes in hydrographic properties in the past are irreversible, the conclusion can be made that in the current situation the good environmental status has already been achieved. The current policy guarantees the preservation of the good environmental status in the event of new activities and focuses on preventing permanent effects.

A close eye will be kept on the environmental status of hydrographic properties by closely monitoring (new) projects with respect to the following indicators:
- The size of the (seabed) area impacted (indicator 23 in the MSFD monitoring programme);
- The size of permanently changed habitat types (indicator 24);
- Changed functions of habitats (indicator 25).

4.6 Measures pertaining to contaminants (descriptor 8)

4.6.1 Policy task

The good environmental status for contaminants in the North Sea is reached when the concentrations of those substances are so low that they do not give rise to pollution effects. Pollutants affect the quality of air, water and soil and constitute a hazard to human health. To boost the good environmental status, the environmental targets are aimed at reducing the concentrations of pollutants in the sea:
- Counteract concentrations of pollutants, insofar as they do not meet the targets within WFD's timeframe;
- Keep concentrations of known pollutants that meet the WFD standards from exceeding their current values, and continue to reduce the concentrations;
- Prevent effects of pollution caused by Tributyltin (TBT) and oil.

Particularly the pollutants that have a negative impact on the marine ecosystem, are poorly biodegradable and accumulate in food webs can spread over long distances in the sea and pose a threat to the marine environment. OSPAR has drawn up a list of 26 pollutants that, on the basis of these properties and the degree to which they are used, are regarded as priority pollutants for action. These are certain (organo)metallics, organohalogens, pesticides, phenols, plasticisers, PAHs and a number of pharmaceutical substances. The WFD sets environmental targets for many of these substances. These targets contribute to an active source policy at river basin level.

The European Commission has identified a number of substances as being ubiquitous[55], i.e. substances whose production or use is already banned, but which, because of their persistence, will continue to occur in the environment for some time.

The main actors and pressure factors for pollutants at sea are shipping and offshore mining; those on land are industry, traffic and transport and agriculture. About two-thirds of the pollutants originating from land-based sources eventually end up in the marine environment. The River Rhine

[55] Polybrominated diphenyl ethers (PBDEs), mercury and mercury compounds, polycyclic aromatic hydrocarbons (PAHs) and tributyltin compounds and, of the newly added substances, perfluorooctane sulfonic acid and its derivatives (PFOS), dioxins and dioxin-like compounds, hexabromocyclododecane (HBCDD) and heptachlor/heptachlor epoxide.

is an important supply route for the Dutch part of the North Sea. Pollutants are also introduced through the English Channel from neighbouring marine areas.

Marine Strategy Part 1 describes the radionuclides that occur in the marine environment as a result of human activities, such as discharges from installations in the nuclear sector (energy generation, isotope production, research institutes) and the non-nuclear sector (offshore oil and gas industry, radiotherapy in hospitals). European norms have been set for radioactive material in food. In OSPAR it has been found that the doses are far below the international norms for human exposure to radiation. For the moment, OSPAR is testing trends in concentrations of radionuclides in the marine environment. These test show that the level is stabilising. Biota are considered unlikely to be affected. However, OSPAR is drawing up environmental assessment criteria for radioactivity in the marine environment.

4.6.2 Existing measures

Recreation

Sites for swimming in the coastal waters of the North Sea have been designated on the basis of the Bathing Water Directive. This EU directive aims to protect the health of bathers in surface waters (coastal and inland), while respecting the preservation, protection and improvement of the quality of the environment.

Cat. 1a: Measures that have been adopted and implemented

Implementation of the Bathing Water Directive
The Bathing Water Directive has been implemented in the Swimming Pool and Swimming Locations Hygiene and Safety Act and the Swimming Pool and Swimming Locations Hygiene and Safety Decree that is based on it. The Act and Decree contain norms that the quality of the bathing water, so also of the swimming locations that the provinces have designated in the coastal waters, must meet. Rijkswaterstaat is responsible for the management of coastal waters. This role is laid down in the Water Act and the Water Decree.
Rijkswaterstaat has drawn up swimming water profiles for the respective swimming locations. These profiles show that the main risks for exceeding the swimming water quality norms are pollutants from the land, such as sewage overflows and the presence of dogs and horses on the beach. In some instances, however, commercial vessels and pleasure craft also pose a risk.

Shipping

Cat. 1a: Measures that have been adopted and implemented

Reducing discharges from shipping (MARPOL)
The description of the measures for shipping for restricting the eutrophication of the North Sea explains that the MARPOL Convention imposes rules regarding discharges into the sea and emissions into the air. These agreements also have a limiting effect on substances other than eutrophying substances, such as oil (see Section 4.4.2). The reduction of discharges of paraffin-like substances and other high-viscous substances has been included in the IMO work programme; amendments to MARPOL Annex II will be prepared. This procedure can take several years.

Ban on TBT

The Netherlands has ratified IMO's Anti-fouling Convention[56]. The Netherlands is one of the convention's initiating countries. The Anti-fouling Convention came into effect in 2008 and prohibits the use of certain harmful substances in paints that prevent fouling on hulls and underwater structures, such as TBT (tributyltin), to prevent emissions into the marine environment. Such substances have a negative effect on the ability of shellfish to breed (the most famous example is the occurrence of sex change (imposex) in whelks).

Reduction of pollution by reducing marine shipping incidents

The Deepwater Route was established in 1997 to enable large, deep-draught vessels and ships with hazardous cargo to pass further away from the coast (considering a longer response time helps to reduce the risk of pollution in coastal waters and the Wadden Sea).

The structure of shipping lanes in the Dutch part of the North Sea was changed as per 1 August 2013. A traffic separation scheme, like in Rotterdam, has been implemented in the approach area to IJmuiden. New anchorages have been introduced and a number of existing anchorages have been changed. This change to shipping lanes has increased maritime safety and thus reduces the risk of environmental damage from accidental discharges and subsequent spreading due to shipping incidents. This measure also offered the possibility of designating wind energy areas off the Dutch coast.

Oil and gas extraction

Since 1986, under the OSPAR Convention, various recommendations and legally binding decisions have been adopted (and periodically revised) to prevent the release of pollutants during the exploration for and exploitation of oil and gas in the seabed. In 2013, 1340 offshore installations operated within the OSPAR maritime area on the continental shelf of seven countries. The majority of these installations are situated on the continental shelf of five coastal states of the 'Greater North Sea'. There are approximately 175 installations in the Dutch part of the North Sea.

Cat. 1a: Measures that have been adopted and implemented

Reducing pollutants discharged by oil and gas extraction installations

Discharges from offshore installations in the Dutch part of the North Sea are regulated under the Mining Act and the Mining Regulations for instance, by issuing mining permits subject to conditions. Furthermore, a number of actions, such as the environmental management system of the oil and gas producers' umbrella organisation NOGEPA, have been implemented on the basis of an environmental covenant agreed with the industry. The international OSPAR agreements that the Netherlands has implemented in this way concern the ban on and regulation of diesel-based drilling fluids and limiting the discharge of oil and other pollutants.

The measures are converted into practice by, for instance, the use of the best available techniques, by requirements for discharging oil in production water, the introduction of environmental management systems and a ban on abandoning or dumping offshore installations no longer in operation.

River basins

The Rhine, Meuse, Scheldt and Eems River Basin Management Plans 2016-2021, drawn up under the Water Framework Directive, include measures to further reduce emissions of pollutants into groundwater and surface water (see also Section 4.4.2).

[56] International Maritime Organisation, *International Convention on the Control of Harmful Anti-fouling Systems on Ships* (2001).

The implementation of the river basin management plans is a major step towards achieving the objectives of the WFD and other EU Directives. For more information on the measures listed below, see these plans (see appendices to NWP2). The same applies to pollutants as to eutrophication, namely that part of the pressure on the Dutch part of the North Sea is caused by emissions from foreign sources. The international coordination of reduction measures is arranged within the compass of the WFD via the international river commissions for this topic as well.

The following is a brief summary of the measures that help reduce pollutants in the transitional and coastal waters as well as in the North Sea.

General

International agreements within the framework of OSPAR

Best available techniques for reducing pollution from land-based sources
Between 1980 and 2002, within the framework of the OSPAR Convention, a total of 38 recommendations and legally binding decisions on the best available techniques for restricting or preventing marine pollution from land-based sources were adopted for 11 industrial sectors. These recommendations and decisions also related to the corresponding limits on discharges into water and emissions into the air. The Netherlands implemented these recommendations and decisions at that time through laws and regulations and by means of permits. In the same period and after, this result of the OSPAR Convention was embedded and further expanded through the implementation of EU legislation such as the Hazardous Substances Directive and the Industrial Emissions Directive.

Reducing pollution of the marine environment when handling hazardous substances
Between 1981 and 2003, within the framework of the OSPAR Convention, 12 recommendations and legal binding decisions were adopted on the use of hazardous substances or products containing such substances in industrial applications, in domestic use, in services and institutions (land-based sources), as well as on ships' hulls and underwater structures. These recommendations and decisions concern 7 substances or groups of substances on the 'OSPAR List of Chemicals for Priority Action'. The Netherlands implemented these recommendations and decisions in laws and regulations pertaining to fabrics and products policy, but also used the covenant policy instrument. In the same period and after, this result of the OSPAR Convention was embedded and further expanded through the implementation of EU legislation such as the Directive on the marketing and use of certain dangerous substances, the Biocidal Product Directive, the Directive and regulation on Plant Protection Products**,** the REACH Regulation (that regulates the production of and the trade in chemicals), the Directive on priority hazardous substances, and the IMO Convention on anti-fouling systems on sea-going vessels.

The EU Priority Substances Directive was revised in 2013 so that as from 2018 the norms for an additional set of substances will come into effect in the 12-mile zone. The effects of this revision are included in the River Basin Management Plans for 2016-2021. A provisional monitoring programme will be developed for the newly selected substances, and will be submitted to the European Commission along with the corresponding preliminary programme of measures no later than 22 December 2018.

Cat. 1a: Measures that have been adopted and implemented

Industry

The Water Act prohibits the discharge of waste, pollutants or harmful substances into surface water, unless the water quality manager has issued a permit or granted discharge exemption on

the basis of general rules. Most discharges from companies that fall under the Industrial Emissions Directive, and other discharges for which there are no exemptions based on general rules require a permit. This concerns the use of the best available techniques and of the emission-immission test. The most significant Orders in Council with general rules for the discharge into surface water bodies are the Activities Decree, the Discharges Decree, the Decree on Domestic Waste Water Discharges and the Decree on Discharging Outside Institutions.

Cat. 1a: Measures that have been adopted and implemented

Preventing and limiting industrial emissions
The Industrial Emissions Directive (formerly IPPC Directive 96/61/EC) aims to prevent and limit environmental pollution caused by industrial activities and intensive livestock farming. All installations that fall under the Directive must have a new or updated permit. The use of European reference documents (BREFs), describing the best available techniques, is a standard procedure for the granting of permits.

Measures ensuing from the Industrial Emissions Directive are: permit regulations, use of state-of-the-art technology, the application of regulations as contained in the European reference documents (BREFs), and use of the emission-immission test when assessing emissions into surface water.
With this package of measures, industrial emissions into surface water will be reduced in accordance with the requirements of the Directive.

The Directive has been implemented in the Environmental Licensing (General Provisions) Act, the Activities Decree (general order in council under the Environmental Management Act) and the Water Act, and in the Decree and the Regulation on Environmental Licensing. Rijkswaterstaat and the district water boards are responsible for all water aspects; the provinces and municipalities are responsible for all other environmental aspects.

Reducing environmental risks ensuing from major accidents
The objective of the Seveso III Directive[57] is to limit environmental risks ensuing from major accidents in or at businesses, such as fires, explosions and large-scale emissions of hazardous substances. Seveso III requires companies to take measures to prevent serious accidents and, if they do occur, to limit the consequences for humans and environment. The directive also applies to industrial installations on and near the coast. The Seveso Directive was implemented in 1999 in the Dutch Major Accidents (Risks) Decree (Brzo). Companies that are subject to this Decree must at least have a safety policy and a safety management system in place. Companies and plants that operate with large quantities of hazardous substances must also draw up a Safety report, including a mandatory environmental risk analysis of the effects accidents can have on surface water.

Inland shipping

Cat. 1a: Measures that have been adopted and implemented

Ban on the discharge of marine waste generated by inland shipping
Under the Ships' Waste (Rhine and Inland Waterways) Decree and the Ships' Waste (Rhine and Inland Waterways) Regulation, all passenger and hotel ships with a capacity of more than 50

[57] Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC (2012)

people are prohibited from discharging domestic waste water into surface water effective 1 January 2012. The Ships' Waste Decree is the implementation of the 2009 Convention on the collection, deposit and reception of waste produced during navigation on the Rhine and inland waterways.

Agriculture

Measures to reduce pollution caused by plant protection products are based on the EU regulations for marketing plant protection products[58] and selling and using biocides[59].
The two regulations have a direct impact. Dutch legislation – the Plant Protection Products and Biocidal Products Act and the corresponding decree and the corresponding regulation – has been brought in line with these two regulations.

Cat. 1a: Measures that have been adopted and implemented

Action Plan for Sustainable Plant Protection

The Netherlands elaborated the Sustainable Use of Pesticides Directive in its Action Plan for Sustainable Plant Protection, which was sent to the European Commission in November 2012. The national policy ensuing from the Sustainable Use of Pesticides Directive is laid down in the Second Memorandum on Sustainable Plant Protection[60]. All national and international requirements pertaining to the environment and water, food safety, human health and working conditions must be met by 2023 at the latest.

Disaster control and incident control at sea

Cat. 1a: Measures that have been adopted and implemented

Coordinated emergency response and incident control in the North Sea, both nationally and internationally, as well as collaboration procedures help to reduce the risk and the spread of accidental spills in the marine environment.

Preparation, cooperation and coordination of disaster and incident control at sea

For the Netherlands, the most important agreements regarding disaster and incident control are laid down in the:

- North Sea Emergency Plan (2009) of the North Sea Disasters Regional Management Team. This is now included in the Incident Prevention Plan (IBP, 2012). This plan will be reviewed in 2016. The objective of the plan is to coordinate disaster and incident control in the North Sea and it contains procedures for collaboration between the Coastguard and relevant bodies and services, including the on-shore authorities.
- Cooperation agreement between the departments of Rijkswaterstaat for the prevention of coastal pollution (SBK-R, 2007). This agreement, which will also be reviewed in the coming years, lays down the collaboration between the relevant departments of Rijkswaterstaat in procedural and operational agreements, in order to coordinate actions to be taken in the event of coastal pollution.
- Cooperation agreement for dealing with Oil-soaked Birds (SBV, 2009). This agreement arranges the coordinated approach to and management of large numbers of oil-soaked,

[58]Regulation (EC) No. 1107/2009 of the European Parliament and the Council of 21 October 2009 concerning the placing of plant protection products on the market and repealing Directives 79/117/EEC and 91/414/EEC (2009).
[59] Regulation (EU) No. 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available and use of biocidal products (2012).
[60] Dutch House of Representatives, 2012-2013 session, 27858, no. 146

beached birds in cooperation with various parties, among which the Ministry of Economic Affairs and five coastal rehabilitation centres.
- Capacity Memorandum for the protection of vulnerable marine and delta areas (Rijkswaterstaat, 2006). This was evaluated in 2010, but there was no cause for change.
-

International cooperation in case of disasters and incidents

The North Sea countries have made agreements on controlling the consequences of incidents and disasters. The Bonn Agreement, for instance, provides for the cooperation between the various national governments upon the occurrence of cross-border disasters. The agreement pertains to conducting risk analyses to prevent accidents, to actions to limit the effects of accidents, and to mandatory the notification of and reporting on such incidents.

Between 2012 and 2015, a project called BE-AWARE was carried out as part of the Bonn Agreement for the purpose of acquiring a common shipping and offshore risk analysis for the entire region, followed by an analysis of the effects of a (oil) disaster on the ecological and/or economically vulnerable areas. This Bonn analysis dovetails with the national plans.

At a northern subregional level Denmark, Germany and the Netherlands cooperate within the compass of the Bonn Agreement in the DENGERNETH approach in the PSSA (Particularly Sensitive Sea Area) of the Wadden Sea and the bordering sea area. The DENGERNETH region extends from Den Helder to Esbjerg, with a quick response zone (QRZ) in the Eems estuary. A QRZ is designed to ensure cross-border collaboration. Which of the two countries is the first on the scene with equipment takes charge, even if that is in the Territorial Zone of the other partner. To the south, France, UK, Belgium and the Netherlands will cooperate. These countries are working on an operational plan for the area between the Strait of Dover and the approach route to the port of Rotterdam.

4.6.3 Analysis of policy task

Marine Strategy Part 1 states that the concentrations of pollutants in the marine environment have been reduced significantly since the 1970s; seals and seabirds being threatened with extinction due to pollutants are now a thing of the past, and concentrations of a great many substances are in keeping with standards appropriate for a healthy environment. This is the result of several measures under EU regulations and agreements at IMO level, often preceded by agreements within the compass of OSPAR. Many of these measures are included in the WFD river basin management plans or fall under the MARPOL Convention or under IMO, or they are part of the specific regulations for offshore mining based on OSPAR decisions. Thus, the most significant risks of pollution of the North Sea (land-based source, shipping and oil and gas extraction) are covered by laws and regulations.

In the current situation, the OSPAR targets for TBT and oil-soaked birds have not yet been achieved. TBT measurements in surface waters show a substantial drop in the measurement points in the main water system. According to the targets of the WFD, not only TBT but some other ubiquitous materials as well (see Section 4.6.1), such as PAHs (polycyclic aromatic hydrocarbons), still occur in high concentration levels, despite the ban on their production and use. Although these concentration levels are dropping, they have started to level off in recent years. These substances end up in the water mainly through atmospheric deposition and also from many widespread applications. It is difficult to estimate how long the substances will continue to be found in the water; they will still be released from the seabed long after all the remediation measures have been taken. There are still signs of excessive concentrations of PCBs (polychlorinated biphenyls) in the fatty tissue of porpoises. This probably leads to low fertility and reproduction rates. However, major adverse effects on birds and marine mammals via the food webs as in the 1970s and 1980s are a thing of the past.

The forecast for plant protection products is that the number of exceedances in surface waters will decrease between 2021 and 2027. However, no downward trend can be observed in concentration levels because the measures are still being implemented.

Besides the river basin management plans, the central government and the other authorities are setting up a Clean Water Work Programme. This work programme is necessary to monitor and promote the proper implementation of the current policy. The aim is to have a list of action points by 2016, with which to monitor the correct adherence to agreements on an annual basis.

Assuming that the WFD objectives will be met, it has therefore been estimated in accordance with Marine Strategy Part 1 that the environmental risks of unwanted effects of pollution on the marine environment will continue to decrease as a result of current policy, and that they will even be minimal between 2020 and 2027 and beyond. Therefore, the good environmental status is not expected to be within reach for most substances until after 2020.

This programme of measures shows the maximum effort that can be made to achieve the good environmental status for the hazardous substances descriptor, as regards both land-based measures (WFD implementation) and sea-based measures. There are no technical measures that could counteract the occurrence of hazardous substances in the Dutch part of the North Sea. Natural conditions do not allow the situation in this part of the North Sea to improve in time, which makes it an exceptional situation as referred to in Article 14, paragraph e, of the MSFD.

Given the above, it is fair to conclude that a policy task in addition to the current policy is unlikely.

A topic calling for specific attention in the coming years is the increase in pharmaceuticals and other new micropollutants in groundwater and surface water. The State Secretary for Infrastructure and the Environment has formulated a policy focusing on a source and chain approach[61]. In the Clean Water Work Programme, in which the central government, district water boards, provinces and municipalities cooperate at an administrative level, this theme will be given explicit attention in the coming years so as to arrive at a systematic approach. However, a source approach can only be effective in the long term, and even then it will not provide a total solution to pollution caused by pharmaceuticals. Attention must therefore also be paid to solutions in the waste phase.

The REACH regulation (that regulates the production of and trade in chemicals), the OSPAR Convention, the CLP Regulation (labelling of substances), the POP Regulation (pertaining to persistent organic pollutants), the Water Framework Directive and the Stockholm Convention (also pertaining to POPs) determine the substances whose use and/or emissions must be reduced. The policy aims to keep these so-called substances of very high concern (SVHC) from invading the environment. The EU-level source and chain approach aims to prevent the use and occurrence of certain substances in products or production processes that are allowed on a European level or are considered the best available technique.

A close eye will be kept on the environmental status for pollutants by monitoring the following indicators:
- Concentrations of contaminants in water (indicator 26 in the MSFD monitoring programme);
- Concentrations of contaminants in biota (indicator 27);
- The incidence of imposex in sea snails (indicator 28);
- The percentage of washed up birds covered in oil (indicator 29).

[61] Dutch House of Representatives, 2012-2013 session, 27625, no. 305

4.7 Measures pertaining to Contaminants in fish (descriptor 9)

4.7.1 Policy task

The good environmental status and the environmental target for contaminants in fish in the North Sea will be achieved when the contaminants in fish and other seafood for human consumption do not exceed the limits set by Community legislation or other relevant norms.

4.7.2 Existing measures

Cat. 1a: Measures that have been adopted and implemented

Norms for contaminants in fish and fish products.
Levels of contaminants in fish and fish products must meet the norms set by national and international legislation[62] (such as Regulation (EC) No. 1881/2006 and Regulation (EC) No. 396/2005).

European norms have also been set for radioactive substances in foodstuffs[63]. OSPAR has shown that the doses in fish products are far below the international norms for human exposure to radiation.

4.7.3 Analysis of policy task

Current levels of contaminants found in fish and fish products do not exceed the standards set by national and international legislation. This means that in the current situation the environmental status is good. It is expected to remain so. If policy remains unchanged, the Netherlands will be able to maintain the status quo until 2020 and beyond.

In the Netherlands, about twenty fish products (commercial fish species and other marine animals, such as crabs, shellfish and shrimps) are sampled on an ongoing basis under the WOT (Statutory Research Tasks) Programme[64] 'Monitoring contaminants in Dutch fish and fish products'. The programme measures such things as various heavy metals, polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), dioxins and polycyclic aromatic hydrocarbons (PAHs).
To be able to identify trends of bioaccumulative substances such as Persistent Organic Pollutants (POPs) in fish, cod and hake livers are sampled annually for PCBs, OCPs and toxaphene in a separate monitoring Programme.
Furthermore, the measurement programmes focus each year on a specific group of relatively unknown pollutants, to gain an insight into the presence of these substances.

[62] such as Regulation (EC) No. 1881/2006 of the Commission of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (2006), and Regulation (EC) No. 396/2005 of the European Parliament and the Council of 23 February 2005 on maximum residue levels of pesticides in or on food and feed of plant and animal origin and amending to Council Directive 91/414/EC (2005).
[63] Council Regulation (Euratom) No. 3954/87 of 22 December 1987 laying down maximum permitted levels of radioactive contamination of food stuffs and of feedingstuffs following a nuclear accident or any other case or radiological emergency (1987).
[64] Statutory Research Tasks, Wageningen UR

A close eye will be kept on the environmental status for pollutants by monitoring the following indicators:

- The frequency with which current limits are exceeded (indicator 30-A in the MSFD monitoring programme);
- The actual values measured in (30-b);
- The number of contaminants that, as measured, concurrently exceeded limits (30-c);
- The source of the contamination (30-d).

4.8 Measures pertaining to Litter (descriptor 10)

4.8.1 Policy task

The good environmental status for litter in and along the North Sea is reached when the properties and quantities of marine litter – including degradation products such as small plastic particles and microplastics – do not harm the marine environment, including the coast. Moreover, the quantities must decrease over time. The basic principle is that litter does not belong in the sea. The environmental targets are geared towards a decrease in the amount of visible litter on the coast (beach waste), and towards a decrease in the amount of litter in marine organisms (waste in the stomachs of fulmars). Recent research into litter (see the enclosure in the letter to the House of Representatives on the packaging policy and the national waste management plan[65]) has shown that the litter policy also has positive effects on the quality of life and the perception of safety and on the health of nature, animal and humans. The litter policy also reduces the loss of raw materials and saves society money.

Marine litter stems from human activity at sea and on land. The world is becoming more aware of the problem of plastics and other marine litter. The leaders of the G-7 countries too endorsed a joint approach in June 2015[66].

The monitoring results of marine litter between 2002 and 2012 show that an average of almost 400 pieces of waste can be found to every 100 metres of beach. Particularly the 'top ten' of the most commonly found items on the Dutch reference beaches is used to estimate the magnitude and distribution of marine litter (see Table 4.2). The 'top ten' covers 83% of the total number of waste items. Of this percentage, 81% consists of plastic and rubber, and only 2% of other material (wood).

Microplastics in the marine environment are caused by plastic litter in the marine environment breaking down into ever smaller particles and by the emission of microplastics into water from land-based sources. Little is known about the environmental impact of microplastics in the marine environment, but there is evidence of potential risks to marine animals and of microplastics being transferred in the food chain.

[65] Dutch House of Representatives, 2014–2015 session, 28694, no. 130
[66] G7 Summit, *Leaders' Declaration G7 Summit, 7-8 June 2015* (2015)

Table 4.2 List of top ten most commonly found items on the 4 Dutch reference beaches.

Position	Item	% of total waste	avg no. of items/ 100 m	Source approach via
1	(Plastic) nets and ropes	38	147.3	Fishing
2	Pieces of plastic and polystyrene	19	72.6	All sectors
3	Plastic bags	6	23.6	Plastic products
4	Plastic caps and lids	5	20.2	Plastic products
5	(Plastic) crisp bags, sweet bags and lolly sticks	4	15.1	Beach
6	Balloons, including ribbons, seal and valve	3	12.7	Plastic products
7	Plastic drinks bottles,	2	8.4	Plastic products
8	Wood < 50 cm	2	7.9	n/a
9	Plastic bottles and packaging for food incl. fast food	2	7.1	Plastic products
10	Plastic industrial packaging and cover material	2	7	Shipping
	All items	**100%**	**395**	
	TOP 10	**83%**	**322**	

Note: * The reference beaches are not located next to bathing beaches; this is why cigarette butts, for example, are not listed in the top ten; however, measures are taken against them.
Source: Dagevos, J.J., Hougee, J.A. van Franeker, B. Wenneker, W.M.G.M. van Loon and A. Oosterbaan, *OSPAR Beach Litter Monitoring In the Netherlands; Update 2012.* North Sea Foundation, Utrecht (2013).

4.8.2 Existing measures

The top ten items washed up on the beach are a practical reason for formulating measures and for analysing the effectiveness of the policy. Consequently, the package of measures has been divided into six clusters: agenda-setting and awareness, beaches, river basins, shipping, fishing, and plastic products.

Agenda-setting and awareness

This cluster contains the measures aimed at raising awareness and addressing the issue of marine litter.

Cat. 1a: Measures that have been adopted and implemented

<u>(Clean-up) campaigns</u>
During the past 10 years national and local attention has been given to the question of how to deal with litter. Municipalities are therefore aware of the litter problem and have implemented litter policies. Numerous initiatives such as clean-up campaigns have been developed to influence behaviour that causes litter. Examples of initiatives are: Supporter van Schoon (Supporter of Clean), Gemeente Schoon (Clean Municipality), de Landelijke Opschoondag (the National Clean-up Day), the Keep it Clean Day and clean-up campaigns with citizens aimed at clean beaches and a clean living environment. Furthermore, campaigns like 'Plastic Heroes' help make Dutch consumers aware of the importance of separating plastic from household refuse. The awareness of Dutch citizens is relatively high. In 2012, 40% of the Dutch population aged 18 years and over was

familiar with the term 'plastic soup'[67]. The efforts of several NGOs and other stakeholders figure hugely in this respect.

Initiative: Sustainable Action
The Ministry of Infrastructure and the Environment launched the Sustainable Action website in 2014. The site gives citizens and entrepreneurs information on how to convert sustainable thinking into sustainable action with inspiring examples that direct them to the websites of stakeholders who help them along in keeping the (water) environment clean.

Beaches

Cat. 1a: Measures that have been adopted and implemented

Stakeholder initiatives on beaches
Municipalities, beach-based catering establishments and the leisure industry as a whole are fully aware of the (economic) importance of clean beaches and various parties act accordingly. Many stakeholders along the beaches help to clean up the Dutch North Sea beaches and keep them clean, such as during the Boskalis Beach Cleanup Tour organised by the North Sea Foundation. Coastal municipalities ensure that their beach is cleaned up (sometimes several times a day) and remove the waste. Furthermore, initiatives and campaigns such as the Blue Flag (almost all beaches in the Netherlands fly the Blue Flag), the 'cleanest beach election' (Netherlands Clean Foundation) and 'My Beach' (North Sea Foundation) help to make beach goers more aware of their behaviour.

River basins

Litter in river basins is receiving increasing attention. Legally speaking, the administrators are not responsible, but they are becoming increasingly more convinced – partly inspired by activities of civil society organisations – of the need for a joint approach to this issue.

Cat. 1a: Measures that have been adopted and implemented

Schone Maas Limburg approach (Clean Meuse Limburg)
SchoneMaas Limburg is a partnership comprising in excess of 30 parties. Stakeholders such as site managers, district water boards, municipalities, NGOs and (recreation) companies are involved in this area-based approach. They assume responsibility in the prevention and removal of waste in the rivers. A characteristic feature is the comprehensive approach to litter in the water. Each party contributes its own expertise. Clean-up campaigns along the shore form the basis of this approach, but it comprises much more: from awareness to monitoring and from making provisions to management and enforcement. The government has a stimulating and facilitating role here, aimed at effective and systematic cooperation between stakeholders and coordinating their activities. Centralised coordination also ensures that knowledge and experience are made as accessible and beneficial as possible to all river basins. Ways for doing that include 'peer-to-peer clean rivers coaching' ('clean river day') and the Litter Knowledge Guide. The project is embedded in society and can count on continuity. The current approach will continue during the 2014-2018 period.
The Litter Collection Scheme operated by the Rijkswaterstaat Southern Netherlands is an important success factor in terms of approach. As part of this scheme, waste collected along river banks by third parties after the flood period in the spring is removed and processed at the expense of Rijkswaterstaat.

[67] TNS-NIPO, *Enquête 'Afval in en rond de Noordzee' in opdracht van Stichting de Noordzee ('Waste in and around the North Sea' survey on behalf of the North Sea Foundation)* (2012)

Shipping

Cat. 1a: Measures that have been adopted and implemented

Implementation of EU directive on port reception facilities
The Netherlands implemented Directive 2000/59/EC on port reception facilities (PRFs) for ship-generated waste and cargo residues in its legislation in 2005. The port authorities in the designated Dutch sea and fishing ports see to satisfactory PRFs. In accordance with the Directive, waste fees are charged indirectly and port waste plans have been implemented in all ports. The amount of ship-generated waste delivered increased from 100,000 m^3 in 2005 to 259,000 m^3 in 2014.

Ban on the discharge of garbage by ships (MARPOL Annex V)
The revised Annex V of the MARPOL Convention came into force on 1 January 2013, partly on the initiative of the Netherlands. The revision introduced an outright ban on ships discharging waste, with the – conditional – exception of food waste.

Marine environmental awareness course
On the initiative of the Netherlands, the marine environmental awareness course, which is based on the example of the ProSea organisation, has become a worldwide mandatory component in the IMO maritime courses.

Fishing

Cat. 1a: Measures that have been adopted and implemented

Fishing for Litter Programme
Since 2000, participation in the Fishing for Litter project has grown to 90 vessels and to date more than 3,000 tonnes of waste have been removed from the North Sea. The Fishing for Litter project is mainly coordinated and implemented by KIMO Netherlands and Belgium. Fishermen can deliver waste they get on board as by-catch to the ports free of charge for removal and processing. This programme is currently the only OSPAR measure in place for reducing marine litter. Fishing for Litter is also a means for raising awareness within the fishing industry. The seabed is cleaner for it and the programme is a promising monitoring tool.

Plastic products

Cat. 1a: Measures that have been adopted and implemented

Implementation of waste policy
The Netherlands is committed to developing and implementing a waste policy. The basis for this policy is contained in several guidelines and agreements (such as Waste Framework Directive, Packaging Framework Agreement 1, National Waste Management Plan 1, and Packaging Waste Management Decree, landfill ban). Domestic and industrial waste is collected separately, processed and reused in a sustainable way. Ambitions with respect to closing raw material chains and the transition to a circular economy have been established. Reducing the loss of raw material is an integral part of the policy.

Voluntary reduction of emissions of microplastics in cosmetic products.
In the Netherlands, emissions of microplastics contained in cosmetic products are reduced by the voluntary effort of cosmetics companies to replace plastic microbeads. By 2017 the products of 80% of Dutch Cosmetics Association members will no longer contain plastic microbeads[68].

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

From Waste to Raw Material (VANG)
The State Secretary for Infrastructure and the Environment has launched the programme *Van afval naar grondstof* ('From Waste to Raw Material', or VANG), the aim of which is to halve the quantity of waste being dumped or incinerated within a decade[69]. This is a step towards the higher purpose of transitioning to a circular economy in which production and consumption cycles are closed. Sustainable production, sustainable use and recycling are pivotal in this respect. The activities that trigger this development also relate to plastic. The following is a list of the components of VANG that are of particular importance to the reduction of litter in the North Sea:

- *Packaging Framework Agreement 2013-2022*
  This agreement promotes the collection and recycling of packaging by means of producer responsibility. 20 million euros per annum are made available to municipalities for additional efforts to tackle the litter problem.
- National litter policy
  A national litter policy was established for the mainland in 2016. Combined with the approach in this MSFD programme of measures, the Cabinet thus creates a coherent approach to litter on land and in the sea. The approach comprises the following elements:
  1) Action plan for pilot projects with an innovative return bonus or reward system (hereinafter: reward systems) for small PET bottles and cans and possibly other packaging materials.[70]
  2) Strengthening motivation for clean behaviour
  3) Comprehensive approach to focus areas (focusing on areas that are more polluted than average such as shopping areas and traffic environments)
  4) Producer Responsibility
  5) Increasing knowledge
- *Plastic Cycle Chain Agreement*
  On 12 November 2013, 55 Dutch parties signed the Plastic Cycle Chain Agreement. That number has increased to around 90 parties. The Plastic Cycle Chain Agreement is an important stepping stone for taking measures, through the VANG programme and the MSFD and together with companies, knowledge institutions and NGOs, that help to close the plastic cycle. One of the initiatives is to support the Ocean Cleanup project that uses an innovative method to collect floating marine litter. Attention is also given to international activities, such as dealing with waste issues around the Olympic Games in Rio de Janeiro in 2016, and to cooperation in addressing urgent problems elsewhere. Sustainable innovations can be accelerated and promoted within the EU as 'best practice'.
- *National Waste Management Plan 2.*
  The National Waste Management Plan 2 applies from 2009 up to the end of 2017 and looks ahead to 2021. It describes the main points of the waste management policy, such as the national targets for separate collection and general principles for instruments such as licensing and enforcement. It also elaborates the main points of the waste policy for specific waste matter.

[68] see Appendix 2 to the letter pertaining to VANG (From Waste to Raw Material), House of Representatives, 2015-2016 session, 33043, no. 41
[69] Dutch House of Representatives, 2013-2014 session, 33043, no. 28
[70] Dutch House of Representatives, 2015-2016 session, 30872 28694, no. 200

Reducing the use of plastic bags

A ban on giving away carrier bags for free will come into force on 1 January 2016. This ban is part of a comprehensive approach to reducing the use of all carrier bags. Exceptions will be made for extremely thin plastic bags necessary for food hygiene and to prevent food wastage. This approach is based on the EU Directive[71] aimed at reducing the use of plastic bags and thus also at preventing and reducing litter.

4.8.3 Analysis of policy task

It is clear from the previous section that the Netherlands already has a well-developed waste management policy in place, whilst the business community and the population develop many initiatives and demonstrate positive developments.

Due to a lack of knowledge for precisely determining the good environmental status and based on the need to establish a clear relationship between waste sources, the good environmental status, environmental targets and measures, several knowledge programmes have been launched. A guidance document was drawn up in this respect under the flag of EU Technical Group on Marine Litter[72]. This has led to new monitoring data for the existing indicators (beach waste and waste in the stomachs of fulmars), as well as to more knowledge on monitoring seabeds, microplastics and litter in river basins.

Recent research into litter describes the relationship between litter on land and in the marine environment. [73] Litter on land is unmistakably related to land sources (consumers litter the streets, litter is blown away when waste is collected, etc.). The researchers conclude that in the past six years the level has remained stable in between 'moderately clean' and 'clean' when measured by appearance. However, according to Statistics Netherlands data, expenditure on the removal of litter increased in the years up to 2011. As regards litter and waste on swimming beaches (not the reference beaches), the researchers conclude that, when measured by appearance, the swimming beaches have become cleaner over the last ten years. This is not true for the (intermediate) reference beaches.

In recent years, much progress has been made in statistically analysing the changes in the composition and the total amount of beach litter on four Dutch reference beaches. The beach litter indicator has been given the status of 'Common indicator for the whole OSPAR region'. The Netherlands and Germany played a leading role within OSPAR to jointly develop a 'Common OSPAR method' for this. A trend analysis of the total numbers of waste items per beach between 2002 and 2012 (see also Table 4.2) shows no significant trends during that time ($p<0.05$)[74]. A trend analysis of specific top ten items shows significant trends per beach; balloons, plastic caps and lids, plastic industrial packaging and cover material, increased in quantity in the monitoring period.

The 'waste in the stomachs of fulmars' indicator is very well developed and has been given the status of 'Common indicator for the North Sea' within OSPAR. Between 2009 and 2013, an average of 94% of fulmars examined across the entire North Sea were found to have plastic in their stomach. The percentage of birds with more than the target value of 0.1 grams of plastics in their

[71] Regulation (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags.
[72] European Commission Joint Research Centre, *Guidance on monitoring of marine litter in European Seas,* JRC scientific and policy reports (2013)
[73] De Waart, S., De Jong, W. and Tijs, M., *Zwerfafval* (Litter). Milieu Centraal (2015). Enclosure in letter to the House of Representatives, 2014-2015 session, 28694, no. 130
[74] Dagevos, J.J., Hougee, J.A. van Franeker, B. Wenneker, W.M.G.M. van Loon and A. Oosterbaan, *OSPAR Beach Litter Monitoring In the Netherlands; Update 2012* (2013).

stomach dropped from 58% (2005-2009) to 52% (2009-2013).[75]

Three Dutch pilot studies on waste on the seabed have been carried out in recent years[76]. This data shows the widespread presence of waste on the North Sea floor (an average of 50-120 items are collected per km^2 with the fishing gear used) with locations with increased presence of waste, which move only slightly over the years (associated with the discharge areas of major rivers and specific substrates in which the waste remains behind).

Through the efforts of knowledge institutions, water managers and governments, a better picture has been formed in recent years of the presence of (plastic) waste in the river basins of the major rivers[77]. The sampling and analysis techniques used in water systems have continued to be developed and the various parties apply the methods to regular studies. The study results show an initial pattern of distribution of plastic parts, both micro and bigger, in the river basins of the Netherlands.

Microplastics are found everywhere in all shapes and variations. Recent research shows that microplastics are found in larger and lesser measures in all media of the marine environment (water, sediment, biota)[78]. That research provided the very first description of the supply of microplastics to the Netherlands via the Meuse and the Rhine (single particles per cubic metre) and the presence of microplastics in the seabed of the North Sea Coastal Zone (an average of 440 particles per kg of dry matter). This shows that microplastics behave like sediment, with hotspots in the estuaries and higher concentrations along the coast. The standardisation of sampling and analysis methods is still limited.

A relationship between the origin and the use of plastic particles can partially be established using the available research results. The results of research into microplastics in sewage treatment plants and in effluent show that households contribute significantly via overflows and sewage treatment plants to the burden of plastic on river basins. An exploratory inventory carried out by the National Institute for Public Health and the Environment (RIVM) provides more insight into the land-based sources[79]. Sources are widespread across several sectors. Higher population densities also have higher emission levels. There generally seem to be fewer primary sources of microplastics than secondary sources. Examples of primary sources are cosmetics and abrasive cleaning agents with added microplastics. Examples of secondary sources are the disintegration and wearing of plastic litter, fibres from clothing, car tyres, paints and dyes and the protective bundles of plastic wires on fishing nets (‘dolly rope’).

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[75] Van Franeker, J.A., S. Kühn, E. L. Bravo Rebolledo & A. Meijboom, *Fulmar Litter EcoQO monitoring in the Netherlands - Update 2012 and 2013.* IMARES Report C122/14 (2014)

[76] Van Hal, R, and De Vries, M., *Pilot: collecting Marine litter during regular fish surveys*. IMARES report C112/13 (2013); Van der Sluis, M., Van Hal, R., *Collecting Marine litter during regular fish surveys*. IMARES report C065/14 (2014); Van Hal, R., *Seafloor litter monitored using catches of the International Bottom Trawl Survey*. IMARES report C083/15 (2015)

[77] Deltares*, Plastic litter in the rivers Rhine, Meuse and Scheldt (2013);* IVM-VU, Microplastics in sediment, biota en effluent RWZI’s (2013); IVM-VU, *Microplastics in zwevend stof en effluent, influent en zuiveringsslib RWZI’s (Microplastics in airborne dust and effluent, influent and sewage sludge from sewage treatment plants)* (2013); Tweehuysen, G, *Maasonderzoek Gemeente Schoon (Clean Municipality Meuse research)*. Waste Free Waters (2013); Urgert, W, *Rapportage afstudeeronderzoek metingen microplastics in water op meetstations Maas en Rijn (concept) (Graduation research paper on measurements of microplastics in water at the monitoring stations on the Rhine and Meuse (draft)),* OU (2014).

[78] draft microplastics background document drawn up by OSPAR; November 2015

[79] Verschoor, Anja et al., *Inventarisatie en prioritering van bronnen en emissies van microplastics (Listing and prioritisation of sources and emissions of microplastics),* RIVM Brief Report 20140110 (2014)

The effects of microplastics seem to be related mainly to the particles themselves (impact on energy balance of biota, which can lead to impaired growth and reproduction) and seem less straightforward with respect to additives and contaminants.

The development of the indicators is progressing and the insight into quantities, composition and trends of marine litter has improved. This shows that the amount of waste is not becoming any less, despite current policy. An additional policy task is needed.

There is no doubt that all measures in this programme pertaining to litter help to reduce litter in the marine environment. This programme thus helps to advance towards a good environmental status, which requires reduction of marine litter, even if this status has not yet been finalised for the marine litter descriptor. Here, too, monitoring and assessment of the environmental status can give rise to additional measures in the light of new insights. For the moment, invoking an exceptional situation as referred to in Article 14 of the MSFD is not an obvious course of action.

A close eye will be kept on the environmental status for litter by monitoring the following indicators:
- Quantitiesy, composition, distribution and sources of beach litter (indicator 31 in the MSFD monitoring programme);
- Quantities of plastics found in the stomachs of northern fulmars (indicator 32).

4.8.4 Additional measures

The measures are aimed at sources connected to the top ten beach litter items and the trends perceived in those items. They pertain to the beach recreation, shipping and fishing sectors. The measures are also aimed at product development and more sustainable and more efficient use of plastic products in particular. Moreover, attention is given to the stakeholders along the rivers ('river basins') as are measures aimed at agenda-setting and raising awareness in general.
To create effective new policies and expand existing policies, government authorities, business communities, knowledge institutes and civil society organisations are collaborating on national and international levels. Strategic basic principles of the package of litter measures are: a preventative approach, facilitating frontrunners, collaboration with stakeholders, an optimal mix of quick wins and long-term measures, transition to a sustainable circular economy, chain approach and the application of the precautionary principle. The measures' building blocks are: support, effectiveness and promise.

Apart from the top ten items, special attention must be given to the microplastics phenomenon. The different kinds of sources (degradation of plastic in the marine environment and emissions from land-based sources) require a different approach. The Netherlands opts to reduce marine litter in general by dealing with the source and hence to address specific micro-plastic emissions from land-based sources.

The MSFD programme of measures includes a wide range of measures against litter from many sources and through many distribution channels. The success of this approach is depends largely on the cooperation of companies, civil society organisations and citizens. To have sufficient knowledge available for effective and feasible measures, workshops were held and several exploratory studies conducted with stakeholders in an iterative participatory process. For example, aspects of feasibility and costs and benefits of specific measures were scrutinised. Close collaboration with motivated stakeholders has resulted in broad public support for the programme of measures and proper alignment with existing initiatives for tackling marine litter.

The main steps towards the programme of measures are (were):
- *The exploratory preparatory phase* (March to September 2012): Execution of initial studies, quick scan of measures, brainstorming session

- *The analysis phase* (September to November 2012): Analysis of current policy in relation to the (trends in the) top ten of beach litter, and a first funnelling of effective policy proposals during a national stakeholder meeting in October 2012.
- *The development stage* (2013/2014): Processing of analysis and insights in collaboration with stakeholders in 6 clusters:
  - agenda-setting and awareness
  - beaches
  - river basins
  - shipping
  - fishing
  - plastic products
- *The decision-making phase* (2014/2015): Preparation of draft programme of measures, coordination and adoption of the final programme.

The clusters addressed the following aspects: Intended effects of the measures, parties required for the implementation, international aspects, step-by-step plan for implementation, possible obstacles in the implementation, costs and evaluation. The cluster leaders held regular meetings to ensure the necessary coordination.

Various measures have been enshrined in so-called Green Deals. Green deals are formal legal documents, covenants. Parties in a chain seek each other out to create more synergy in their activities and investments. In the area of waste, those parties include collectors of plastic waste in port collection facilities, fishing ports and on beaches, as well as sorters and processors of plastic materials, and users of raw materials.
During the implementation phase the green deals serve as active platforms allowing more and more parties to join in. Regular evaluations are carried out to ascertain whether the ambitions recorded have been achieved and follow-up agreements are made, followed by a report to the House of Representatives. The Green Deal Board supervises the progress.

A general SCBA study was conducted for the litter measures[80] and a number of studies were carried out specifically for certain sectors such as shipping and beaches.

OSPAR Regional Action Plan Marine Litter

In 2014 OSPAR established its Regional Action Plan (RAP) Marine Litter. The plan describes actions and measures for achieving the OSPAR region's common targets for reducing the litter problem. These actions and measures target sea-based sources and land-based sources, via the rivers or otherwise. The member states link as many of their national litter measures as possible to OSPAR's action plan. The Netherlands and Germany together have a coordinating role here. The OSPAR regional action plan (RAP) supports the ambitions of the MSFD and the Rio+20 agreement for achieving a significant reduction in marine litter by 2025. The Netherlands has a leading role in the development of the following OSPAR measures: Implementing regional coordination of the PRF directive and improving the implementation of ISO standards; Reducing the impact of dolly rope; Exchanging best practice to reduce waste in rivers; Tackling microplastics in cosmetics products and other sources; and Reinforcing Fishing for Litter agreements.

[80] Van der Veeren, R. and X. Keijser, *Economic and social analyses for the Marine Strategy Framework Directive. Part 2: Program of measures: Theme: Marine Litter* (2013)

Agenda-setting and awareness

Cat. 2b: Additional MSFD measures

Putting litter on the agenda of stakeholders via education
There will be no additional communication process for putting the litter issue on the agenda and raising awareness; instead, possibilities are sought for joining in existing initiatives. Actions to put the litter problem on the agenda of stakeholders include: Including the litter/plastic soup theme in the successive levels of learning (with the Institute for Curriculum Development) and promoting the topic among teaching and education professionals. Improving and intensifying education about litter and waste separation as well as focusing education also on behavioural change by means of an education measure together with NGOs and other organisations focused on education. This measure is part of a 'shared management' operational plan under the maritime part of the European Maritime and Fisheries Fund (EMFF).

Beaches

Litter is a visible problem on the beaches. Although much is already being undertaken to tackle this problem, more can be done, such as deepening and providing better access to knowledge and experience.

Social Cost-Benefit Analysis (SCBA) studies conducted by the Agricultural Economics Institute (AEI) (2012) and Ecorys (2012)[81] show that it is cost-effective to reduce waste on beaches, including non-bathing beaches, by means of extra clean-up campaigns and by making beach goers aware and co-responsible.
The studies also show that there is no blueprint for waste management on beaches. Waste management differs significantly per municipality: In terms of organisation, involving stakeholders and assigning responsibilities for waste facilities and cleaning beaches. Policies aimed at preventing litter may pay off because, depending on how effective the preventative measures are, they save costs.

Furthermore, the studies show that litter in the marine environment can affect the well-being of people. These effects are difficult to specify in terms of costs and benefits and to the extent that they can be specified, the benefits appear to be quite limited.

The results of the studies have contributed to making the additional measures tangible.

Cat. 2b: Additional MSFD measures

Within this category, actions and obligations for government authorities, entrepreneurs, civil society organisations and private individuals for the 2015-2021 period are brought together in a green deal.

Green Deal for Clean Beaches
The Green Deal for Clean Beaches provides insight into how different parties go about cleaning up the Dutch North Sea beaches and keeping them clean. The Green Deal also includes the ambitions

[81] AEI*, How to achieve good environmental status in North Sea: Framework for cost effectiveness and cost-benefit analysis for the MSFD,* AEI report 2011-036 (2012); Ecorys, *Schoonmaakkosten KRM - Kostenkentallen voor opruimen zwerfvuil langs de Nederlandse stranden (MSFD clean-up costs - Cost indicators for cleaning up litter along the Dutch beaches)* (2012)

and plans of these parties as concrete actions. Making activities and plans manifest promotes collaboration and coordination between multiple parties. KIMO Netherlands and Belgium initiated and coordinated the Green Deal for Clean Beaches[82]. The Green Deal for Clean Beaches was signed on 20 November 2014.

The Green Deal for Clean Beaches has three objectives:

a. *Permanently cleaner beaches:* Less litter is found on the Dutch North Sea beaches by 2020.
b. *Good cooperation and coordination between parties:* By 2020 all Dutch coastal municipalities are united in the Green Deal for Clean Beaches. The number of participating beach operators, NGOs and other companies and organisations increases annually between 2015 and 2020.
c. *Proper attitude and behaviour of beach goers* By 2020 beach goers leave less waste behind on the Dutch North Sea beaches.

To achieve this, the following process goals have been set:

- At the end of 2016 signs, for instance, in at least 10 municipalities will influence littering by beach goers. By 2020 this campaign is adopted by 15 to 20 municipalities.
- Municipalities facilitate volunteer beach clean-up campaigns; at least 10 municipalities in 2016, increasing to 15 to 20 municipalities by 2020. Examples of facilitating are providing aids (prickers, rubbish bags), and removing waste.
- By the end of 2016 at least 5 coastal municipalities have a specific approach to the problem of cigarette butts on the beach. That number is 10 to 20 municipalities by 2020.
- Together with the Environment, Safety and Quality Hallmark Foundation (KMVK), at least 5 municipalities (increasing to 10 by 2020) support the beach-based catering establishments in obtaining the Green Key quality mark by the end of 2016. This at least doubles the number of beach-based catering establishments that have this quality mark[83] by 2020 .
- By the end of 2016 at least 5 municipalities work together with Rijkswaterstaat to monitor the effects of certain interventions on the beaches. By 2020 at least 10 municipalities participate in this.

As regards the shared responsibility of the central government in cleaning up beaches, the Ministry of Infrastructure and the Environment is engaged in talks with relevant parties and expects to carry out a pilot in 2016/17. Based on this pilot, the central government will consider whether to extend the Litter Collection Scheme to the North Sea beaches.

When the above measures are implemented, the Ministry of Infrastructure and the Environment will see to the availability, safeguarding, exchange and development of knowledge. Concrete actions include: Developing tools such as a menu or a Litter Knowledge Guide, organising workshops and facilitating pilot and demonstration projects. This knowledge is made accessible via the Litter Knowledge Guide.

[82] KIMO Netherlands and Belgium is an association of local authorities, and a division of KIMO International. The organisation is taking action against pollution of the North Sea, Irish Sea, North-east Atlantic Ocean and the Baltic Sea.

[83] Establishments with the Green Key quality mark do not use mono packaging for such accompaniments as milk and sugar and use only durable tableware. Green Key also promotes the active influencing of 'green' behaviour of visitors.

River basins

Cat. 2b: Additional MSFD measures

Setting on the agenda of Water managers

The Ministry of Infrastructure and the Environment encourages district water boards, municipalities and provincial governments to implement an active policy aimed at reducing litter and disseminates knowledge about this. This pertains to the following actions:

- *Provision of information on the issue and tackling of litter and agenda-setting by water managers*, so that they actually contribute to tackling litter. The focus lies on opening up knowledge that is relevant to a comprehensive approach to litter, and on identifying potential tasks and roles of the managers. Examples include mapping the hotspots, conducting research, mobilising initiatives, ensuring awareness, etc. This means, for instance: Expanding networks, giving presentations and holding discussions and securing the topic in various policy and management plans.
- *Facilitating the exchange of knowledge, best practices and instruments between water managers* by means of knowledge meetings, the Litter Knowledge Guide and assistance.
- *Supporting projects and knowledge development* in terms of the comprehensive approach to litter in water by participating and by extracting and sharing knowledge.

The OSPAR Regional Action Plan Marine Litter is aimed at sharing best practices to reduce waste in rivers.

River basin oriented litter policy

The successful Clean Meuse Limburg approach is being scaled up to at least six partnerships along the rivers Meuse, Waal, Rhine, Lek, Scheldt and IJssel. In this regional approach stakeholders such as site managers, district water boards, municipalities, NGOs and (recreation) companies take their responsibility in the prevention and removal of waste in rivers. The role of the (central) government is to encourage and facilitate effective and systematic cooperation.

Roll–out of Litter Collection Scheme

The Litter Collection Scheme of the Rijkswaterstaat Southern Netherlands in the Clean Meuse project will be extended to the regional departments of Rijkswaterstaat in its role of water manager. The roll-out of this scheme by the central government encourages partnerships for clean river basins. The Litter Collection Scheme is both a service and a means of communication. The scaling up of the Litter Collection Scheme is part of the operational plan in 'shared management' under the maritime part of the European Maritime and Fisheries Fund (EMFF).

Shipping

Much is already being done about waste for and by shipping. The amount of waste delivered from ships has doubled, but there is still room to improve waste managed by ships and ports.

Cat. 2b: Additional MSFD measures

Green Deal for Ships' waste chain

Parties in the maritime chain closed the Green Deal for Ships' Waste Chain on September 10, 2014[84]. This deal includes concrete agreements to close the maritime waste cycle by means of

[84] Dutch House of Representatives, 2013-2014 session, 33043, no. 35

waste prevention during provisioning, further optimisation of supervision, optimisation of waste delivery in seaports and recycling of plastic maritime waste ashore. Participants are the Port of Rotterdam, the Port of Amsterdam, the Zeeland Seaports, the Groningen Seaports, the Port of Den Helder, KVNR (Dutch shipowners), NVVS (Dutch ship suppliers), VOMS (Dutch port reception facilities), Bek & Verburg, Martens Port Reception Facility, the North Sea Foundation, Human Environment and Transport Inspectorate (ILT), Ministry of Infrastructure and the Environment (I&E) and the Ministry of Economic Affairs (EA). The initiator of this green deal is the Ministry of Infrastructure and the Environment.

Concrete objectives are geared towards separated collection of plastic maritime waste and recycling:

a. By 2017, 50% of the ships that deposit plastic waste will have separated that waste prior to depositing it at the Dutch ports where separated collection and processing are possible. This is 75% of the ships of shipowners who are affiliated with the Royal Association of Netherlands Shipowners (KVNR).
b. By 2017 all the separated plastic delivered is also collected, removed and processed separately by the members of the Association of Environmental Services Enterprises for Shipping (VOMS). 100% of the ('clean') plastic waste collected by the members will be recycled or processed into fuel. They will re-sort as much of the deposited mixed plastic as possible so as to recycle as much of that plastic as possible.

The measures from the Green Deal target four topics:
- *Prevention*: Preventing provisioning waste by using less packaging, opting for reusable packaging and – before departure – delivering as much packaging material as possible to the port reception facilities (PRFs).
- *Enforcement*: Research into data on actual deliveries and the better use of previous inspection results.
- *Harmonising procedures of Port Reception Facilities (PRFs):* Efforts are being concentrated on this at bilateral, OSPAR and EU level. A common break-even system has been agreed with the Flemish ports.
- *Separated collection of plastic ships' waste:* Several measures (such as financial incentives and quality requirements for PRFs to allow separated waste collection) encourage ships to deliver separated plastic which is subsequently recycled or processed into oil on land.

The measures are geared to optimising waste management in ports and on board of ships and to increasing the efficiency and effectiveness of the supervision. Expectations are that this approach will limit the cost implications (see page 92).
The OSPAR Regional Action Plan for Marine Litter aims for a binding recommendation for responsible waste management on board and at PRFs, in accordance with ISO standards.

Fishing

While projects such as Fishing for Litter have already been running for some time, waste management in the fisheries sector still has room for improvement. An initial Social Cost-Benefit Analysis (SCBA) study conducted by the Agricultural Economics Institute (2011) shows that finding and applying alternatives to using 'dolly rope' to protect beam trawls could be a particularly cost-effective measure to reduce the amount of plastic waste on beaches. An SCBA study on the closing of green deals has also been completed (see page 92).

The knowledge and experience of fishermen was extremely helpful in selecting measures for the sector. Between 2012 and 2014 various measures were evaluated and further developed in collaboration with the sector.

Cat. 2b: Additional MSFD measures

Green Deal for Fishing in Support of a Clean Sea
In the Green Deal for Fishing in Support of a Clean Sea, the fishing industry, together with the Ministry of I&E, ports, waste processors and other parties, is seeking ways to close the waste cycle and thus prevent waste ending up in the sea. One of the basic principles is that all fishing vessels will deliver their operational and domestic waste on land as from 2020. The green deal tackles the main waste streams of fishery: operational ships' waste (nets, ropes, dolly rope) and domestic waste. The agreements on the Fishing for Litter waste will also be included in the Green Deal for Fishing in Support of a Clean Sea. The agreement was signed on 20 November 2014.

The operational goal of the Green Deal for Fishing in Support of a Clean Sea is that no new fishing waste is found on beaches in 2020. The actions include:

- *Removal of domestic waste.* Domestic waste is stored on board and handed in in the port. This action also includes installing domestic waste storage facilities on board, such as containers, bins, wheelie bins in a safe place on board, or a rack for stowing rubbish bags. The installation of these facilities is accompanied by a communication programme. This action makes it possible to take waste back to shore. KIMO carried out a pilot study in late 2014 to evaluate the storage of domestic waste on board of fishing vessels[85]. During the pilot study less litter was detected on board and on the quay. Based on the results of the pilot study, the parties to the green deal are conferring on supplementary measures for restricting loose household refuse both on board and on the harbour quayside.
- *Removal of operational maritime waste.* This action seeks to keep this kind of waste (nets, cables, dolly rope) on board until it can be properly deposited in the ports. This puts an end to the current practice of throwing some of this waste overboard.
- *Fine-tuning port-based collection facilities to the needs of fishermen* Port-based collection facilities can be improved by:
  - Lowering the threshold for handing in waste; Fine-tuning the availability and locations of containers and the collection frequency to the needs of the fishermen;
  - Providing lockable containers so that seagulls cannot get at the waste and people living in the neighbourhood cannot use them to dump their domestic waste;
  - Enabling separated waste collection.
- *Recycling of old nets (exploratory study into reward system)* Recycling plastic fishing gear (nets, ropes, dolly rope and fish crates) is more environmentally friendly than dumping. The Healthy Seas pilot project aimed at collecting and recycling nets is currently underway. The infrastructure for recycling nylon, polyester and other plastic material is under construction. Several companies are already working on this.
- The effectiveness of a reward system in having old fishing gear, including other fishermen's fished up nets, handed in at the harbour, is still being studied.
- Fishing for Litter 2.0 is a campaign to maintain the current Fishing for Litter project.
- *Research into alternatives to the use of dolly rope.* The clusters of plastic fibre attached under the end of fishing nets to protect the nets against wear and tear are called dolly rope. It is the dolly rope and not the net that scrapes along the seabed, leaving behind a trail of tiny pieces of abraded plastic fibre on the sea floor. Dolly rope also ends up in the sea during maintenance of the nets.
  The fishing industry, NGOs, research institutes and governments have been working together since 2013 on a project in search of an alternative to dolly rope. As the project has not yet been completed and no satisfactory alternative has yet been found, it has been included in the

[85] Veerman, B., *Eindrapport Onderzoek naar de opslag van huisvuil aan boord van vissersschepen (Final Report on Study into the storage of rubbish on fishing vessels) KIMO Netherlands and Belgium)* (2014)

MSFD programme of measures under Exploratory Studies, Chapter 6[86]. Once an alternative to dolly rope has been found, a concrete measure will ensue. As part of the green deal, this action is also intended to encourage fishermen to keep dolly rope from ending up in the sea during maintenance activities on board.

In the Green Deal for Fishing in Support of a Clean Sea key sources of marine litter are addressed.

The conclusion of the agreement is initiated and coordinated by the Association of Coastal Municipalities KIMO Netherlands and Belgium.

Awareness in the fisheries sector
The ProSea organisation is developing an educational programme to raise awareness in the fisheries sector of the waste issue. A four-day 'Future-proof Fishing' course will be provided to fishermen in training at marine fishery schools. One of the course components focuses on preventing waste. For established fishermen, ProSea is developing a series of one-day workshops on 'current challenges at sea', which includes a workshop on waste.

The 'fishery waste streams', 'Fishing for Litter' and 'alternatives to dolly rope' aspects of the Green Deal for Fishing in Support of a Clean Sea will also be included in the OSPAR Regional Action Plan for Marine Litter, in which the Netherlands plays a leading role.

Plastic products

Given that the interests of the economy and those of the environment are perfectly compatible and that this provides opportunities for the private sector, the Cabinet is advocating the concept of 'green growth'[87]. This calls for sustainability-oriented product development as well as a more sustainable and more efficient use of plastics.
An important strategic principle for additional measures for plastic products is the focus on the 'top ten' of most commonly found (plastic) items on beaches. Measures pertaining to plastic carrier bags and drink containers are already included in existing policy. Generic additional measures relate to balloons and microplastics in cosmetics and abrasive cleaning agents. Chapter 6 announces an exploratory study into nation-wide possibilities for reducing emissions of microplastics from car tyres, abrasive cleaning agents and paint. If possible, measures will be formulated on the basis of this exploratory study. For eco design and end-of-life measures, the central government abides by measures that OSPAR engages in. Cigarette butts fall under the Green Deal for Clean Beaches.

Cat. 2b: Additional MSFD measures

Reducing the number of balloons
This measure aims to reduce the release of balloons (including decorative ribbon, seal and valve). It brings the issue of balloon residue in the environment to the attention of municipalities and citizens and dovetails with existing initiatives. In addition to the awareness campaigns, the Cabinet seeks to restrict the simultaneous launching of large numbers of balloons and to disseminate information on possible alternatives. To that end, the Cabinet is conducting research into balloons in the marine environment and is considering taking measures to drive back the release of balloons.

[86] Another exploratory study focuses on preventing beam trawlers' fishing gear getting caught up in fixed nets. For more information, see Chapter 6: *Exploratory studies and opportunities for the future.*
[87] Ministry of Infrastructure and the Environment, *Agenda duurzaamheid; een groene groeistrategie voor Nederland (Sustainability Agenda; a green growth strategy for the Netherlands),* Dutch House of Representatives, 2011-2012 session, 33041, no. 1

Commitment to EU ban on microplastics in cosmetics and detergents.
The Netherlands is aiming for an EU ban on microplastics in cosmetics and detergents to reduce the emission of microplastics into the marine environment. Invoking MSFD Article 15 (call to action on a European level because measures at a national level are not effective enough) is an option that is considered.

Social costs and benefits

A general social costs and benefits analysis (SCBA) study [88]and a number of studies specific to certain sectors such as shipping have been conducted for the litter measures as well as for measures combating litter on beaches[89]. The most recent SCBA study looked at the costs and effects of the green deals. This study has demonstrated that it is difficult to properly estimate the expected (quantitative) benefits and costs associated with the various green deals[90]. This is partly because the parties that incur the majority of the costs cannot always deduce the precise amount budgeted for litter. It can also be that the relevant companies cannot yet translate their concrete activities into information that can be used for a cost-benefit analysis. Moreover, many instances involve private parties who do not always wish to share their (partly competitively sensitive) information. Parties enter voluntarily into a green deal. They do so only when they expect their participation to deliver an added value that exceeds the costs of the measures they agree on. This added value can be an environmentally aware image, which has a positive effect on attracting new customers, or (more directly) it can be an economic advantage as a result of a cleaner environment. The expected limited implementation costs for governments and businesses obviously have a positive influence on the consideration. The added value for the environment is that each measure contributes to reducing the amount of litter in the marine environment and on beaches. This may also have economic benefits for designated uses at sea (less damage due to floating litter), for beach recreation and for public health.

It is difficult to make a quantitative assessment of the costs and benefits, but a qualitative look ahead, on the other hand, is feasible. Expectations are that implementing the measures that have now been formulated will not entail high additional costs for the sectors and certainly no large-scale investments. The financial risk of the implementation of the measures is therefore limited for all parties. On the other hand, the measures (collectively) address an urgent social problem and the relatively low costs are offset by the potential benefits of reducing litter in the marine environment and on the coast. Particularly fishery, shipping and recreation benefit from this. Without quantifying the costs and benefits (which can be done in the long term), it is fair to conclude that the social benefits of the implementation outweigh the costs. This is subject to the precondition, of course, that the measures are effective, and that depends not only on what the Netherlands does, but also on the commitment of other countries to formulating policies for reducing litter.

[88] Van der Veeren, R. & X. Keijser, *Economic and social analyses for the Marine Strategy Framework Directive. Part 2: Program of measures. Theme: Marine Litter* (2013)
[89] Examples are: Ecorys, *Schoonmaakkosten KRM - Kostenkentallen voor opruimen zwerfvuil langs de Nederlandse stranden* (*MSFD Clean-up Costs - Cost figures for cleaning up litter along the Dutch beaches)* (2012); Ecorys, *Schoonmaakkosten KRM - Bepaling van schade door afval in netten en schroeven (MSFD Clean-up Costs - Determination of damage from waste in nets and propellers)* (2012); EFTEC, Enveco, Intersus, *Recreational benefits of reductions of litter in the marine environment* (2012); Oranjewoud, *Discussion document Managing undesirable ship generated waste discharges in Marine Environments* (2012);
[90] Ecorys, *MKBA Green deals zwerfvuil (SCBA Green deals on litter)* (2014).

These conclusions can also be drawn with respect to the extension of the Meuse Litter Collection Scheme to the other major rivers managed by Rijkswaterstaat (Roll-out of Litter Collection Scheme), for which an SCBA has been carried out as well[91].

4.9 Measures pertaining to the Introduction of energy, including Underwater noise (descriptor 11)

4.9.1 Policy task

The good environmental status is achieved when the introduction of energy, including underwater noise, is at a level that does not adversely affect the marine environment. A second condition is that continuous low-frequency noise and loud low-frequency and medium-frequency impulse noises that sound under water as a result of human activities do not have an adverse impact on ecosystems.
The characteristics of noise produced by human activity (anthropogenic) differ from those of the naturally occurring sounds of waves, surf, rainfall and sea animals. The effects of anthropogenic underwater noise on marine mammals range from subtle behavioural changes to avoidance of areas and impaired hearing, and – in extreme cases – even immediate death. Other animals can also respond to noise. Fish, for instance, tend to be sensitive to low frequencies.

More knowledge is required about certain aspects of underwater noise before evaluable environmental targets can be defined. The environmental goals that can already be formulated pertain to:

- *Individual cases such as pile driving and seismic research:* prevention of harmful effects of these specific activities on populations or on the ecosystem and then particularly on marine fauna.
- *Background noise and cumulative effects on populations or the ecosystem*: goals for this will be formulated in 2018 when more knowledge has been gained.

Anthropogenic sources of underwater noise include: pile driving, seismic surveys and shipping. The noise introduced under water may last a short time, such as pile driving during construction work at sea. It can also be prolonged noise, such as seismic surveys, but there are also permanent sources such as ship noise, which also moves. Anthropogenic noise is much more intense than natural sounds. Anthropogenic sound also travels further.

From Marine Strategy Part 1 it emerged that underwater noise, particularly impulse noise, resulting from human activities in the southern North Sea has increased significantly. It is unclear how big a problem the current background noise, such as noise generated by shipping, already is, and the (cumulative) effect of all noise sources is likewise unknown. No information is available on background noise levels in the North Sea because they have not yet been measured. The monitoring of underwater noise is being organised in cooperation with other countries in the region. There is no concrete evidence to suggest that the (probably) increased level of background noise in the Dutch part of the North Sea has harmful consequences. Nor can that conclusion be drawn as yet for marine mammal species living in the North Sea, especially considering the presence of (sensitive) species such as porpoises in wind farms.

[91] Ecorys, *MKBA opruimen zwerfafval uit rivieren (SCBA on cleaning up litter in rivers)* (2014)

4.9.2 Existing measures

Wind farms

Cat. 1a: Measures that have been adopted and implemented

Licensing procedure for wind farms
The licensing procedure for wind farms has been revised with the coming into force of the Wind Energy at Sea Act. The Plot Decrees for the planned wind farms stipulate amended conditions for pile-driving for wind farms with a view to reducing noise levels. A maximum permissible noise level has been prescribed depending on the building season and the number of piles to be driven.
The obligations under the European Birds and Habitats Directives have been incorporated into the licensing procedure. The Nature Conservation Act and the Flora and Fauna Act came into effect in the Exclusive Economic Zone (EEZ) on 1 January 2014. This protection level is based on those Acts. This means that the effects are to be reduced on all protected species and all their habitats (i.e. not just in BHD areas and species). Licensing conditions, including reducing the source level, centre on the prevention of adverse effects on the porpoise population in the North Sea, and the disturbance of seals as well as of (non-commercial) fish and their habitats. New insights gleaned from research into underwater noise might result in amendments to the licensing conditions.

Military activities

The Ministry of Defence is responsible for regulating military activities. Measures to be taken are described in the operational regulations of the Ministry of Defence.

Cat. 1a: Measures that have been adopted and implemented

Reducing impulse noise via the Code of Conduct for explosive ordnance disposal
The Ministry of Defence's current internal Code of Conduct for explosive ordnance disposal[92] aims to avoid unnecessary damage due to explosives clearance activities in the North Sea. The code of conduct stipulates that explosives may only be detonated at sea when there are no reasonable alternatives. There are no fixed detonation positions in the North Sea; only positions at safe distances from objects such as offshore installations, pipelines, cables and shipping routes. It is prohibited to detonate explosives near wrecks so as to prevent ecological damage caused by the release of toxins from the wreck and to protect flora and fauna from being harmed.
The Ministry of Defence invests in knowledge to ensure it can make responsible use of the sea today and in the future. Based on recent research the Ministry will develop a new regulation in 2016 to restrict possible harmful effects of explosives clearance and to introduce feasible alternative techniques or mitigating measures (see also Chapter 6: Exploratory Studies).
Should additional measures and/or alternative techniques need to be developed, the Ministry of Defence will cooperate with international partners.

Regulations on sonar use
The Ministry of Defence observes the Responsible Use of Active Sonar Regulation[93]. The objective of this regulation is to prevent or minimise the harmful effects of anti-submarine sonar signals on marine mammals.

[92]Royal Dutch Navy, *Gedragscode Springen van munitie op de Noordzee* (Code of conduct for detonating ammunition in the North Sea) (2005)
[93] Royal Dutch Navy Command Directorate of Operations Regulation MWC 230 Responsible Use of Active Sonar (2015))

Information and research results on controlling harmful effects of sonar during defence activities are shared across countries. The Ministry of Defence collaborates internationally to coordinate the rules on the use of sonar as best as possible. Cooperation regarding defence matters usually occurs on a NATO level and not in an EU context.

The Ministry of Defence will amend the regulations should new knowledge so require. Relevant data on the use of sonar is available for the MSFD monitoring programme, insofar as they do not conflict with operational interests of national security.

Oil and gas extraction

Cat. 1a: Measures that have been adopted and implemented

Amending regulations on seismic surveys

Since the Nature Conservation Act and the Flora and Fauna Act came into effect in the EEZ on 1 January 2014, a permit for seismic surveys in the marine environment under the Nature Conservation Act and/or an exemption from the Flora and Fauna Act is/are required. Elements of the procedure for obtaining this permit and/or exemption are: an appropriate assessment (Nature Conservation Act), a species protection test (Flora and Fauna Act) and corresponding mitigating measures to restrict the effects on protected species (marine mammals, but also fish and their habitats).

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

Restrictions on platform lighting on oil and gas platforms

Illumination of oil and gas platforms is important for the sake of safe operations on the platforms themselves and to reduce the risk of collisions. However, a well-known side effect is that birds, especially migratory birds, are attracted to the lights and can therefore get stranded on platforms, or they circle around the platforms for too long, ultimately running out of energy to reach the mainland. There are no indications to suggest that this phenomenon also affects the population levels of bird species.
Birds are attracted to the red spectrum in light. Alternatives to the current platform lighting include adjusting the colour of the light, shielding the light sources or dimming the lights during peak migration periods.
In 2015 OSPAR established voluntary guidelines to mitigate the effects of platform illumination on migratory birds[94]. These guidelines include such measures as shielding light sources and automatically disconnecting light sources in places on the platform where no work is being carried out. Agreements on the implementation of the guidelines will be made with the Dutch oil and gas industry.

Shipping

Cat. 1b: Measures that have been adopted, but not yet (fully) implemented

Implementation of IMO guidelines for reducing underwater noise produced by commercial shipping

In the meeting of the Marine Environment Protection Committee of the IMO in April 2014, non-binding guidelines were adopted aimed at reducing the underwater noise produced by commercial

[94] OSPAR Commission, *Guidelines to reduce the impact of offshore installations lighting on birds in the OSPAR maritime area*. OSPAR Agreement 2015-08 (2015)

shipping[95]. This recommendation pertains to ships to be newly built. If research shows that further measures are evident or necessary, the procedure will normally be implemented throughout the IMO.

4.9.3 Analysis of policy task

The policy takes into account the effects of impulse noise in particular. As a precautionary measure, impulse noise produced by pile-driving for the construction of wind farms and by seismic surveys for the extraction of oil and gas is regulated via the Nature Conservation Act and the Flora and Fauna Act.

Marine Strategy Part 1 states that in 2018 additional targets will possibly be set at ecosystem level for the accumulation of impulse noise and background noise from various activities and over prolonged periods of time. Based on the precautionary principle, a policy task may follow. The concern around the recently increased number of stranded porpoises figures in this development. Potential causes for this increase are explored within the context of the Porpoise Protection Plan (see Chapter 6, Exploratory Studies).

Given the international nature of shipping, the accumulation of impulse noise and background noise caused by ships is an issue that requires looking into at the very least at North Sea level. The Netherlands therefore does not follow its own course in this respect, but will address this issue on an OSPAR and IMO level.

A social cost-benefit analysis (SCBA) was carried out for a number of noise measures to gain a better insight into the possibilities of mitigating measures and their costs[96]. During this exercise it was examined whether mitigating measures, such as the use of other foundation techniques or noise-reducing casings, are more efficient and cost-effective than, for example, ceasing pile-driving activities during certain times of the year. The SCBA examined the costs and benefits of measures for reducing underwater noise for three different themes, namely pile driving (offshore wind energy), seismic surveys and shipping. The current situation (baseline scenario) of each of these activities was compared with a number of policy alternatives. The results of the SCBA can be used to set goals in the first update of the MSFD in 2018, provided enough information is available on accumulation of noise in the North Sea region.

A close eye will be kept on the environmental status for underwater noise by monitoring the following indicators:
- Distribution in time and space of loud impulsive noises with a low or medium frequency;
- Uninterrupted low-frequency noise.

These indicators are still being examined.

The monitoring programme for underwater noise will be formulated in coordination with other North Sea countries, as required by the MSFD. The fastest progress can be expected to be made in compiling an overview of the total amount of impulse noise, but it might still take some years before a clear and common picture of the trends in noise levels is reached. Validated background noise levels will not be available within the very short term. Initial information on background noise may become available in 2018, but obtaining an insight into the trends in background noise will

[95] International Maritime Organisation, *Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life,* IMO MEPC.1/Circ.833 (2014)
[96] Meulendijk-de Mol, P., Van Nieuwerburgh, L. and Van Mastrigt, A., *Underwater noise social cost benefit analysis*. Royal Haskoning DHV BD4543-101-100/R/304326/Lond (2015)

take several years. It is therefore premature at this point in time to formulate, as a precaution, a concrete target for (accumulation of) background noise.

This programme of measures contains several important measures and initiatives that help to reduce underwater noise at locations in the Dutch part of the North Sea, in accordance with the requirements of Natura 2000 and other plans. The programme thus helps to expedite the good environmental status, even though the description of this status has not yet been completely worked out, given the uncertainties still surrounding noise levels and accumulation of noise. For the moment, invoking an exceptional situation as referred to in Article 14 of the MSFD is not an obvious course of action.

4.10 Tax measures

The Environmental Investment Rebate scheme (MIA) and the Arbitrary Depreciation of Environmental Investments scheme (Vamil) aim, by way of fiscal incentives, to encourage investments in environmentally friendly technologies. Under the MIA scheme up to 36% of the investment can be deducted, over and above the standard investment deduction. Under the Vamil scheme, up to 75% of the investment costs can be deducted at a point in time determined by the investor. The list of environmentally friendly technologies to which these schemes apply is updated on an annual basis. Because of the flexible nature of these schemes, they dovetail with the social needs and opportunities for the business community. Investments can pertain to various ways for reducing the environmental pressure. The Vamil scheme is an important tax measure, but there are other fiscal schemes as well to tackle land-based sources in particular. Examples include the Energy Investment Allowance (EIA) and the Research and Development Promotion Act (WBSO) which gives companies that innovate a discount on wage tax.

Cat. 1a: Measures that have been adopted and implemented

Fiscal incentives for environmentally friendly technologies (Environmental Investment Rebate (MIA) scheme/Arbitrary Depreciation of Environmental Investments scheme (Vamil)

With respect to the Marine Strategy, the following provisions are relevant to the implementation of measures for the various descriptors:

- *fishing*: MIA\Vamil promotes sustainable fish farming, crustacean or shellfish farming, replacing the beam trawl with a Seine-haul fishing installation, investments in holding tanks for live by-catch in the eel or shrimp fishery with improved procedures for returning by-catch to the sea and acoustic deterrent devices on fishing nets. Through the Energy Investment Allowance a tax benefit can be obtained for an investment in an electric pulse installation and a hydrorig installation.
- *non indigenous species*: Entrepreneurs who invest in a ballast water management system and in environmentally-friendly protection of ships' hulls are eligible for a tax benefit via MIA\Vamil. Ocean-going vessels fall under a different scheme (tonnage tax scheme) and therefore do not benefit from the MIA\Vamil schemes because the MIA\Vamil schemes apply under the Corporate Tax Act and the Income Tax Act. Shipowners who are subject to this tax legislation, however, should be able to take advantage of MIA\Vamil.
- *eutrophication*: MIA\Vamil provides tax benefits for various investments in the agricultural sector to reduce emissions of fertilisers by, for example, runoff, water drainage and precision farming.
- *pollutants*: MIA\Vamil provides tax support for investments in the production of raw materials of biological origin, prevention of emissions from plant protection products, environmentally friendly protection of hulls, non-standard water recycling, port reception facilities, reduction of discharge of plant protection products into surface water and the source approach to drug residues (decentralised purification).

- *litter*: MIA\Vamil provides tax benefits for port reception facilities, pyrolysis of plastic maritime waste, upcycling, recycling and downcycling of raw materials, the use of raw materials of biological origin in the manufacture of products, the production of bioplastics, and environmentally friendly dismantling of ships.
- underwater noise: MIA\Vamil stimulates investment in equipment that limits the harm of underwater noise, and in low-noise propellers.

For the 2016 list that will be published in late 2015, other possible investments (e.g. pertaining to fisheries and beaches) that are eligible for a tax deduction under the MIA\Vamil schemes are being explored. This in line with the Green Deal for Fishing in Support of a Clean Sea and the Green Deal for Clean Beaches. The question of whether expansion to the marine ecosystem (species, habitats) is an option is also examined. Every year the list also includes several investments that contribute to the circular economy.

4.11 Results of ODEMM analysis

The Options for Delivering Ecosystem-based Marine Management (ODEMM)[97] methodology was used to analyse the impact of the measures in the MSFD programme of measures on the (chains of) effects of human activities on the ecosystem.[98] The ODEMM project has identified 942 effect-chains for the Dutch part of the North Sea, representing all potential relationships through which human activities can disrupt the ecosystem. All existing and planned measures in the MSFD programme of measures are linked to these ODEMM effect chains that are relevant to the Dutch part of the North Sea.

After the analysis, a risk assessment was conducted for each chain of effects to determine the probability of the current activities having a (negative) impact on the ecological component, and how long it will take in that case to restore the original condition of the relevant ecological component. Both assessment questions were also combined.

The inventory indicates for each measure in how many chains of effects and in which chains of effects the measure has a reducing effect on the impact of human activity on the ecosystem. The potential reducing effect of the measures was also expressed in a risk percentage. Finally, the Dutch MSFD programme of measures was assessed as to how well it covers the potential risks of failing to achieve the good environmental status (according to Marine Strategy Part 1). Because the analysis is based on the full implementation of a measure (e.g. mitigation of emissions of a hazardous substance results in 100% reduction), its result depends on the extent to which the measure is actually implemented. The ODEMM methodology is not intended for comparing the (relative) contribution of each individual measure, but it is suitable for evaluating the programme of measures in its entirety. The results of the analysis show that almost all effect relationships are covered with measures. All impact of human activities on the ecosystem can potentially be reduced with this package of measures. This therefore indicates that the MSFD programme of measures provides a complete set of measures to achieve the good environmental status, but that this ultimately depends on how well measures are fleshed out and implemented.

[97] Developed within EU funded FP7 project Options for Delivering Ecosystem-based Marine Management (ODEMM).
[98] Piet, G., Sluis, M.T. van der, and Paijmans, A.J. , *Toepassing ODEMM-methodiek voor het Nederlandse KRM Programma van Maatregelen (Use of ODEMM methodology for the Dutch MSFD programme of measures)*, IMARES (2014)

4.12 Results of the Strategic Environmental Assessment (SEA) National Water Plan 2

The Plan EIS that was drawn up for the National Water Plan (including the Policy Document on the North Sea and the additional measures in the MSFD programme of measures) leads to the conclusion that by and large the policy statements in Marine Strategy Part 1, centred on improving the natural situation in the North Sea, have a positive impact[99]. The preliminary evaluation[100] shows that more MSFD measures have a positive effect on the core objectives of Natura 2000 areas in the North Sea. New seabed protection measures are specifically aimed at closing parts of the Frisian Front (Natura 2000) and the Central Oyster Grounds to fishing that disturbs the seabed. These measures will have a positive effect on these areas. Negative effects of fishermen shifting to (other) Natura 2000 areas in the North Sea can be ruled out, as fishermen are not permitted to move to those areas when seeking alternative fishing grounds.
The measures pertaining to litter have a positive impact on beaches and the North Sea environment.

The recommendation of the EIA Commission notes that on balance the impact assessment with respect to the Policy Document on the North Sea and Marine Strategy Part 3 is positive, but that in the long term developments can lead to bottlenecks or conflicting situations[101]. The long-term future holds the risk of insufficient room for development in order to realise goals and ambitions. The Commission recommends for purposes of drafting the National Environmental Vision (planned for 2018) that a further analysis be conducted on the room for the environment and for achieving ambitions for the North Sea. Based on the above, the Commission recommends that it be assessed whether this will lead to potential conflicts and/or risks in the long-term.

In response to this, the Cabinet has indicated in the National Water Plan that it will investigate, in preparation of the National Environment Vision, to what extent the North Sea policy plan and the Marine Strategy provide sufficient preconditions for subsequent decisions on the use of the North Sea.

4.13 Conclusions

Headway is being made in achieving the MSFD environmental targets. Progress can be seen in the protection of species and habitats in Natura 2000 areas, the recovery of fish stocks, the development of alternative fishing gear and the reduction of by-catch within the revised Common Fisheries Policy. Protection of non-commercial vulnerable and endangered species requires extra attention.

The efforts in the Natura 2000 sites for protecting the integrity of the seabed and the benthic fauna that lives there are not sufficient to create a coherent and representative network of protected areas in the North Sea. As an additional action, therefore, parts of the seabed of the Frisian Front and the Central Oyster Grounds are being protected.

Expectations are that under the current policy for averting the risk of non indigenous species, the introduction of new non indigenous species will have dropped dramatically by 2020.

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[99] Arcadis, *Planmer Nationaal Waterplan 2 (Plan EIS on National Water Plan*, (2014)
[100] Arcadis, *Voortoets Natuurbeschermingswet 1998 Bij Het Nationaal Waterplan 2 (Preliminary Evaluation of Nature Conservation Act 1998 performed for the National Water Plan,* (2014)
[101] EIA Commission *Tweede Nationaal Waterplan (NWP2), Toetsingsadvies over het milieueffectrapport (Second National Water Plan (NWP2) Assessment recommendation on the environmental impact statement.* EIA Commission report number 2995–36 (2015)

The good environmental status for the eutrophication and pollutants descriptors is considered to be within close reach in the years after 2020. However, a precondition here is that the (international) measures agreed in connection with the WFD for meeting the targets for nutrients are implemented. The fact that only a few eutrophication phenomena still occur in the Dutch part of North Sea is proof positive that we are on the right track. Reducing nitrogen emissions from agriculture and shipping still requires the necessary attention, as does the presence of specific persistent pollutants (lagging effects) in the North Sea environment. Over the coming years, attention must also be given to pharmaceutical residues in surface water. This is a potentially increasing threat to the marine environment.

The policy pertaining to large-scale interventions affecting the hydrographic properties of the North Sea is geared towards preventing permanent effects and guarantees the preservation of the good environmental status under new activities.

Current levels of pollutants found in fish and fish products do not exceed the standards set by national and international legislation. This means that in the current situation the environmental status is good and is expected to remain that way.

The Netherlands is already making every effort to eradicate litter and promote a circular economy. But our assessment is that additional national and international action is needed. A set of measures for significantly reducing the amount of marine litter has been included in the MSFD programme of measures. Some of the measures are aimed at excluding microplastics.

Measures for preventing impulse noise will reduce the pressure of underwater noise. Further research into accumulation of both impulse noise and background noise can lead to additional measures.

To recapitulate: The MSFD programme of measures contains numerous measures to help achieve the environmental targets that the Cabinet has set for the Dutch part of the North Sea. With the current and planned policy (primarily under WFD, BHD, CFP, IMO and through licensing of designated uses at sea within existing legal frameworks), the Netherlands can achieve or retain the good environmental status in many respects. The measures focus on the activities that put the environment in the North Sea and on land the most under pressure. The reasons for the measures lie in the sustainability of designated uses, a species-oriented and area-based protection approach, and active restoration of the ecosystem where possible.
Additional policy tasks are: to bring the Common Fisheries Policy more in line with the obligations under the MSFD, to protect the seabed of the Frisian Front and the Central Oyster Grounds, and to further reduce litter, including (micro-)plastics, in the North Sea.

Despite the many efforts, it is impossible to predict in what condition the Dutch part of the North Sea will be by 2020. That is because of the dynamic nature of the North Sea, the current disrupted state, the many elements that together determine the good environmental status, the diversity of activities that influence this status, and the lack of a precise reference point for the status of the marine ecosystem.
This uncertainty is also linked to the impossibility of methodically indicating to what extent and at what rate the ecosystem will recover as a result of the measures. It should be borne in mind that it can take many years to achieve a somewhat stable good status and that it is difficult to estimate how stable that status will be. It is not yet possible to estimate, for example, how long and with what effect the pollutants that have accumulated in the North Sea in the past, will continue to have effect. Irreversible processes associated with climate change must also be taken into account.

The ODEMM analysis shows that the MSFD programme of measures covers the relationships between use, pressure and impact on the marine ecosystem, and the response of the system. The

biggest risks, threats and disruptions are addressed. Additional measures are technically feasible and cost-effective. The package contributes to a healthy sea and sustainable use, through which the environmental targets set for 2020 can be progressively achieved on the path towards a good environmental status.

It cannot yet be established whether all Natura 2000 and MSFD areas combined form a representative and coherent network of protected areas in accordance with the requirements of MSFD Article 13.4. Based on the ecosystem approach, it is advisable to answer this question on a regional scale in respect of all the protected areas in the whole of the North Sea. The key question is what the relationship is between a representative and coherent network of protected areas and achieving the good environmental status, especially for the biodiversity and food webs descriptors. The Netherlands is joining in with initiatives in the context of OSPAR and the EU to evaluate the coherence and representativeness of protected areas. This evaluation is made in the OSPAR Intermediate Assessment, which will be published in 2017. In connection with these initiatives, the Cabinet is dedicated to a region-specific approach to the North Sea in conjunction with neighbouring countries, as outlined above. The aim is to be able to draw conclusions on this when updating the assessment of the environmental status of the North Sea in 2018. If necessary, the current policy and management of protected areas be will be amended after 2018.

The environmental status of the Dutch part of the North Sea and the effects of measures will be closely monitored. The organisation and procedure are described in the MSFD monitoring programme (Marine Strategy Part 2). The general approach to attaining the targets of the Marine Strategy provides flexibility and options for control. The combination of efforts to reduce the main sources of pressure on the North Sea environment and a cyclical monitoring programme allows a timely intervention should the environmental status develop too slowly or in an unwanted direction. The policy can thus be adjusted 'hands on' when developments (such as greater sustainability of use) require a different approach. The review of this programme of measures in 2018, in accordance with MSFD Article 18, should make this clear. The second MSFD cycle, from 2018 onwards, presents a framework for examining this in greater detail.

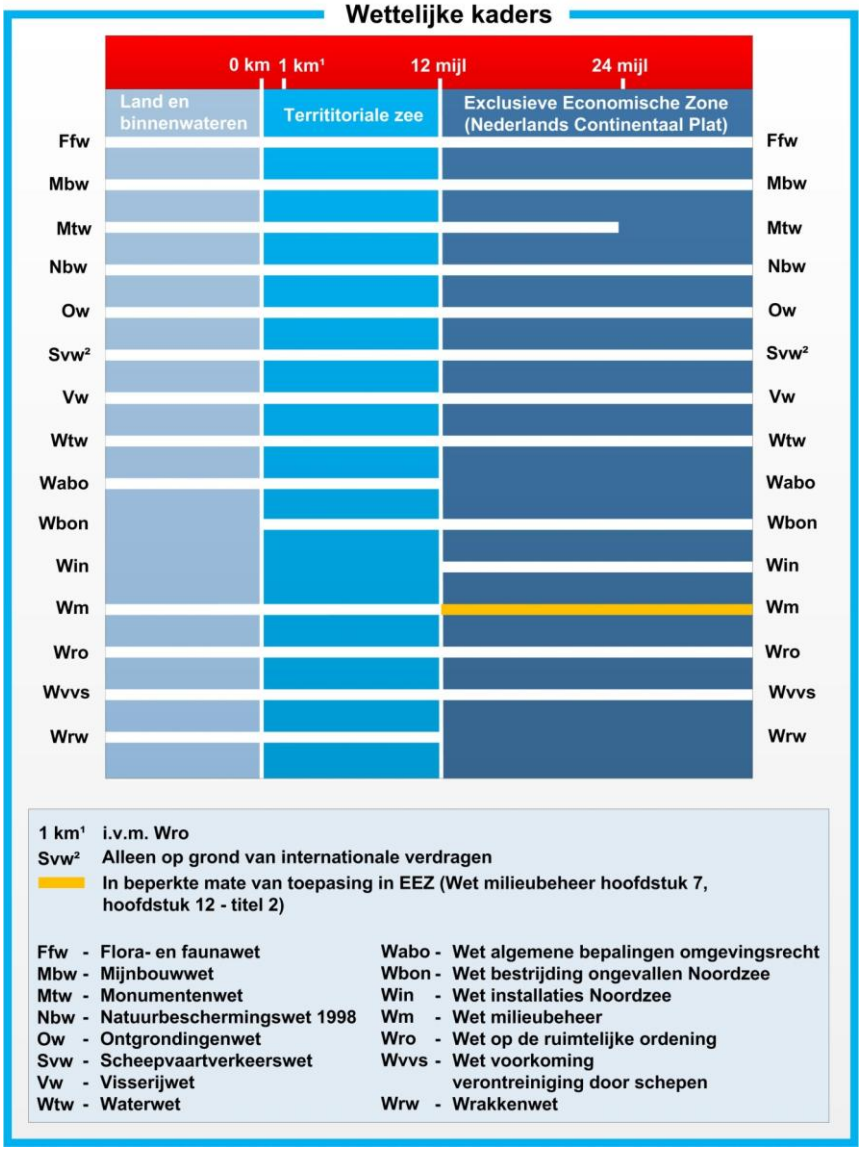
Promoting sustainable use is an inherent part of the Marine Strategy (see Chapter 2). Sustainable use is one of the three starting points for policy, in addition to the regional approach and species approach and the active restoration of the ecosystem. In accordance with the risk management principle and the precautionary principle, the MSFD programme of measures is geared towards the greatest (potential) threats and their related use. The policy aims to push, in the most effective manner, the use of ecosystems in a direction and on a scale that does not exceed the ecosystem's capacity (ecosystem approach).
In this way, sustainable use helps to achieve or maintain the good environmental status for the various descriptors. Realising sustainable use involves environmental requirements and preconditions such as licensing, setting standards for emissions of pollutants (best available techniques), focus on sustainable alternative fishing techniques within the CFP, striving for clean shipping in the IMO context, and boosting sustainable developments by closing green deals and offering tax benefits.
All this contributes to 'Green Growth' on land 'Blue Growth' at sea and to a circular economy. Chapter 6 contains exploratory studies into more possibilities for sustainable use, to anticipate future problems in the marine environment, or because there are win-win opportunities between ecosystem and economy.

5. Spatial planning and good environmental status

The central government sets spatial frameworks for the use of the Dutch part of the North Sea, for efficient, sustainable and safe use, and to protect the ecosystem. These frameworks are applied in their entirety at plan level, in spatial marine planning (Section 5.1) and at project level when issuing permits (Section 5.2). The statutory assessment frameworks pertain to nature, the environment and regulation of use (see Table 5.1) and elaborate (sectoral) EU regulations and international treaties. The EIS Directive is decisive for executing a Strategic Environmental Assessment (SEA) at plan level (spatial planning) and for performing an EIA at project level when applying for a permit.

Applying the SEA to spatial planning plans and the comprehensive assessment framework for use requiring a permit, helps to achieve or maintain the good environmental status for all MSFD descriptors. The current legal framework contains no gaps that can cause any effects of use that stand in the way of achieving/maintaining the good environmental status and the associated environmental targets for 2020.

Figure 5.1 Statutory frameworks for nature, the environment and regulations for the use of the North Sea.



5.1 Spatial planning and Plan EIS.

The Policy Document on the North Sea 2016-2021, of which this MSFD programme of measures is an integral part, is also the spatial plan for the Dutch part of the North Sea (Framework Vision). Section 4.2.2 describes that Natura 2000 areas have been designated for the protection of habitats and species within the scope of the BHD, and that various search areas have been designated for seabed protection within the compass of the MSFD. Furthermore, the spatial planning of designated uses (such as shipping lanes, wind farms and offshore mining) ensure that the interests of safety, nature and the environment are served as best as possible. For instance, in 2013, the routing system for shipping was adjusted for the safety and growth of shipping in relation to the decisions on additional offshore wind energy areas.
A Plan EIS must be drawn up to highlight any effects of the spatial plan as contained in the Policy Document on the North Sea. Should there be any significant potential impact on BHD sites and species, an appropriate assessment is to be made under the Nature Conservation Act. In the event of any significant effects, the spatial plan is to be amended, or the effects are to be counteracted when the plan is worked out. No significant impact caused by spatial plans on the marine ecosystem are foreseen in the planning period of the Policy Document on the North Sea 2016-2021. If the offshore wind farms continue to expand and sand extraction for coastline protection is scaled up, significant negative effects on the ecosystem after 2020 cannot be ruled out. Cumulative effects on the ecosystem as a result of accumulation of roles in the North Sea region, in combination with the impact of climate change, also demands ongoing attention.

The effects of cumulative use and climate change will be explored internationally in more detail (see Chapter 7, Knowledge Gaps).

5.2 Comprehensive assessment framework for permits

The Policy Document on the North Sea contains a comprehensive assessment framework for activities that require permits (chapter 5). The comprehensive assessment framework is a policy rule that, based on the Framework Vision on the North Sea (spatial plan), requires the competent authority to assess permit applications submitted by sea-based North Sea users. The assessment framework applies to all activities that are subject to a permit under the laws and regulations pertaining to the territorial sea and the Exclusive Economic Zone (EEZ) (the Water Act, the Soil Erosion Act, the Nature Conservation Act, the Flora and Fauna Act, the Environmental Management Act, a number of shipping laws and the Mining Act).[102] Rijkswaterstaat is the competent authority on behalf of the Ministry of Infrastructure and the Environment, the Ministry of Economic Affairs and the Ministry of Defence. The procedure in accordance with the comprehensive assessment framework for permits helps to achieve and maintain the good environmental status and associated targets for 2020, as set out in Marine Strategy Part 1.
Spatial assessments are drawn up for functions that are not subject to permits (shipping, some military uses and recreation) when policy is reviewed. Another exception concerns fishing activities in the EEZ. This is regulated by the Common Fisheries Policy of the European Union.

The comprehensive assessment framework for permits is applied according to a fixed procedure with the following key weight factors: the spatial planning aspects, safety, and the effects on ecology and the environment. Basic assumptions for the assessment are the stipulations under the EIA Directive and the fact that the North Sea is part of the National Ecological Network (NEN). Because both the precautionary principle and the ecosystem approach apply here, the assessment can lead to attaching conditions and restrictions to a permit. The principle entails a user having to take preventative measures if there are reasonable grounds for concern that the activity could

[102] Insofar as this pertains to the aspects affecting the North Sea water system.

cause potential irreparable damage to the marine environment, human health and/or other lawful use. Adequate proof of a causal relationship between activity and consequences will not be required then.

Under the Nature Conservation Act, a permit must be requested for each activity that possibly has a significantly negative impact on a Natura 2000 area. If a significant impact can be expected, the Nature Conservation Act requires that the following actions be taken: seek alternatives, justify imperative reasons of overriding public interest[103] and compensate effects. Management plans govern the use of the Natura 2000 areas. When management plans are drawn up, activities of designated uses are assessed against the requirements of the Nature Conservation Act and, if the outcome is positive, are exempted from the permit requirement. For the protection of species (especially marine mammals, birds and non-commercial species of fish), the Flora and Fauna Act imposes a duty of care on the initiator of a particular activity. This duty comprises a ban on the killing, injuring or disturbing of said species. An exemption from this ban can be obtained under certain conditions.

[103] The motivation set out in the Policy Document on the North Sea 2016-2021 can be used for activities of national interest.

6. Exploratory studies and opportunities for the future

6.1 Introduction

The policy for the North Sea (see draft Policy Document on the North Sea 2016-2021) essentially comes down to managing, together with social partners, by desired use in space and time, ecology and economy, and continued development of the natural potentials of sea and coast. In this respect, the central government strives to achieve the highest possible level of combinations of uses. In some instances, uses must be kept separate for reasons of safety or vulnerability of the ecological system, for example. The Marine Strategy is a comprehensive framework for the development and implementation of the policy to achieve or retain the good environmental status. Chapter 4 of the MSFD programme of measures contains concrete details on this.
But because developments are by definition ongoing, the MSFD also requires adaptive management, a look ahead, picking up potential problems before they occur and seizing opportunities for further sustainability. The ambition to ensure a healthy sea and a sustainable use calls for unfaltering alertness to opportunities to enhance the sustainable use of the North Sea, to further limit pressure on the marine environment and the ecosystem, and, where possible, to actively foster recovery of the North Sea ecosystem. Based on this line of approach to making the most of opportunities and solving problems (potential or actual), a number of enquiries have been formulated. The results of the exploratory studies will feed the goals and measures for the second MSFD cycle starting from 2018 or lead to earlier adjustments if desirable and possible.

The description of the exploratory studies in the following sections is arranged according to the three starting points for policy: sustainability of use (6.2), area-based and species-oriented approach (6.3) and active ecosystem restoration (6.4).

6.2 Rendering use sustainable

The MSFD programme of measures consists largely of measures for promoting sustainable use and preventing or reducing adverse effects on the marine ecosystem. The following sections describe the exploratory studies and opportunities that the Cabinet addresses and examines – in addition to already defined measures – in order to find alternatives to current, non-sustainable use, or to exploit opportunities that merge economic growth, innovation and further sustainability.

iSea: Stimulating ideas for sustainable use

iSea is a networking event for innovative entrepreneurs. iSea is aimed at all those who have a vision or idea for sustainable use of the North Sea. The aim is to encourage the various sectors that use the North Sea to develop innovative ideas and accelerate the implementation of promising ideas. Ideas for all sorts of uses of the North Sea are welcome, from shipping and fisheries, power generation and hydraulics to developments in nature and the environment, such as preventing marine waste. Workshops are held on financing, enterprise and subsidies. Inspiring presentations lead to entrepreneurs sharing best practices and highlight the latest successful innovations. The most important event of iSea is the Clash of the Concepts, a pitch parade of sustainable ideas that are assessed by a professional jury. First prize is an innovation voucher that can be spent at one of the major knowledge institutions, plus a similar contribution from the institute of choice, and one-on-one support from the government in putting the idea into practice. iSEA is organised by Rijkswaterstaat once every two years.

Aquaculture and mariculture

Developments in aquaculture/mariculture within the EU are mainly geared towards innovation and deepening knowledge for the purpose of increasing production and sales. This type of food and raw material production might provide a discrete sustainable future prospect, in addition to a more sustainable fishing industry.
The new Common Fisheries Policy includes the provision that the member states draw up a National Strategic Plan for Aquaculture (NSPA) on the basis of a long-range vision on the sustainable development of aquaculture/mariculture. The Netherlands' National Strategic Plan for Aquaculture was adopted in July 2014. This long-term plan is also the basis for the aquaculture innovation scheme that is to be established. The first subsidy tender will be opened in spring 2016. In the Netherlands, several developments are underway in this area, some of which are still in the idea stage, some already in a test phase: a pilot for the cultivation of seaweed (North Sea Farm Foundation) and a study carried out by IMARES into the viability of mussel culture by means of the suspended culture technique (hanging method) at offshore wind farms. In the context of improving shared use/multi-purpose use of the North Sea, various workshops are organised to explore the possibilities of aquaculture/mariculture in more detail. International research (Mermaid) is being conducted into the use of Multi-Used Platforms. Over the coming years, studies, experiments and pilot projects will be carried out to see whether proposed ideas and activities are technically and economically feasible. For those that are deemed technically and economically feasible, opportunities can be seized to combine sustainable economic growth and a healthy marine system.

Designating areas with low NOx emissions (NECA)

MARPOL Annex VI provides the possibility of designating seas as NOx Emission Control Areas (NECA). New ships must meet rigorous nitrogen oxide (NOx) norms in those areas. The North Sea countries have invited the Baltic states to simultaneously submit an application to the IMO to have the North Sea and the Baltic be declared a NECA. HELCOM is considering this request. This will eventually reduce NOx emissions. Because this norm applies only to new ships, this measure will only have effect in the long term.
In 2012 investigations were conducted into the implications of the North Sea being designated a NECA for the economy, the environment and a possible modal shift. Evidently, NOx emissions from shipping in the North Sea are responsible for 7 to 24% of the average on-shore NOx concentrations in the North Sea coastal states. A NECA in the North Sea will reduce this percentage to about one third by 2030: 2 to 8%, and even more after 2030[104].
Between 2005 and 2012 nitrogen oxide emissions in the Dutch part of the EEZ dropped by 22%, mainly due to the economic crisis.

Use of lead in recreational fishing

The lead content in inland and coastal waters meets the norms of the WFD and lead in the North Sea is not considered a problem substance at OSPAR level either.
Current policy, such as the ban on lead drinking water pipes and lead pellets for hunting, helps to reduce the use of lead and to encourage the use of environmentally friendlier alternatives to lead flashing in the construction sector. As a consequence of the results of existing policy, the loss of sinkers by anglers, along with the loss of lead in the construction industry, is still the greatest source of lead pollution in Dutch waters. It is estimated (by wide margins) that anglers loose approximately 54,000 kg of lead each year in the inland waters and between 26-470,000 kg of lead

[104] Hammingh, P., Holland, M.R., Geilenkirchen, G.P., Jonson, J.E., Maas, R.J.M.. *Assessment of the environmental impacts and health benefits of a nitrogen emission control area in the North Sea,* PBL Netherlands Environmental Assessment Agency (2012)

in the coastal waters[105].
Some of the accumulating amount of lead dissolves permanently, particularly in a high energetic environment. lead normally sinks into the sea-floor or the riverbed. If current use (and hence the loss of lead) persists, it is only a matter of time before norms are exceeded in the sea-floor and riverbeds, mainly at places where a lot of fishing occurs. Furthermore, those who mould their own sinkers run the risk of damaging their health. Consequently, the current use of sinkers cannot be considered sustainable in the long run.
Environmentally friendly alternatives are available, albeit to a limited extent. They appear to be especially suitable for the heavier weights, which are used mainly by coastal fishermen. The manufacture of iron alternatives for the small weights (<80 grams) is still proving to be difficult; however, there are alternatives made of stone, pewter and glass. The development of various alternatives was co-financed by the Water Framework Directive Innovation Programme between 2008 and 2011. The cost price of these alternatives is higher than the current retail prices of sinkers. This is due to their higher production costs and as yet limited production volume.
Given the potential risk to the environment and the availability of alternatives for sustainable use, the Cabinet, in conjunction with stakeholders such as Netherlands Sport Fishing, district water boards and NGOs, launched an investigation into effective measures to demonstrably reduce the use and sale of lead sinkers over time. In this respect, it is being investigated whether closing a green deal for this topic is a viable option. Because the target group comprises 470,000 marine recreational fishers, support and proper communication are important preconditions. The Netherlands can perhaps benefit from the experiences in England, where it is mandatory to use pewter as an alternative to small lead weights. Denmark has had a ban in place on the production, import and sale of lead sinkers since 2005.

Alternative to dolly rope

The bundles of blue or orange plastic fibres that are attached under the end of fishing nets to protect them from wearing on the seabed are called dolly rope. During operational use, it is the dolly rope and not the nets that wears, leaving many filaments of loose fibre behind in the marine environment. Dolly rope is also released into the sea during maintenance on the nets.
As a result, birds become entangled in the fibres, plastic particles end up in the food chain, and beaches become polluted with the dolly rope. Monitoring of marine litter along the coast shows that for every 100 metres of beach more than 100 visible pieces of dolly rope can be found. Loose fibres of dolly rope make up an important portion of the plastic waste in the North Sea. The first concrete steps were taken in 2013 to find a sustainable alternative to dolly rope and within 5 months promising materials were selected and tested at sea. The project continued throughout 2014 and 2015 with national and international cooperation between the fishing industry, NGOs, research institutes and governments. Once an alternative with the same protective properties but without the risk of depositing plastic material in the marine environment has been found, this alternative will be considered for large-scale implementation together with the stakeholders.

Reducing interaction with fixed fishing gear

This exploratory study investigates how to prevent trawlers from getting caught up in the fixed nets (gill nets, crab pots). Central reporting of fixed net positions is not required, nor is it to mark them on digital maps. If nets are not marked properly, vessels can unintentionally tow their gear through them. This happens at least once a year per fishing vessel, with the consequence of not only economic damage (loss of fishing time and loss of nets), but also increased litter due to

[105] Deltares, *Emissie van lood door de sportvisserij in zoete en zoute wateren (Lead emissions by recreational fishing in fresh and salt water)* (2014)

tattered nets being left in situ or thrown overboard. Better communication concerning the locations of gill nets can help solve this problem.

Reduction of emissions of microplastics by sources on land

This exploratory study examines the possible reduction of emissions of microplastics by paint, abrasive cleaning agents and car tyres as land-based sources. The report drawn up by the National Institute for Public Health and the Environment (RIVM) entitled 'Inventory and prioritisation of resources and emissions of microplastics' is an important basis for taking measures[106] on a national level. This report contains a preliminary inventory of land-based sources from which microplastics end up in the marine environment. Possible measures are being explored in consultation with stakeholders. The administrative cooperation between the central government, district water boards, provinces and municipalities centred on reducing microplastics is given shape in the Clean Water Work Programme. The goal is to decide in 2016 on the course of action for taking measures.

Support for a common approach within Europe is also being explored; European legislation is one of the elements that need to be considered. At the end of 2015 the Ministry of Infrastructure and the Environment organised a meeting in cooperation with OSPAR on potential measures to reduce emissions of microplastics on an international scale. Decisions on measures to be taken by OSPAR countries are not expected before 2017.

Innovation measures with respect to underwater noise

Impulse noise
In 2016 the Ministry of Defence will develop a new regulation to expand restrictions on effects of explosives clearances and introduce feasible alternative techniques or mitigating measures (see Section 4.9.2). The Ministry of Defence will explore together with international partners whether the future will bring alternative technologies that can further reduce damage to the marine environment.

The Ministry of Defence will continue its research into the effects of sonar signals, identifying conditions that necessitate mitigation measures for the use of sonar. This will be done in cooperation with European and NATO partners and experiments will be carried out at sea.
The Ministry of Defence will verify across departments and on an international level whether the current method for assessing the risk of the use of sonar still dovetails sufficiently with developments in assessing cumulative effects of impulse noise (pile-driving, seismic surveys and sonar). The Ministry of Defence will amend regulations accordingly.

Background noise
There is as yet no concrete evidence to suggest that an increased level of background noise in the Dutch part of the North Sea has harmful consequences for the marine ecosystem. It is premature to already define as a precautionary measure a concrete goal for (accumulation of) background noise; however, the Netherlands does keep up with developments and research into the effects of background noise, as well as mitigation possibilities. Dutch institutes participated in the FP-7 research programmes SONIC and AQUO. If as a result of this exploratory study additional measures are deemed necessary, the Netherlands will not take autonomous action but will seek to coordinate matters through the IMO.

[106]Verschoor, A., et al. *Inventarisatie en prioritering van bronnen en emissies van microplastics (Inventory and prioritisation of resources and emissions of microplastics),* RIVM Brief Report 20140110 (2014)

6.3 Area-based and species-oriented approach

Regional interests in the North Sea must be weighed up. The Netherlands weighs up these interests by developing a vision on the entire area. Functions and uses can clash, but can also be combined or even reinforce each other. The North Sea policy for 2050 emphasises multipurpose use; a combination of functions on the basis of comprehensive planning in space and time. In the vision on the region with a look ahead to 2050, sub-areas will be used in future times for just one function for reasons of security or vulnerability of the marine environment (temporary or permanent). The Cabinet also aims to encourage combinations with nature by way of the 'building with nature' concept. For example, more added value can be created through synergy of nature and designated economic uses such as wind energy, sand extraction and food supply. Inspiration for this can be drawn from the North Sea 2050 Spatial Agenda[107]. In this respect, the Marine Strategy integrates the preconditions for a healthy marine ecosystem and environment.
Chapter 4 especially highlights the protection of marine areas as a way to restore the ecosystem. This section is mostly about building with nature, which can possibly help improve the quality of the ecosystem as well as providing new opportunities for sustainable and innovative use.
The species-oriented approach in this section focuses mainly on research into measures to restore the shark and ray populations, and research into the activities within the compass of the Porpoise Protection Plan.

Hard substrate

In the nineteenth century, one third of the Dutch part of the North Sea was covered with extensive deposits of hard substrate such as shellfish banks (of the flat oyster, for instance) and peat deposits. The ecosystem and food webs were different from today. Most of the hard substrate disappeared by the first half of the twentieth century, especially as a result of human activities. A limited area of hard substrate still exists in the form of gravel and rocks on the Cleaver Bank and the Borkum Reef Ground and spread more widely over the seabed in the form of wrecks and the foundations of offshore platforms and wind farms. It should be borne in mind that artificial objects are temporary by definition: wind farms and platforms are removed after some time and wrecks decay or are removed for safety reasons.

In Marine Strategy Part 1, the Cabinet announced an exploratory study into the significance of artificial hard substrates such as wrecks and into the question of how to deal with them, also in an international context. The Cabinet aims to take a policy stance based on the exploratory study. In the 2012-2014 period studies were carried out[108], including an expedition to wrecks in the North

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[107] *North Sea 2050 Spatial Agenda. Report on a joint investigation into the potential of the sea and coastal areas in the long term, translated into a vision, ambitions, opportunities and assignments, and in maps,* Appendix to Dutch House of Representatives, 2013-2014 session, 33450, no. 24

[108] Didderen, K., Lengkeek, W., Coolen, J.W.P. and Waardenburg, H.W. , *Harde substraten en biodiversiteit - vooronderzoek naar kunstmatige objecten in de Noordzee (NCP) (Hard substrates and biodiversity - preliminary research into artificial objects in the North Sea (DCS))*, (12-450) Bureau Waardenburg (2012); Worm, J. *Onderzoek juridische bescherming scheepswrakken (Investigation into the legal protection of shipwrecks)*, WaterPlanetEarth (2012);
Lengkeek, W., Didderen, K., Dorenbosch, M., Bouma, S. en Waardenburg, H.W., *Biodiversiteit van kunstmatige substraten (Biodiversity of artificial substrates). Een inventarisatie van 10 scheepswrakken op het NCP (An inventory of 10 shipwrecks on the Dutch Continental Shelf,* (13-226) Bureau Waardenburg (2013). Jager, Z., *Biodiversiteit kunstmatig hard substraat in de Noordzee (NCP) (Biodiversity of artificial hard substrate in the*

Sea, and comparative research was conducted into the ecology on (artificial) hard substrates throughout the southern part of the North Sea and along its shores. Stakeholders were consulted when the North Sea Spatial Agenda 2050 was drawn up and during the National Shipwrecks Consultation. Possible legal frameworks for protecting wrecks were also considered. Cultural and historical values, the obligation to remove depreciated objects such as wind farms and offshore mining platforms, spatial coordination with other designated uses, cost aspects and opportunities for sustainable development were also taken into account. In the first instance, wrecks are to be removed (immediately after sinking). In second instance, the Nairobi Convention is consulted to determine whether a wreck may remain submerged or whether it must be partly or entirely removed. In principle, old wrecks may be left undisturbed (no removal obligation).

It is evident that objects such as wrecks, wind farms and offshore platforms have a very high as well as different biodiversity than their mostly sandy surroundings. They can be a refuge and a breeding ground for species such as cod and sea bass. Studies show that, depending on the location and shape (e.g. cavities and walls), the biodiversity on wrecks and wind farms is comparable to that on natural hard substrates along the British and French coasts and to that on the still remaining natural hard structures on the sea-floor.

Even so, the significance of such objects as stepping stones for the spread of various species of organisms or for the functioning of the North Sea ecosystem as a whole is of less overriding importance. For the purposes of the MSFD, there is therefore no immediate reason as far as the North Sea is concerned for the central government to actively protect such existing artificial hard substrates or to leave any of the depreciated objects where they are.

Conversely, well thought-out introductions of a certain hard substrate at ecologically suitable sites can be a purposeful contribution to ecological values of the North Sea or to active ecosystem recovery. Examples include specific measures targeted at sharks and rays, recovery of flat oyster banks and well thought-out building with explicit consideration for nature.

Rip-rap that protects the foundation of wind turbines can consist of specially shaped rocks to which many organisms can attach themselves. This provides opportunities for nature to develop in combination with sustainable use such as aquaculture or sustainable forms of fishing (lobster, crab, sea bass). This can become increasingly more significant when wind farms are constructed on a large scale. They can also be test sites for active restoration of natural hard substrates such as oyster banks (see Section 6.4).
These are some examples of the kind of shared use of wind farms that the Cabinet aims to bring about, besides other combinations such as wave and tidal energy or other sustainable forms of food supply (see Section 4.3 of Policy Document on the North Sea 2016-2021).
Depending on how these win-win programmes develop, on the collection of relevant knowledge and on the shared use of wind farms, this can ultimately lead to alternative 'end of life' strategies for depreciated wind farms or oil and gas platforms. The six-yearly update of the Marine Strategy is a natural point in time to evaluate these developments and possibly link policy conclusions to them. Furthermore, the planned expansion of legislation for underwater archaeology and cultural heritage can also be of significance to the local ecology of historic wrecks. As regards the enforceability of the Flora and Fauna Act and the Dutch Monuments and Historic Buildings Act on the North Sea and in preparation of the new Nature Conservation Act and Heritage Act, the Netherlands is aiming for a set of agreements between stakeholders (code of conduct) for activities on and around wrecks.

North Sea (DCS), (ZW 2013-04). ZiltWater Advies (2013); Moorsel, G. van *Biodiversiteit kunstmatig hard substraat in de Nederlandse Noordzee (Biodiversity of artificial hard substrate in the Dutch part of the North Sea); vergelijking met natuurlijk substraat (comparison with natural substrate)*, EcoSub (2014)

Action Plan for Sharks and Rays

The Cabinet will finalise an action plan for the recovery of vulnerable sharks and rays in the North Sea (Action Plan for Sharks and Rays) by the end of 2015. The plan is aimed at preventing the by-catch of sharks and rays, increasing the survival rate of discarded fish and, by means of communication and education, improving the recognition and increasing the awareness of the role of sharks and rays in the ecosystem. Spatial protection measures will also be investigated.

Porpoise Protection Plan

Porpoises are protected by law, partly as a consequence of international conventions, directives (Habitat Directive) and agreements (Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas; ASCOBANS). The Dutch Cabinet has therefore adopted a Porpoise Protection Plan for the Dutch part of the North Sea with the aim preserving the porpoise and reducing in disruptive pressure factors. The plan gives specific attention to by-catch and loud impulse noise. There are, however, many more unanswered questions. Therefore, the impact of the by-catch of porpoises and the effects of underwater noise will be researched in more detail. Based on the results of this research, the possible necessity of additional measures will be considered, taking natural influences into account.

Concrete actions include:
- setting up a national scientific commission to supervise the implementation of the prioritised knowledge agenda;
- monitoring (or intensifying monitoring) the population, ascertaining the size and growth or decline data. In 2014 this monitoring was implemented via the MSFD monitoring programme. The aims are: to hold a regular six-yearly international survey;
- to conduct a scientific by-catch observation programme;
- to conduct research into the controlled use of pingers;
- to amend the relevant European fishing regulations, making them applicable to the Dutch situation.

Brown Ridge and Borkum Reef Ground

In 2012 research was done into possible additional Natura 2000 areas. This research showed that the Gas Seeps and Zeeland Ridges areas did not meet the criteria for designation as Natura 2000 areas. These areas therefore do not need specific area protection under the Birds and Habitats Directive. A follow-up study was conducted for the Borkum Reef Ground and Brown Ridge areas. Based on this study, the Borkum Reef Ground will not be designated as a Natura 2000 area[109]. This area will be included in the evaluation of the network of marine protected areas as part of the update of the assessment of the environmental status of the North Sea in 2018 (update to Marine Strategy part 1). The possible designation of Brown Ridge as a Natura 2000 area based on the Birds Directive will be decided in the first half of 2016.

6.4 Active ecosystem recovery

Up to the beginning of the twentieth century, one third of the North Sea was covered in hard (biogenic) substrates such as oyster and shell reefs, tube worm thickets (Sabellaria), stones and gravel and peat deposits. In those days, the characteristics of the ecosystem and the food web

[109] Dutch House of Representatives, 2014-2015 session, 33450, no. 42.

differed from today. Substantial, natural hard substrates in the Dutch part of the North Sea can only still be found in places like the Cleaver Bank. As described in Section 6.3, wind farms, oil and gas platforms and wrecks are temporary hard substrates for all kinds of life. According to Natura 2000 and MSFD, the current protection of marine areas might lead to the spontaneous recovery of some of these vulnerable habitats. As described in Chapter 4, the central government aims to investigate the extent to which this 'missing link' of natural hard substrates can be actively restored in a coherent marine ecosystem and to what extent other functions can make sustainable use of those substrates. A few promising initiatives will therefore be developed in the coming years that can lead to extra biodiversity enrichment and possible restoration of the marine ecosystem. Also, a pilot will be carried out to investigate whether the Atlantic sturgeon has any chance of returning to this part of the world now that the water quality of the Rhine has improved significantly, barriers in the migration routes are being removed and fishery is becoming more sustainable.

Pilot study into the reintroduction of the flat oyster and shell reefs

Shell reefs, and especially flat oyster banks, used to be an important habitat in the North Sea. Many marine species are dependent on a hard base, which the flat oyster banks once were, to establish themselves. The uneven surface provides shelter from predators and serves as a nursery for fish. With the disappearance of virtually all shell reefs, an important link in the marine ecosystem of the North Sea has been lost as well. Now there seem to be a opportunities to restore flat oyster banks and shell reefs in the North Sea.
By order of the Ministry of Economic Affairs and the Ministry of I&E, Imares Wageningen UR and partners explored the possibilities of the flat oyster recovering and the conditions that must be met for that recovery[110]. On the basis of that exploratory study and also on the initiative of a number of environmental organisations, it will be determined where in the Voordelta small-scale restoration experiments can be conducted with flat oyster banks as well as with mussel banks. This initiative is a first step towards potential recovery in other parts of the North Sea as well.

Pilot study into the reintroduction of Atlantic sturgeon

The Ministry of Infrastructure and the Environment is sponsoring a feasibility study on the reintroduction of Atlantic sturgeon in the Rhine. The Atlantic sturgeon is a top predator that can be considered virtually extinct in the North Sea and in the rivers of north-western Europe. It is a migratory fish that can grow big and old: its presence in healthy numbers in the food web points to a properly functioning fresh water and salt water ecosystem. The Worldwide Fund for Nature (WWF) has picked the European sea sturgeon (Acipensersturio) as a model species for a healthy river system. The Rhine is now one of the cleanest major rivers in Europe and plants and animals are returning sooner than expected. With the partial opening of the Haringvliet Locks (the Haringvliet Locks Management Decree; see Section 4.2.2) the conditions should also be suitable. The sturgeon is not expected to colonise the Rhine again without human intervention. Sturgeons were first released in 2012 during the WWF's 50th anniversary. As part of the feasibility study, 53 young sturgeons were released in June 2015.

[110] Smaal, A.C., Kamermans, P., Van der Have, T.M., Engelsma, M. and Sas, H.J.W. *Feasibility of Flat Oyster (Ostrea edulis L.) restoration in the Dutch part of the North Sea*. IMARES Wageningen UR, report C028/15 (2015)

7. Knowledge Gaps

7.1 Knowledge for implementation

As stated in Marine Strategy Part 1, research to fill the knowledge gaps is an important part of the MSFD implementation. Focus areas are relatively 'new' topics, such as sources and effects of marine litter and underwater noise, and the (cumulative) effects of human activities on the quality of the ecosystem. To analyse the issues and direct a study, the Ministry of Infrastructure and the Environment has drawn up a knowledge agenda for the North Sea. Knowledge for policy and management, and knowledge required for the MSFD and related policy fields are integrated in that agenda. This complements and builds on existing policy for the North Sea – also in the spirit of the MSFD.

The most critical knowledge gaps have been identified specifically for the MSFD. Some gaps are related to the implementation of measures. Other questions concern the composition and functioning of the marine ecosystem and measuring and assessing the effects of human activities. This part of the knowledge agenda is also included in Marine Strategy Part 2, the MSFD Monitoring Programme.

Knowledge must be available at the right time. Benchmarks for this are OSPAR's Intermediate Assessment in 2017, the update to the national assessment of the environmental status of the Dutch part of the North Sea in 2018 and the assessment of the achievement of the good environmental status by 2020. These deadlines determine the scheduling of research for the MSFD.

7.2 Internationally related knowledge agendas

Concurrent with the development of the Dutch knowledge agenda for the North Sea, OSPAR and the European Commission too identified the key knowledge questions. This shows that the MSFD is a structuring and converging factor: after all, all European member states with a maritime territory should perform the same tasks at the same time and mostly face the same knowledge gaps. Moreover, many research questions can understandably only be answered on a regional scale. Local differences due to geography, use or regulations allow for some diversity, but there is much interest within OSPAR and the European Commission to coordinate marine research. To this end, the Joint Programming Initiative Oceans (JPI Oceans)[111] was set up and many European research programmes now include a section on the MSFD.

In this context it is worthwhile to start up international research programmes that are partially funded by the European Commission. The Horizon 2020, Interreg and Life+ programmes and the European Maritime and Fisheries Fund (EMFF) give the impetus to do so. Furthermore, the Environment Directorate General, responsible for the MSFD, calls for joint projects designed to promote the consistency of the MSFD implementation among member states. These projects are financed from the share of the EMFF under direct management. The Netherlands has always promoted interaction between the national, the regional and the European tracks. For example, the Netherlands initiated the OSPAR knowledge agenda, which has strengthened our position. Moreover, the Dutch research institutes enjoy above-average success in international consortia. A recent example of a project co-funded by the European Commission which is directly related to the

[111] The joint activities within this JPI are geared towards the cooperation of all EU member states and associated countries that invest in marine and maritime research.

implementation of MSFD is 'Towards a Joint Monitoring Programme for the North Sea and the Celtic Sea'. This project unites almost all institutions responsible for monitoring the North Sea and the Celtic Sea. It is coordinated by Rijkswaterstaat.

7.3 Research projects by theme

This section describes the current and planned research projects by theme starting from 2014/2015. Long-term planning is under development and depends on the progress of the implementation process itself and on what possibilities there are for utilising European funds and for cooperating with neighbouring countries – especially on a North Sea scale. Third-party initiatives will be encouraged, provided they contribute to the priority knowledge questions. The results of the projects will be used to update the assessment of the environmental status of the Dutch part of the North Sea in 2018, unless stated otherwise. Results must be made available for this by 2017 at the latest.

Litter
Within the compass of OSPAR, the Ministry of I&E is contributing to the development and use of common indicators, including an indicator for waste lying on the seabed. In addition, much attention is given to gaining insight into the extent of the microplastics issue. For the development of indicators for microplastics, the central government is championing the standardisation of methods for measuring plastic particles in environmental media and the effects of microplastics in organisms and on ecosystems. Efforts also include determining trends in loads of plastic heading for the sea. The Interreg 2-SEAS project MICRO, for instance, investigated the presence of microplastics in the southern part of the North Sea and the potential damage to organisms. In partnership with the international Rhine Commission and Meuse Commission, knowledge is being amassed on the quantity of litter (including microplastics) entering the sea via rivers. National attention is given to the effects of nanoplastics on the safety of food harvested from the sea.

Underwater noise
Research into underwater noise is geared to obtaining a better understanding of the magnitude of the issue. The aim is to set environmental targets for background noise and accumulation of effects by 2018, and to develop and implement systematic monitoring. To gain a better insight into the effects of underwater noise (impulse noise and background noise) on the marine environment, the noise levels must first be mapped. Mapping concerns noise sources, the main noise disturbances and the temporal and spatial variations in those disturbances. The Netherlands is making preparations, on an OSPAR level with other countries in the North Sea region, for the monitoring of both impulse noise and background noise. The research subject is the relationship between noise exposure and its effects. This primarily concerns the cumulative effects and the effects on a population or ecosystem level. Where possible, this research should be international, enabling an assessment at regional level and allowing policy objectives to be drawn up by 2018 if possible.

Protected areas
The criteria for evaluating the intended coherent and representative network of protected areas in the North Sea will be worked out in more detail in collaboration with other North Sea countries. The aim is to draw conclusions together with the neighbouring countries for the purpose of updating the national assessments of the environmental status of the North Sea in 2018.

Cumulative effects of human use
Within the compass of OSPAR, the Ministry of Infrastructure and the Environment will help to test and apply methods for evaluating cumulative effects. The Netherlands (I&E) has initiated an international pilot for the intermediate assessment in 2017. This subject is high on the OSPAR agenda.

Marine ecosystems and stress factors
The Ministry of Economic Affairs continually invests in MSFD research and monitoring of the policy areas of nature and biodiversity, and fisheries. Examples include the research associated with investigating an action plan for sharks and rays and the Porpoise Protection Plan. In addition, investments are being made in increasing the understanding of the function of the marine ecosystem's resilience, the development of research tools to implement protective measures for the seabed in the Frisian Front and the Central Oyster Grounds, and the development of common indicators for biodiversity within the compass of OSPAR. For the purposes of fisheries, the Ministry of Economic Affairs is developing knowledge on sustainable fishing methods, such as pulse fishing, and healthy fish stocks. Furthermore, the Ministry is contributing to the development of common indicators for commercial fishing stocks within the compass of ICES.

Long-term developments
Within the scope of OSPAR, the Ministry of Infrastructure and the Environment is helping to effectively monitor acidification so as to gain a better understanding of changes in the ecosystem against the background of global long-term processes such as climate change. The Netherlands has launched the National Knowledge and Innovation programme for Water and Climate. This programme bundles the knowledge tasks in this field in order to create synergy and make more possible solutions available at the same cost. The consequences of climate change (acidification, rise in temperature), changes in human pressure on ecosystems and sustainable uses, such as aquaculture, integrated energy farms, recovery of shellfish culture and multiple use of space fall under the most critical knowledge and innovation questions. This research is aimed at a longer time scale.

8. Implementation section

8.1 Orchestration

The MSFD programme of measures contains approximately 70 measures (or packages of measures) that help to achieve the environmental goals in the Dutch part of the North Sea (see Appendix 2). The measures have an effect on a wide variety of predominant pressures[112]. Some measures focus on the main economic sectors in the North Sea, notably shipping, fishing, oil and gas extraction and wind energy. In addition, (economic) sectors and on-shore actors carry out various measures, especially in the basins of the main rivers: industry, agriculture, sewage treatment and transport (inland shipping). Other measures are aimed at protecting the North Sea environment and vulnerable areas, with the central government usually acting as licensor and manager.

Expectations are that this programme of measures, including the additional measures listed in this document, will bring the good environmental status within reach, provided, of course, that the adopted measures are actually implemented. The progress made with respect to the environmental status and the effectiveness of measures are measured by means of the MSFD monitoring programme. For the purposes of the second MSFD cycle, the Marine Strategy, and thus the programme of measures as well, will be evaluated. Article 15 of the MSFD provides the possibility to identify issues that cannot be addressed on a national level, but which require a European or international framework instead.
Many of the existing measures are implementations of European and international rules and agreements (such as IMO and OSPAR). Table 8.1 below contains an overview of how the measures are orchestrated: via laws and regulations, covenants and green deals, economic instruments or awareness activities. The table also includes measures for which a sector has voluntarily assumed responsibility.

8.2 Financial implications

Costs of current policies

Marine Strategy Part 1 contains an overview of the costs incurred each year to protect the marine environment. It shows that for its marine tasks, the government spends approximately €35 million per annum on policy development, policy preparation and coordination, management activities, policy evaluation and monitoring, and knowledge development. This is a small portion of the total costs for protecting the North Sea environment. Sectors that operate in and around the North Sea incur annual expenses of about €147 million for a very wide range of measures, such as: dismantling platforms, additional costs for storing polluted marine dredgings on land rather than strewing it at sea, and the costs shipping incurs for the use of port reception facilities. However, including a portion of the costs for purifying waste water in sewage treatment plants or of the manure policy in agriculture, the costs for protecting the marine environment easily amount to ten times the above-mentioned amount.

This far from complete list shows that the government's share is only a small proportion of the total expenditure on the protection of the marine environment. The fact that the majority of the costs of environmental measures is borne by the sectors that are responsible for the environmental

[112] Term used in the Marine Strategy Framework Directive (MSFD).

pressure is proof positive of the polluter pays principle. But, as stated in Section 3.3, certain sectors are experiencing difficult times, which puts the relevant sectors' means for funding additional MSFD measures under pressure. By implementing the package of measures in close consultation with the stakeholders, an attempt was made to create a feasible and affordable package of measures that can count on wide support.

Costs of additional MSFD policy task
In Marine Strategy Part 1, the Cabinet set the implementation budget relating to the policy and knowledge intensification that is required in the 2012-2020 period for implementing the MSFD at approximately €26 million. The amounts are already included in the long-term budget of the Ministry of Infrastructure and the Environment and the Ministry of Economic Affairs; see Table 8.2. These resources are used to flesh out the seabed protection in the Frisian Front and Central Oyster Grounds, for measures pertaining to litter (including microplastics), exploratory studies into the protection of species of porpoises, sharks and rays and the active restoration of oyster banks, the development of new indicators, knowledge programming (see Chapter 7), additional Natura 2000 monitoring and generating information for the MSFD monitoring programme for updating the initial assessment in 2017-2018 as a part of the preparations for the second cycle of the Dutch marine strategy.
Government spending relating to implementation, monitoring or policy development that contribute to the good environmental status but are already prevailing or planned within other existing legal frameworks is not included in the overview. The costs associated with the additional policy task for the CFP in relation to the MSFD will be covered by the current budget for the CFP and are therefore not included in Table 8.2.

Where possible and effective, the Cabinet uses the Marine Strategy to advocate international coordination and cooperation, as well as linking up with the EU programming. In the context of the MSFD programme of measures, the OSPAR Regional Action Plan Marine Litter calls for cooperation in protecting species and habitats and in investigating the effects of underwater noise. To this end, the best possible use is made of possibilities for EU co-funding.

Within the operational programme for the use of funds from the European Maritime and Fisheries Fund (EMFF) under shared management, the budget that is intended for maritime matters is spent on research and measures for reducing marine litter and underwater noise. This increases the budget for the implementation of the MSFD up to 2021 by €2.5 million for a period of seven years.

Table 8.2 Forecast of government expenditure for the intensification of the Marine Strategy 2013-2020 (x €1 MIL), supplementary to existing and initiated policy (not included in the table).

Activity	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Policy development and implementation	0.8 -	1.1	0.7	0.6	1.0	1.0	1.0	1.0	1.0
Knowledge and monitoring	2.2	2.2	2.1	2.1	1.7	1.7	1.7	1.7	1.7
Coordination, communication and public participation	0.2	0.2	0.12	0.12	0.07	0.07	0.07	0.07	0.07
Total	**3.2**	**3.5**	**2.92**	**2.82**	**2.77**	**2.77**	**2.77**	**2.77**	**2.77**

Sources:

- Multiannual -2024 Chapter 12, I&E/DGRW: MSFD and OSPAR items (own capital and BOA): 13.5 MIL (by year: 0.9 MIL 2012; 1.7 MIL 2013; 1.6 MIL 2014; 1.6 MIL 2015; 1.5 MIL Per year for 2016-2020 and beyond)
- Multiannual budget I&E/RWS 2012-2024 Infrastructure Fund: National Water Management and Basic information tasks 2.25 MIL (annual series: 0.25 MIL a year 2012-2020)
- Multiannual budget EA, Operational target 18.3, Maintaining international/national biodiversity and reinforcing our nature: 10.5 MIL (annual series: 2 2012; 1.5 2013; 1 MIL a year for 2014-2020)

Table 8.1 Overview of international regulations and implementation of measures in Dutch regulations.

1a measures	**European/ International regulations**	**National set of instruments**
Descriptor 1 Biodiversity		
Assessment of (large-scale) interventions and relevant compensation	Directive on the environmental impact assessment of certain public and private projects (011/92/EU)	Environmental Management Act, EIA Decree
Expansion of scope of Nature Conservation Act and Flora and Fauna Act		Flora and Fauna Act & Nature Conservation Act (soon to be the new Nature Act)
Restriction on fishing in the coastal zone	Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC)	Flora and Fauna Act & Nature Conservation Act (soon to be the new Nature Act)
Zoning and phasing of activities along the coast.	Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC)	Flora and Fauna Act & Nature Conservation Act (soon to be the new Nature Act)
Regulation of other activities within the coastal zone	Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC)	Flora and Fauna Act & Nature Conservation Act (soon to be the new Nature Act)
Descriptor 2 Non indigenous species		
Conditions attached to permits to prevent the spread of non indigenous species	Convention on Biological Diversity; Convention on the conservation of European wildlife and plants and natural habitats; Regulation (EU) concerning the use of alien and locally absent species in aquaculture (708/2007) Regulation (EU) on the prevention and management of the introduction and spread of invasive alien species (1143/2014;) Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC)	Flora and Fauna Act & Nature Conservation Act (soon to be the new Nature Act) Fisheries Act 1963 Regulation on the use of alien and locally absent species in aquaculture Policy rules laying down policy rules pertaining to shellfish relocations
Management of Natura 2000 areas (non indigenous species)	Convention on Biological Diversity; Convention on the conservation of European wildlife and plants and natural habitats; Regulation (EU) concerning the use of alien and locally absent species in aquaculture (708/2007) Regulation (EU) on the prevention and management of the introduction and spread of invasive alien species (1143/2014; enforcement expected as per 1 January 2015 Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC)	Nature Conservation Act (soon to be the new Nature Act) Fisheries Act 1963
Descriptor 5 Eutrophication		

Implementation of Annex V MARPOL Convention	IMO International Convention for the Prevention of Pollution from Ships (MARPOL)	Prevention of Pollution from Ships Act
Mandatory manure processing	Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrates Directive; 91/676/EEC); Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)	Manure Act
Urban waste water treatment	Directive on the treatment of urban waste water (91/271/EEC); Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)	Water Decree; Environmental Management Act
Descriptor 7 Hydrographic properties		
Assessment of hydrographic interventions and compensation for effects	EU Directive on the environmental impact assessment of certain public and private projects (2011/92/EU)	Environmental Management Act, EIA Decree
Descriptor 8 Pollutants		
Implementation of the Bathing Water Directive	Directive on the management of the bathing water quality and repealing of Directive 76/160/EEC (Bathing Water Directive, 2006/7/EC)	Bathing Facilities Hygiene Act/Decree
Reduction of discharges from shipping (MARPOL Annex V)	IMO International Convention for the Prevention of Pollution from Ships (MARPOL)	Prevention of pollution from ships Act
Ban on TBT	International Convention on the Control of Harmful Anti-fouling Systems on Ships (Antifouling Treaty)	Prevention of Pollution from Ships Act
Reduction of pollution by reducing shipping incidents	IMO (Shipping lanes)	Change of shipping lanes 1 Aug 2013
Reduction of discharges of pollutants from oil and gas installations	<u>Drilling</u> 1) OSPAR Decision 2000/3 on the Use of Organic-phase Drilling Fluids (OPF) and the Discharge of OPF-contaminated Cuttings 2) OSPAR Recommendation 2006/5 on a Management Regime for Offshore Cuttings Piles <u>Use and discharge of chemicals</u> 3) OSPAR Decision 2000/2 on a Harmonised Mandatory Control System for the Use and Reduction of the Discharge of Offshore Chemicals. Amended by Decision 2005/1 4) OSPAR Recommendation 2010/3 on a Harmonised Offshore Chemical Notification Format Amended by Recommendation 2014/17 5) OSPAR Recommendation 2010/4 on a Harmonised Pre-screening Scheme for Offshore Chemicals 6) OSPAR Recommendation 2005/2 on Environmental Goals for the Discharge by the Offshore Industry of Chemicals that Are, or Contain Added Substances, Listed in the OSPAR 2004 List of Chemicals for Priority Action 7) OSPAR Recommendation 2006/3 on Environmental Goals for	Mining Act and Mining Regulations; NOGEPA Environmental Covenant (1995-2010)

	the Discharge by the Offshore Industry of Chemicals that Are, or Which Contain Substances Identified as Candidates for Substitution <u>Discharge of produced water</u> 8) OSPAR Recommendation 2001/1 for the Management of Produced Water from Offshore Installations. Amended by OSPAR Recommendation 2006/4 and Recommendation 2011/8 9) OSPAR Recommendation 2012/5 for a risk-based approach to the management of produced water discharges from offshore installations <u>Other waste water from production processes</u> PARCOM Recommendation of a 40 mg/l Emission Standard for Platforms, 1986	
Preventing and limiting industrial emissions	Directive on industrial emissions (integrated pollution prevention and control) (2010/75)	Activities Decree on environmental management; Water Act; Decree and Regulations on environmental law
Reduction of environmental risks ensuing from major accidents	Directive on the control of major-accident hazards involving dangerous substances (Seveso III); Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)	Major Accidents (Risks) Decree 2015
Ban on discharging ships' waste from inland shipping vessels	Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)	Rhine and Inland Shipping Waste Decree + Scheme
Action Plan for Sustainable Plant Protection	Directive on sustainable use of pesticides (2009/128/EC); Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)	Plant Protection Products Act
Preparation, cooperation and coordination of disaster and incident control at sea		Act on maritime accident control in the North Sea; North Sea Incident Control Plan Decree; Memorandum on Maritime and aeronautical emergency aid in the North Sea 2010-2015; Cooperation agreement between the departments of Rijkswaterstaat for the prevention of coastal pollution; Cooperation agreement oil stained birds; Capacity Document 2006-2010.
International cooperation in case of disasters and incidents	Cooperation agreement on controlling pollution of the North Sea by oil and other harmful substances (Bonn Agreement); Bonn Agreement Counter Pollution Manual; International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties.	Act on accident control in the North Sea; Bonn Agreement Action Plan 2013-2016; Act on accident control in the North Sea.
Descriptor 9 Contaminants in fish		
Standards for contaminants in fish and fish products.	such as Regulation (EC) No. 1881/2006 and Regulation (EC) No. 396/2005	Directly enforceable
Descriptor 10 Litter		
(Cleaning) campaigns		Voluntary/Awareness and communication
Clean Meuse Limburg Approach		Awareness and communication

Sustainable Action Initiative		Awareness and communication
Stakeholder initiatives on beaches		Voluntary
Implementation of EU directive on port reception facilities	Directive on port reception facilities for ship-generated waste and cargo residues (2000/59/EC)	Prevention of Pollution from Ships Act
Ban on the discharge of garbage by ships (MARPOL Annex V)	IMO International Convention for the Prevention of Pollution from Ships (MARPOL)	Prevention of Pollution from Ships Act
Marine environmental awareness course	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (SCTW Convention)	Laws and regulations: Ministry of Education, Culture and Science education legislation
Fishing for Litter Programme		Voluntary; awareness and communication
Implementation of litter and waste policy		Awareness and communication
Voluntary reduction of microplastics in cosmetics in the Netherlands		Voluntary
Descriptor 11 Underwater noise		
Licensing procedure for wind farms	Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC)	Nature Conservation Act
Reducing impulse noise by means of the Code of Conduct for explosive ordnance disposal		Royal Navy Code of Conduct for detonating ammunition in the North Sea, 2005 (to be replaced in 2016 by new Navy Command regulation)
Regulations on sonar use		Regulation Navy Command-Operations Management MWC 230 Responsible use of active sonar (2015)
Amending regulations on seismic surveys	Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC)	Mining Act
Tax measures		
Fiscal incentives for environmentally friendly technologies (Environmental Investment Rebate (MIA) scheme/Arbitrary Depreciation of Environmental Investments scheme (Vamil)		Economic: Environmental Investment Rebate scheme (MIA) Arbitrary Depreciation of Environmental Investments scheme (Vamil)
1b measures		
Descriptor 1 Biodiversity		
Implementation of OSPAR List of threatened species and habitats	OSPAR Commission, *OSPAR List of Threatened and/or Declining Species and Habitats– correction 2014,* Reference Number 2008-6	Flora and Fauna Act & Nature Conservation Act (soon to be the new Nature Act)

	(2014)	
Restriction on fishing that disturbs the seabed at cleaver Bank, Dogger Bank and the Frisian Front.	Directive on the conservation of wild birds (Birds Directive; 79/409/EEC); Directive on the conservation of natural habitats and of wild flora and fauna (the Habitats Directive; 92/43/EEC); Regulation (EU) on the Common Fisheries Policy (1380/2013)	Flora and Fauna Act & Nature Conservation Act (soon to be the new Nature Act)
Haringvliet Locks Management Decree on the partial opening of the Haringvliet locks		Haringvliet Locks Management Decree
Descriptor 2 Non indigenous species		
Regulation on the prevention and management of invasive species	Regulation (EU) on the prevention and management of the introduction and spread of invasive alien species (1143/2014;)	
Countering the spread of species via ballast water	International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention); OSPAR Convention	Prevention of Pollution from Ships Act
Implementation of protocols for exemptions after Ballast Water Convention comes into force	International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Convention); OSPAR Convention	
Implementation of Hull Fouling Guidelines against growth of non indigenous species on ships' hulls	Convention on Biological Diversity; IMO Anti-hull fouling guidelines	
Descriptor 3 Commercial fish, crustaceans and shellfish		
Commercial fishing catch management	Regulation (EU) on the Common Fisheries Policy (1380/2013)	Directly enforceable
Minimising and phasing out of discards (landing obligation)	Regulation (EU) on the Common Fisheries Policy (1380/2013)	Directly enforceable
Encouraging alternative fishing gear		Economic instrument
Sustainable Seafood Certification	Regulation (EU) on the Common Fisheries Policy (1380/2013)	Directly enforceable
Descriptor 5 Eutrophication		
Fifth Action Programme of the Nitrates Directive	Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrates Directive; 91/676/EEC)	Manure Act Implementation Regulation
Delta Plan for Agricultural Water Management		Voluntary
Improvement of purification efficiency of sewage treatment plants		Voluntary
Descriptor 10 Litter		
Plastic Cycle Chain Agreement		Covenant
From Waste to Raw Material (VANG)		Policy programme
- Packaging Framework Agreement 2013-		Covenant

2022		
- National litter policy		Voluntary
- Plastic Cycle Chain Agreement		Covenant
- National Waste Management Plan 2		Policy programme
Reducing the use of plastic bags	Regulation (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards the consumption of lightweight plastic carrier bags.	Packaging management regulation
Descriptor 11 Introduction of energy, including underwater noise		
Implementation of IMO guidelines on the reduction of underwater noise from commercial shipping	Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life, IMO MEPC.1/Circ.833	Voluntary
Limitation of platform lighting on oil and gas platforms	Guidelines to reduce the impact of offshore installations lighting on birds in the OSPAR maritime area. OSPAR Agreement 2015-08 (2015)	tbd
2a measures		
Descriptor 6 Seabed protection		
Seabed protection in the Frisian Front and Central Oyster Grounds	Directive establishing a framework for Community action in the field of the marine environment (Marine Strategy Framework Directive (MSFD); 2008/56/EC); Regulation (EU) on the Common Fisheries Policy (1380/2013)	tbd
2b measures		
Descriptor 10 Litter		
Putting litter on the agenda of stakeholders and in education		Awareness and communication
Green Deal for Clean Beaches		Covenant
Agenda-setting for water managers		Awareness and communication
River basin oriented litter policy		Awareness and communication
Roll-out of Litter Collection Scheme		Rijkswaterstaat scheme; economic instrument
Green Deal for Ships' Waste Supply Chain		Covenant
Green Deal for Fishing in Support of a Clean Sea		Covenant
Awareness in the fisheries sector		Awareness and communication
Promoting the reduction of balloons		Voluntary
Aim for an EU ban on emissions of microplastics		tbd

in cosmetics and detergents		

Explanation of category classification: 1a: Measures from other policies that have been adopted and implemented; 1b: Measures from other policies that have been adopted but not yet (fully) implemented; 2a: Measures that build on existing implementation processes and go beyond what is agreed in those frameworks; 2b: New measures beyond existing frameworks.

Abbreviations

ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
BD	Birds Directive
BHD	Birds and Habitats Directive
CBD	Convention on Biological Diversity
CBS	Statistics Netherlands
CFP	Common Fisheries Policy
EA	Ministry of Economic Affairs
EC	European Commission
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
EMFF	European Maritime and Fisheries Fund
EU	European Union
Ff Act	Flora and Fauna Act
FIMPAS	Fisheries Measures in Marine Protected Areas
HD	Habitats Directive
HELCOM	Helsinki Commission; manages the Convention on the Protection of the Marine Environment of the Baltic Sea Area
ICES	International Council for the Exploration of the Sea
IDON	Interdepartmental Directors' Consultation on the North Sea
I&E	Ministry of Infrastructure and the Environment
IMO	International Maritime Organisation
LEI	Agricultural Economics Institute
MARPOL	International Convention for the Prevention of Pollution from Ships
MIA	Environmental Investment Rebate
MSFD	Marine Strategy Framework Directive
MSY	Maximum Sustainable Yield
NGO	Non-governmental organisation
NWP	National Water Plan
ODEMM	Options for Delivering Ecosystem-based Marine Management
OIM	Infrastructure and Environment Consultation
OSPAR (Convention)	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAHs	Polycyclic aromatic hydrocarbons
PRF	Port reception facility
RIVM	National Institute for Public Health and the Environment
RWS	Rijkswaterstaat (Directorate-General for Public Works and Water Management)
SCBA	Social cost-benefit analysis
STP	sewage treatment plants
TBT	Tributyltin
Vamil	Arbitrary Depreciation of Environmental Investments
UN	United Nations
WFD	Water Framework Directive

Sources

Arcadis, *Passende beoordeling Natuurbeschermingswet 1988 bij Nationaal Waterplan 2016-2021 (NWP2) (Appropriate assessment of the Nature Conservation Act 1998 as part of National Water Plan 2016-2021)* (2014)

Arcadis, *Planmer Nationaal Waterplan 2 (Strategic Environmental Assessment on National Water Plan 2), (2014)*

Arcadis, Voortoets Natuurbeschermingswet 1998 Bij Het Nationaal Waterplan 2 *(Preliminary Evaluation of Nature Conservation Act 1998 performed for the National Water Plan, (2014)*

Baggelaar, P.K., and Van der Meulen, E.C.J., *Evaluation and fine-tuning of a procedure for statistical analyses of beach litter data*. IcaStat/AMO (2014)

Bos, O.G., et al., *Biodiversity hotspots on the Dutch Continental Shelf. A Marine Strategy Framework Directive perspective*. IMARES Wageningen University & Research Centre report no. C071/11 (2011)

Brandsma, S.H., Nijsen, P., van Velzen, M.J.M. and Leslie, H.A., *Microplastics in zwevend stof en effluent, influent en zuiveringsslib RWZI's (Microplastics in airborne dust and effluent, influent and sludge from sewage treatment plants)* IVM-VU (2013),

CBS, 2014 (private communication by M. van Rossum)

CBS, *Economic description of the North Sea for the Netherlands, 2005-2008-2010-2011, edition 2014* (2014)

Deltares*, Plastic litter in the rivers Rhine, Meuse and Scheldt* (2013)

Deltares, *Emissie van lood door de sportvisserij in zoete en zoute wateren (Lead emissions through recreational fishing in fresh and salt water)* (2014)

Didderen, K., Lengkeek, W., Coolen, J.W.P. and Waardenburg, H.W., *Harde substraten en biodiversiteit - vooronderzoek naar kunstmatige objecten in de Noordzee (NCP) (Hard substrates and biodiversity - preliminary research into artificial objects in the North Sea (DCS)*. Bureau Waardenburg 12-450 (2012)

Ecorys, *Schoonmaakkosten KRM - Kostenkentallen voor opruimen zwerfvuil langs de Nederlandse stranden (MSFD clean-up costs - Cost figures for cleaning up litter along the Dutch beaches)* (2012)

Ecorys, *Schoonmaakkosten KRM - Bepaling van schade door afval in netten en schroeven (MSFD Clean-up Costs - Determination of damage from waste in nets and propellers)* (2012)

Ecorys, *Baseline Scenario Marine Strategy Framework Directive* (2013)

Ecorys, *Quick Scan MKBA maatregelen Green Deals zwerfvuil (Quick Scan of SCBA measures in Green Deals for litter)* (2014)

Ecorys, *MKBA opruimen zwerfafval uit Rivieren (SCBA for cleaning up litter in Rivers)* (2014)

Eftec, Enveco, Intersus, *Recreational benefits of reductions of litter in the marine environment* (2012)

EIA Commission, *Tweede Nationaal Waterplan (NWP2), Toetsingsadvies over het milieueffectrapport (Second National Water Plan (NWP2), Assessment recommendation on the environmental impact statement)* EIA Commission report number 2995–36 (2015)

European Commission, *Article 12 Technical Assessment of the MSFD 2012 obligations. The Netherlands* (2014)

European Commission, *Programmes of Measures under MSFD Recommendations for establishment /implementation and related reporting* (2014)

European Commission, *Reporting on Programmes of Measures (Art. 13) and on exceptions (Art. 14) for the Marine Strategy Framework Directive* (2015)

European Environment Agency, *Marine Protected Areas in Europe's Seas – An overview and perspectives for the future*. EEA Report No 3/2015 (2015)

European Commission, *Naar een circulaire economie, een afvalvrij programma voor Europa (Towards a circular economy: A zero waste programme for Europe)*. COM (2014) 398 (2014)

European Commission, *Commission report to the European Parliament and the Council on progress in the establishment of marine protected areas (as required under Article 21 of the Marine Strategy Framework Directive 2008/56/EC).* European Commission COM (2015) 481 final (2015)

Fey-Hofstede, F., en Witbaard, R., *Factsheets Kaderrichtlijn Mariene Strategieindicatoren van het Friese Front en de Centrale Oestergronden (Fact sheets pertaining to Marine Strategy Framework Directive Indicators for the Frisian Front and the Central Oyster Grounds)*. IMARES Report C185/13 (2013)

Franeker, J.A., *Survey of methods and data analyses in the Netherlands OSPAR Beach litter monitoring programme*. IMARES, unpublished report (2013)

Franeker, J.A., Kühn, S., Bravo Rebolledo, E. L., and Meijboom A., *Fulmar Litter EcoQO monitoring in the Netherlands - Update 2012 and 2013*. IMARES report C122/14 (2014)

Van Hal, R., *Seafloor litter monitored using catches of the International Bottom Trawl Survey*. IMARES report C083/15 (2015)

Van Hal, R, and De Vries, M., *Pilot: collecting Marine litter during regular fish surveys*. IMARES report C112/13 (2013)

Van der Hammen, T. and De Graaf, M., *Recreational fishery in the Netherlands: demographics and catch estimates in marine and fresh water*. Imares report C147/13 (2013)

Hammingh, P., Holland, M.R., Geilenkirchen, G.P., Jonson, J.E., and Maas, R.J.M.. *Assessment of the environmental impacts and health benefits of a nitrogen emission control area in the North Sea,* PBL Netherlands Environmental Assessment Agency (2012)

Hougee, J.J., Van Franeker, J.A., Wenneker, B., Van Loon, W.M.G.M., and Oosterbaan, A., *OSPAR Beach Litter Monitoring In the Netherlands; Update 2012*. North Sea Foundation (2013)

IVM-VU, *Microplastics in sediment, biota and effluent* RWZI's (2013)

IVM-VU, *Microplastics in zwevend stof en effluent, influent en zuiveringsslib RWZI's* (Microplastics in airborne dust and effluent, influent and sewage sludge from sewage treatment plants) (2013);

Jager, Z., *Biodiversiteit kunstmatig hard substraat in de Noordzee (NCP)* (Biodiversity of artificial hard substrate in the North Sea (DCS). ZiltWater Advice 2013-04 (2013)

Kuhlman, J.W., and Van Oostenbrugge, J.A.E., *Bodemberoerende visserij op de Noordzee (Seabed-disturbing fishing techniques on the North Sea); Huidige situatie, recente ontwikkelingen en toekomstscenario's (Current situation, recent developments and future scenarios)* AEI Wageningen UR, AEI Report 2014-024 (2014)

Lengkeek, W., Didderen, K., Dorenbosch, M., Bouma, S., and Waardenburg, H.W., *Biodiversiteit van kunstmatige substraten. Een inventarisatie van 10 scheepswrakken op het NCP (Biodiversity of artificial substrates. An inventory of 10 shipwrecks on the Dutch Continental Shelf)* Bureau Waardenburg 13-226 (2013)

LEI, *How to achieve good environmental status in North Sea: Framework for cost effectiveness and cost-benefit analysis for the MSFD*, LEI Wageningen UR, AEI report 2011-036 (2012)

Lindeboom, H., Rijnsdorp, A.D., Witbaard, R., Slijkerman, D., and Kraan, M. *Het ecologisch belang van het Friese Front (The ecological significance of the Frisian Front).* Imares report C137/15 (2015)

LTO Nederland (Dutch Federation of Agriculture and Horticulture), *Deltaplan Agrarisch Waterbeheer (Delta Plan for Agricultural Water Management)* (2013)

Meulendijk-de Mol, P.,Van Nieuwerburgh, L. and Van Mastrigt, A., *Underwater noise social cost benefit analysis*. Royal Haskoning DHV BD4543-101-100/R/304326/Lond (2015)

Ministry of Infrastructure and the Environment , *Geen zand, geen land! (No sand, no land!) Voorstel 'Beslissing Zand': (Proposal for 'Decision on Sand':) Adaptatieagenda voor duurzaam behoud van de kust (Adaptation agenda for sustainable preservation of the coast)* (2014)

Ministry of Infrastructure and the Environment, *Noordzee 2050 Gebiedsagenda. Verslag van een gezamenlijk onderzoek naar de potentie van de zee en kustgebieden op lange termijn, vertaald in een visie, ambities, kansen en opgaven, en in kaarten (North Sea 2050 Spatial Agenda Report on a joint investigation into the potential of the sea and coastal areas in the long term, translated into a vision, ambitions, opportunities and tasks, and into maps)* (2014). Appendix to Dutch House of Representatives, 2013-2014 session , 33450, no. 24

Ministry of Infrastructure and the Environment, *Stroomgebiedbeheerplan Rijn/Maas/Scheldt/Eems 2016-2021 (River basin management plan for Rhine/Meuse/Scheldt/Eems 2016-2021)* (2014)

Ministry of Infrastructure and the Environment, *Samenvatting Maatregelprogramma Rijn/Maas/Scheldt/Eems (Summary of programme of measures for Rhine/Meuse/Scheldt/Eems)* (2014)

Ministry of Infrastructure and the Environment, *policy document on the North Sea 2016-2021* (2014)

Ministry of Infrastructure and the Environment, *Marine Strategy for the Dutch part of the North Sea 2012-2020, Part 1* (2012)

Ministry of Infrastructure and the Environment, *Marine Strategy for the Dutch part of the North Sea 2012-2020, Part 2, MSFD Monitoring Programme* (2014)

Ministry of Infrastructure and the Environment, *National Water Plan 2016-2021* (2014)

Moorsel, G. van, *Biodiversiteit kunstmatig hard substraat in de Nederlandse Noordzee; vergelijking met natuurlijk substraat (Biodiversity of artificial hard substrate in the Dutch part of the North Sea; comparison with natural substrate).* EcoSub (2014)

MSFD Technical Subgroup on Marine litter, *Guidance on monitoring of marine litter in European Seas*. JRC (2013)

OECD, *OECD Territorial Reviews: Netherlands* (2014)

Van Oostenbrugge, H., Slijkerman, D., Hamon, K., Bos, O., Hintzen, N., Bos, E. and Van de Wal, J.T., *Effects of seabed protection on the Frisian Front and Central Oyster Grounds. A Multi-criteria Cost Benefit Analysis*. LEI Wageningen UR (2015)

Oranjewoud, *Discussion document: Managing undesirable ship generated waste discharges in Marine Environments* (2012)

OSPAR Commission, *Guidelines to reduce the impact of offshore installations lighting on birds in the OSPAR maritime area*. OSPAR Agreement 2015-08 (2015)

OSPAR Commission, *OSPAR MSFD Advise Document on GES 7 – Hydrographical conditions*. OSPAR Committee of the Environmental Impact of Human Activities (EIHA) (2012)

OSPAR Commission, *Regional Action Plan Marine Litter* (2014)

OSPAR Commission, *Regional Plan to improve adequacy and coherence of MSFD implementation* (2014)

OSPAR Commission, *The North-East Atlantic Environmental Strategy* (2010)

Piet, G., Van der Sluis, M.T., and Paijmans, A.J., *Toepassing ODEMM-methodiek voor het Nederlandse KRM Programma van Maatregelen (Use of ODEMM methodology for the Dutch MSFD programme of measures)*, IMARES (2014)

Rijnsdorp, A.D., *Flyshoot visserij in relatie met de instelling van bodem beschermende maatregelen voor het Friese Front en de Centrale Oestergronden (Fly shoot fishing in relation to the implementation of seabed protection measures for the Frisian Front and the Central Oyster Grounds).* Imares report C065/15 (2015)

Scientific, Technical and Economic Committee for Fisheries (STECF) (in prep), *The 2014 Annual Economic Report on the EU Fishing Fleet (STECF-14-05)*. Publications Office of the European Union, Luxembourg, EUR 26158 EN, JRC 84745 (2015)

Van der Sluis, M., and Van Hal, R., *Collecting Marine litter during regular fish surveys*. IMARES report C065/14 (2014)

Smaal, A.C., Kamermans, P., Van der Have, T.M., Engelsma, M. and Sas, H.J.W. *Feasibility of Flat Oyster (Ostrea edulis L.) restoration in the Dutch part of the North Sea*. IMARES Wageningen University & Research Centre, report C028/15 (2015)

Socio-Economic Council, *Energy agreement for sustainable growth* (2013)

TNS-NIPO, *Enquete 'Afval in en rond de Noordzee', in opdracht van Stichting De Noordzee (Waste in and around the North Sea survey on the commission of the North Sea Foundation)* (2012)
Tweehuysen, G, *Maasonderzoek Gemeente Schoon* (*Clean Municipality Meuse research)*. Waste Free Waters (2013)

Urgert, W, *Rapportage afstudeeronderzoek metingen microplastics in water op meetstations Maas en Rijn (concept, OU) (Graduation research paper on measurements of microplastics in water at the monitoring stations on the Rhine and Meuse (draft, OU)* (2014)

Van der Veeren, R., and Keijser, X., *Economic and social analyses for the Marine Strategy Framework Directive. Part 2: Program of measures; Theme: Marine Litter* (2013)

Veerman, B., *Eindrapport Onderzoek naar de opslag van huisvuil aan boord van vissersschepen*, KIMO Nederland en België *(Final Report on Study into the storage of rubbish on fishing vessels). KIMO Netherlands and Belgium* (2014)

Verschoor, A., et al. *Inventarisatie en prioritering van bronnen en emissies van microplastics (Inventory and prioritisation of sources and emissions of microplastics)*. RIVM report 20140110 (2014)

VIBEG, *Vissen binnen de grenzen van Natura 2000 (Fishing within the boundaries of Natura 2000). Afspraken over het visserijbeheer in de Noordzeekustzone en Vlakte van de Raan voor de ontwikkeling van natuur en visserij (Agreements on fishery management in the North Sea coastal zone and the Raan Flats for the development of nature and fisheries)* (2011)

Vuik, J., and Van Rossum, M., *Economic description of the North Sea for the Netherlands.* CBS (2011)

Van der Wal, M., Van Meulen, M.D., Roux, E.W.M, Wolthuis, Y., Tweehuysen, G., and Vethaak, A.D., *Plastic litter in the rivers Rhine, Meuse and Scheldt, Summary report*. Deltares, 1206088-000-ZKS-0004 (2013)

Worm, J., *Onderzoek juridische bescherming scheepswrakken (Investigation into the legal protection of shipwrecks)*. Amsterdam, WaterPlanetEarth (2012)

Appendix 1 Good environmental status, environmental targets and indicators

Descriptor	Good environmental status 2020	Environmental target 2020	Indicators
marine ecosystem (includes the descriptors biodiversity, commercial fish, crustaceans and shellfish, food webs, integrity of the seabed)	• The biological diversity is maintained. The quality and occurrence of habitats and the distribution and densities of species are in line with prevailing physiographic, geographic and climatic conditions. • Populations of all commercial fish, crustacean and shellfish species are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock. • All elements of the marine food webs, to the extent that they are known, occur in normal densities and diversity and at levels capable of ensuring the long-term density of the species and the retention of their full reproductive capacity. • Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and that benthic ecosystems, in particular, are not adversely affected.	**Main target: structure of the ecosystem:** The interim target for 2020 is to reverse the trend of degradation of the marine ecosystem due to damage to seabed habitat and to biodiversity towards a development of recovery. This constitutes a first step towards a situation in which the marine ecosystem in the Dutch part of the North Sea can (in part) recover in the long term. This implies a structure in which the relative proportions of the ecosystem components (habitats and species) are in line with prevailing physiographic, geographic and climatic conditions. **Sub-targets:** **1. Species:** *Benthos:* a) Improvement of the size, quality and distribution of populations of long-living and/or vulnerable (i.e. sensitive to physical disturbance) benthic species. *Fish:* b) Improvement of the size, quality and distribution of populations of vulnerable fish species, in so far as deterioration is caused by human activity. This includes fish species with a long-term negative trend in population size and fish species with a low reproductive capacity (rays and sharks). As regards improving the status of the Habitats Directive species, the targets are in accordance with the national targets of the Habitats Directive. Items c and d below apply to commercial fish, crustaceans and shellfish covered by this description.	**Benthos indicator** (1) Aggregated indicators for distribution, occurrence and condition of representatives of long-living benthic species and biogenic structures sensitive to seabed disturbance. **Fish stock indicators** (2) The mortality of commercially exploited fish or – if values are not available for this – the (change in) Catch per Unit of Effort. (3) The spawning stock biomass of commercially exploited fish. (4) Size distribution of fish stocks, of both commercially exploited fish and vulnerable species. (5) Aggregated indicators for population size, distribution and health of sharks, skates and rays, fish species demonstrating a prolonged negative trend and migratory fish. (6) Fisheries discards. **Birds indicator** (7) Distribution, population size, health and future prospects of populations of vulnerable (endemic) bird species on the North Sea and the quality of the habitat. **Marine mammals indicator** (8) Distribution, population size, health and future prospects of populations of marine mammals and the quality of the habitat. **Demographic characteristics indicator** (9) Relevant indicators have already been mentioned under 'species'. **Food web indicators** (10) Share of large fish in catches of bottom species from the International Bottom Trawl Survey (IBTS): length-frequency distribution. There is a comparable OSPAR indicator: EcoQO large fish indicator (weight percentage of caught

		c) The fishing mortality rate (F) for all commercial fish, crustacean and shellfish stocks remains at the same level as or below the value of a Maximum Sustainable Yield, (MSY): F≤Fmsy. d) The Spawning Stock Biomass (SSB) of commercial fish, crustaceans and shellfish is above the precautionary level Bpa. e) Minimisation and, eventually, elimination of discards from fishing. *Birds:* f) The targets for Birds Directive species are in line with the national targets of the Birds Directive. For pelagic seabirds for which the Dutch part of the North Sea is important but no Birds Directive areas are designated, the aim is to attain a favourable conservation status on a regional scale. For species for which this is relevant, the decrease in food availability resulting from lessening fisheries discards and decreasing eutrophication are taken into account. *Marine mammals:* g) The targets for marine mammals covered by the Habitats Directive (common seal, grey seal and porpoise) are the same as the national targets under the Habitats Directive. *Demographic characteristics:* h) The demographic characteristics of fish, bird and marine mammal populations are indicative of resilient populations in terms of, for instance, natural size and age groups, male/female ratio, reproduction and mortality. Sub-targets c and d contribute to this sub-target for commercially exploited fish species. **2. food webs:** i) The effect of human interventions on interactions between the different trophic levels in the food	fish measuring over 40 cm in length). (11) Indicators for seabirds, marine mammals, and sharks and rays as top predators. The indicators referred to under 'species' can be used here. (12) Food relationships of key species (indicator still to be developed). **Habitats indicators** (13) Distribution and population size of common habitats (EUNIS level 3) and habitats under the Habitats Directive. (14) Seabed area that is not disturbed. (15) Indices for the composition of benthic communities. (16) Indicators for the quality of the various habitats at EUNIS level 3.

		web is being reduced where problems are identified. **3. Habitats:** j) The distribution and surface area of predominant habitat types remain more or less the same (i.e. within the limits of natural variation at EUNIS level 3). k) The special habitat types protected under the Habitats Directive are subject to the national targets of the Habitats Directive. l) Supplementary improvement of the quality of the deeper, silty parts and deeper, non-dynamic sandy seabeds in the Dutch part of the North Sea. The quality of the habitats relates to the physical structure, ecological function and diversity and structure of the associated species communities. m) 10-15% of the seabed of the Dutch part of the North Sea is not appreciably disturbed by human activities.	
Non indigenous species	Non indigenous species introduced by human activities occur at levels at which the ecosystem does not change.	Minimise the risk of new introductions of non indigenous species.	(17) The number of invasive exotic species present. (18) The number of new, invasive exotic species per year. (19) The ratio between densities or biomass of endemic species for a selection of specific species groups (phytoplankton, macrobenthos, fish) in Natura 2000 areas.
Eutrophication	Human-induced eutrophication is minimised, especially the adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.	• Reduce the concentrations of nutrients wherever they do not meet the Water Framework Directive, pursuant to its time line. • Algae biomass and blooms approximate 50% above the background value. The concentration of chlorophyll-a during the phytoplankton growth season (March - September) that is consistent with the good environmental status does not exceed 50% above the background value, in accordance with the Water Framework Directive goals (up to 1 nautical mile from the baseline) and OSPAR (beyond). • No increased occurrence of harmful algae blooms. • No oxygen deficiency due to eutrophication.	(20) Area-specific average winter concentrations (December-February) of dissolved inorganic nitrogen (DIN, a sum total of nitrate, ammonium and nitrite) and dissolved inorganic phosphorus (DIP). (21) Concentration of chlorophyll-a during the phytoplankton growth season (March-September). (22) Local oxygen deficiency in sedimentation areas and as a result of massive harmful algae blooms.

Hydrographic properties	Permanent alteration of the hydrographic properties does not harm the marine ecosystems.	Human activities do not result in permanent, large-scale negative effects on the ecosystem due to changes in the hydrographic conditions. **Operational target:** All developments must comply with the existing statutory regime (for example, directives concerning the environmental impact assessment of certain public and private projects, concerning the assessment of the consequences for the environment of certain plans and programmes, and the Habitat Directive) and regulatory assessments must take into consideration potential impacts arising from permanent changes in hydrographical conditions, including cumulative effects, at the most appropriate spatial scales following the guidance prepared to this end. (EUNIS level 3, reference year 2008). Within the framework of WFD implementation, targets and measures have been drawn up to improve the migration opportunities for diadromous fish.	(23) The size of the (seabed) area impacted. (24) The size of permanently altered habitat types. (25) Changed functions of habitats.
Contaminants	Concentrations of contaminants are at levels not giving rise to pollution effects.	• Counter the concentrations of contaminants where these do not meet the targets of the Water Framework Directive, pursuant to its timeline. • Ensure that concentrations of other known substances that meet the Water Framework Directive standards do not exceed current concentrations and, if possible, reduce those concentrations further. • A prevention target for currently observed effects of pollution from TBT and oil. **Operational target:** Occurrence and extent of significant, serious pollution events (e.g. slicks resulting from spills of oil and oil products or spills of chemicals) and their impact on biota that are adversely affected by this pollution should be minimised through appropriate risk based approaches.	(26) Concentrations of contaminants in water. (27) Concentrations of contaminants in biota. (28) The incidence of imposex in sea snails. (29) The percentage of washed up birds covered in oil.

Contaminants in fish products for human consumption	Contaminants in fish and other sea food for human consumption do not exceed the levels established by Community legislation or other relevant standards.	The levels of contaminants in fish and other sea food from the North Sea do not exceed the standards of national and international legislation.	(30-a) The frequency with which the applicable limits are exceeded. (30-b) The actual values measured. (30-c) The number of contaminants that, as measured, concurrently exceeded limits. (30-d) The source of contamination (geological versus anthropogenic, local versus remote).
Litter	Properties and quantities of marine litter, including their degradation products such as small plastic particles down to microplastics do not damage the coastal and marine environment, and the volume decreases over time.	• The quantity of visible beach litter has decreased (basic reference 2002-2009). • There is a decreasing trend in the quantity of litter in marine organisms (basic reference 2005-2009).	(31) Quantities, composition, distribution and sources of beach litter. (32) Quantities of plastics found in the stomachs of northern fulmars.
Underwater noise	The introduction of energy, including underwater noise, is at a level that does not adversely affect the marine environment. Loud, low and mid-frequency impulse sounds and continuous low frequency sounds introduced into the marine environment through human activities do not have adverse effects on marine ecosystems.	• Individual cases: preventing harmful effects on populations or the ecosystem, particularly on marine fauna, resulting from specific activities, such as pile-driving and seismic surveys. • Background noise and accumulation of effects on populations or the ecosystem: targets in 2018, when more knowledge has been gained.	• Distribution in time and space of loud impulse noises with a low or medium frequency, • Uninterrupted low-frequency noise.

Appendix 2 Operational targets of MSFD measures

Measure per descriptor per category	1a*	1b*	2a*	2b*	Operational targets	MA	TM
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Marine ecology (nos. 1, 3, 4 and 6)							
Assessment of (large-scale) interventions and their compensation	x				Permit requirement: preventing, mitigating, compensating for effects on nature and the environment, such as with respect to significant effects on BHD species and areas.	2	2,7
Expansion of scope of Nature Conservation Act and Flora and Fauna Act	x				Expansion of scope of Nature Conservation Act (BHD operationalisation) and Flora and Fauna Act to include EEZ.	2	2
Restriction on fisheries in the coastal zone	x				Termination of fishery with tickler chains as per 1 January 2016 for the purpose of preventing and mitigating significant effects on BHD species and areas (does not apply to shrimp fishing).	1	1
Zoning and phasing of activities along the coast.	x				Zoning and phasing of activities outside the breeding ground and breeding season: preventing and mitigating significant effects on BHD species.	1	3
Regulation of other activities in the coastal zone	x				Recovery of natural age composition of fish populations and benthic fauna and restoration of order for marine mammals and birds.	1	7
Implementation of OSPAR list of endangered animal species and habitats		x			Elaboration of plans for achieving the objectives of OSPAR's North-East Atlantic Environmental Strategy for 16 animal species and five habitat types.	1.2	7
Restriction on seabed-disturbing fishing techniques at Cleaver Bank, Dogger Bank and restriction on fishing in the Frisian Front.		x			Designation of Cleaver Bank, Dogger Bank and Frisian Front as Natura 2000 areas. Conservation goals have been established for each area.	1	1
Haringvliet Locks Management Decree for partial opening of Haringvliet Locks.		x			Restoration of migration of diadromous species of fish – HD and WFD.	1	7
Commercial fisheries catch management		x			Management of fish stocks in 2015-2018 at the level of a maximum sustainable yield (MSY) with related level of maximum fish mortality.	1	1
Minimising and phasing out of discards (landing obligation).		x			As per 1 January 2015, landing obligation of catches for (some) pelagic trawlers; as per 1 January 2016, landing obligation of all catches of target species determined by fisheries.	1	1
Encouraging alternative fishing gear		x			Introduction of alternative methods enabling more selective fishing.	1	1
Sustainable Fisheries Certification		x			Development and adoption of criteria for an eco label for fisheries and aquaculture at EU level.	4	6
Seabed protection in the Frisian Front and Central Oyster Grounds			x		Protection of 1200-4200 km^2 of the Dutch part of the North Sea against significant seabed disturbance.	1	1

Non indigenous species (no. 2)							
Permit conditions to prevent the spread of non indigenous species.	x				Prevent transport of invasive species.	2	1
Management of Natura 2000 areas (non indigenous species)	x				Prevent import of non indigenous species and counter occurrence of invasive non indigenous species.	1	2
Regulations for preventing and managing invasive species.		x			Prevention of invasive species, eradication of invasive non indigenous species in early stage of establishment and control of established non indigenous species. Drafting of action plan on approach to introduction routes for non indigenous species.	1	2
Prevent spread of non indigenous species through ballast water.		x			Purification of ballast water	1	2
Implementation of protocols for exemptions after the Ballast Water Convention comes into effect		x			Minimise possibilities for introducing new non indigenous species in ports within five years of the Ballast Water Convention coming into force	2	2
Implementation of Hull Fouling Guidelines to prevent non indigenous species from growing on hulls		x			Limitation of growth of non indigenous species on hulls	1	2
Eutrophication (no. 5)							
Implementation of MARPOL Convention	x				Prevention of discharge of hazardous substances into water	1	1
Mandatory manure processing	x				Balance on the fertiliser market by processing a yet to be determined percentage of the surplus.	1	1
Treatment of urban waste water	x				Attainment of Nitrates Directive's quality goals	1	1
Fifth Nitrates Action Programme		x			Contribution to achieving goals for nutrients, plant protection products and water quality.	1	1
Delta Plan for Agricultural Water Management		x			Meet the set norm and area output of 75% for total phosphorus and total nitrogen per management area.	1	1
Improvement of purification efficiency of sewage treatment plants		x			Improvement of purification efficiency of sewage treatment plants	1	1
Hydrographic properties (no. 7)							
Assessment of hydrographic interventions and compensation of effects	x				Mitigation of negative (cumulative) effects on the environment and possible offset of significant effects, specifically in relation to BHD.	1	2,7
Pollutants (no. 8)							
Implementation of the Bathing Water Directive	x				Prevention of discharge of hazardous substances into water	1	1
Reduction of discharges by shipping	x				Reduction of hazardous substances in the marine environment	1	1
Ban on TBT	x				Reduction of hazardous substances in the marine environment.	1	1
Reduction of pollution by reducing shipping incidents	x				Reduction of hazardous substances in the marine environment.	1	1
Reduction of pollutants discharged by oil and gas extraction installations	x				Reduction of pollutants discharged into the marine environment	1	1

Reduction of industrial emissions	x				Prevent and limit environmental pollution due to industrial activities and intensive farming	1	1
Reduction of environmental risks as a result of major accidents	x				Reduction of hazardous substances in the marine environment.	1	1
Reduction of waste generated by inland shipping vessels	x				Reduction of pollutants discharged into the marine environment	1	1
Action Plan on Sustainable Use of Plant Protection Products	x				Innovated sustainable use of plant protection products	1	1
Preparation, cooperation and coordination of disaster and incident control at sea	x				Coordinated emergency response and incident control in the North Sea; cooperation procedures	1	4
International cooperation	x				Coordinated emergency response and incident control in the North Sea.	1	4
Contaminants in fish, no. 9)							
Standards for contaminants in fish and fish products	x				Meet European standards	1	4
Litter (no. 10)							
(Clean-up) campaigns	x				Reduce litter on beaches	1	2
Sustainable Action Initiative	x				Promote sustainable action	4	8
Stakeholder initiatives on beaches	x				Reduce litter on beaches	1	2
Clean Meuse Limburg approach	x				Prevention and removal of waste in the River Meuse	1	2
Implementation of EU Port Reception Facilities directive	x				Presence of adequate PRFs in the Dutch ports	1	2
Ban on the discharge of ships' waste	x				Reduction of pollutants discharged into the marine environment	1	1
Marine environmental awareness course	x				Promote environmental awareness among students of maritime courses	4	8
Fishing for Litter programme	x				Delivery of caught waste to ports for transport and processing on land.	1	2
Implementation of litter and waste policy	x				Sustainable separation, collection, processing and reuse of waste	1	1,2
Voluntary reduction of emissions of microplastics in cosmetics products	x				Reduction in the use of microbeads in cosmetics products 2018	1	1
From Waste to Raw Material (VANG)		x			Within 10 years, halving the quantity of waste destined for landfill or incineration	1	1
- Packaging Framework Agreement 2013-2022		x			Producers take back and recycle packaging	1	2
- National litter policy		x			Reduction of the share of small beverages containers in litter	1	1
- Plastic Cycle Chain Agreement		x			Promote innovations for closing plastic chain cycle	1	1
- National Waste Management Plan 2		x			Collection of separated waste	1	2
Reduction in the use of plastic bags		x			Restrict the issue of free plastic bags at the counter	1	1
Put litter on the agenda of stakeholders via education				x	Incorporate the litter issue in curricula and promote it among educational professionals	4	8
Green Deal for Clean Beaches				x	a. *consistently cleaner beaches:* by 2020 less litter is found on the Dutch North Sea beaches b. *good cooperation and coordination between parties:* by 2020 all Dutch coastal municipalities	4	1,2

					are united in the Green Deal for Clean Beaches. The number of participating beach operators, NGOs and other companies and organisations will increase every year between 2015 and 2020 c. *Proper attitude and behaviour of beach goers* by 2020 beach goers leave less waste behind on the Dutch North Sea beaches.		
Agenda-setting for water managers				x	Improving water managers' knowledge of litter	4	8
River basin oriented litter policy				x	Cleaning up waste in the rivers Scheldt, Rhine, Lek, Meuse (Brabant), IJssel and other water systems.	1	2
Roll-out of Litter Collection Scheme				x	Litter Collection Scheme also applies to other water systems	1	2
Green Deal for Ships' Waste Supply Chain				x	a. By 2017, 50% of the ships that deposit plastic waste will have separated that waste prior to depositing it at the Dutch ports where separated collection and processing are possible. This is 75% of the ships of shipowners who are affiliated with the Royal Association of Netherlands Shipowners (KNVR). b. By 2017 all the deposited separated plastic will also be collected, transported and processed separately by members of the Association of Environmental Services Enterprises for Shipping (VOMS). 100% of the ('clean') plastic waste collected by the members will be recycled or processed into fuel. They will sort as much of the deposited mixed plastic as possible so as to recycle as much of that plastic as possible	4	1,2
Green Deal for Fishing in Support of a Clean Sea				x	By 2020 no new waste from fisheries on the beach	1	1,2
Awareness in the fisheries sector				x	Increasing environmental awareness among fishermen	4	8
Reducing the number of balloons				x	Reducing the release of balloons	1	1
Reducing emissions of microplastics in cosmetics products by means of an EU ban				x	Reduction of emissions of microplastics into the marine environment	1	1
Introduction of energy, including underwater noise (no. 11)							
Licensing procedure for wind farms	x				No significant effects on protected BHD species and their habitats	1	1,2
Reduction of impulse noise via Code of Conduct for explosive ordnance disposal.	x				Preventing unnecessary harm to marine mammals due to explosive ordnance disposal	1	1,2

Regulations on sonar use	x				Minimising harmful effects of anti-submarine sonar signals on marine mammals	1	1,2
Amending regulations on seismic surveys	x				Limiting the effects of shooting seismic surveys on protected species	1	1,2
Platform lighting on oil and gas platforms		x			Reducing the effects of offshore platform lighting on migratory birds	1	1,2
Implementation of IMO guidelines for reducing underwater noise produced by commercial shipping.		x			Reduction in the production of underwater noise by newly built ships	1	1
Tax measures							
MIA\VAMIL	x				Stimulating investments in environmentally friendly technologies with respect to fishery, non indigenous species, eutrophication, pollutants and litter.	3	6

Explanatory notes to the table

The member states have agreed at EU level on the information that is to be included in the programmes of measures. These reporting guidelines are given in the document entitled Reporting on Programme of Measures (Art. 13) and on exceptions (art. 14) for the Marine Strategy Framework Directive.

Columns 2 through 5 show which category of existing or additional measures is concerned:
1a: Measures from other policies that have been adopted and implemented
1b: Measures from other policies that have been adopted but not yet (fully) implemented
2a: Measures that build on existing implementation processes and go beyond what is agreed in those frameworks
2b: New measures beyond existing frameworks

Column 6 shows the operational goals of the measures

Column 7, MA, shows the measure's mode of action
1. Technical measure, measure that is visible and/or measurable.
2. Statutory measure, measure laid down in regulations for achieving environmental goals.
3. Economic measure, measure aimed at economic incentives to promote desired behaviour.
4. Policy-driven action, such as voluntary agreements with stakeholders, communication strategies, awareness campaigns, and education.

Column 8, TM, shows the type of measure (based on Annex VI to the Marine Strategy Framework Directive)
1. Input measure, aimed at influencing human activities (source-oriented)
2. Output measure, aimed at influencing the permissible degree of disturbance of the ecosystem (effect-oriented)
3. Spatial and time measure, aimed at influencing the place and time at which the measure is to be enforced
4. Management coordination measure, aimed at coordinating activities

5. Measure for tracing marine pollution
6. Economic incentive, focused on the interest of the person who uses the marine ecosystem in achieving or conserving a good environmental status
7. Mitigation and recovery measure, aimed at reducing and or repairing damage to the ecosystem ensuing from human activities
8. Communication measure aimed at commitment of stakeholders and the awareness of the general public

Appendix 3 Additional information on new MSFD measures

Measure	Operational targets	cMA	cDM	gCA	hDA	iTC	jFin	kLC	m.Eff
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*11*
Seabed protection in the Frisian Front and Central Oyster Grounds	Protection of 1200-4200 km^2 of the Dutch part of the North Sea against significant seabed disturbance	1	1	EC	--	ma	os	Eur	MP
Putting litter on the agenda of stakeholders via education	Incorporating the litter issue into curricula and promoting the litter issue among educational professionals.	4	8		NGO	perm	EMFF	Nat	--
Green Deal for Clean Beaches	a. *consistently cleaner beaches:* Less litter is found on the Dutch North Sea beaches by 2020. b. *good cooperation and coordination between parties:* By 2020 all Dutch coastal municipalities are united in the Green Deal for Clean Beaches. The number of participating beach operators, NGOs and other companies and organisations increases annually between 2015 and 2020. c. *Proper attitude*	4	1.2		var.	ma	os	Nat	MP

	and behaviour of beach goers By 2020 beach goers leave less waste behind on the Dutch North Sea beaches.								
Agenda-setting for water managers	Improving water managers' knowledge of litter	4	8		I&E	ma	os	Nat	--
River basin oriented litter policy	Cleaning up waste in the rivers Scheldt, Rhine, Waal, Lek, Meuse (Brabant), IJssel and other water systems.	1	2		var.	ma	os	Nat.	--
Roll-out of Litter Collection Scheme	Collection Regulation also applies to other water systems	1	2		RWS	ma	EMFF	Nat.	--
Green Deal for Ships' Waste Supply Chain	a. By 2017, 50% of the ships that deposit plastic waste will have separated that waste prior to depositing it at the Dutch ports where separated collection and processing are possible. This is 75% of the ships of shipowners who are affiliated with the Royal Association of Netherlands Shipowners (KVNR). b. By 2017 all the separated plastic delivered is also collected, removed and processed separately by the members of the Association of Environmental Services Enterprises for Shipping (VOMS). 100% of the ('clean') plastic waste collected by the members will be recycled or processed into fuel. They will sort as much of the deposited mixed plastic as possible so as to recycle as much of that plastic as possible	4	1.2		var.	ma	os/EMFF	Nat.	MP
Green Deal for Fishing in Support of a Clean Sea	By 2020 no new waste from fisheries on the beach	1	1.2		var.	ma	os	Nat.	MP

Awareness in the fisheries sector	Increase environmental awareness among fishermen	4	8		Ngo	ma	os	Nat.	--
Reduce the number of balloons	Reduce the release of balloons	1	1		Var	ma	---	Nat./loc.	MP
Reduction of emissions of microplastics in cosmetics products by means of EU ban	Reduction of emissions of microplastics into the marine environment	1	1		Ind.	ma	os	Nat.	--

Explanatory notes to the table

The member states have agreed at EU level on the information that is to be included in the programmes of measures. These reporting guidelines are included the document entitled Reporting on Programme of Measures (Art. 13) and on exceptions (art. 14) for the Marine Strategy Framework Directive.

Columns 2, 3 and 4 are explained in Appendix 2.

Column 5 (gCA; question g in the reporting guidelines), responsible competent authority unless stated otherwise: Central government; EC European Commission.

Colum 6 (hDA), body responsible for implementing the task (if not the competent authority):
- var. various
- RWS Rijkswaterstaat (Directorate-General for Public Works and Water Management)
- NGO non-governmental organisations

Column 7 (iTC) period for which the measure applies:
- perm permanent
- ma multi-annual

Column 8 (jFin), financing of the measure:
- EMFF European Maritime and Fisheries Fund
- os own sources

Column 9 (kLC), coordination level of the measure:
- Eur Europe
- Nat national
- loc locally within the Netherlands

Column 11 (mEff), measuring the measure's effectiveness
- MP monitoring programme

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