Government of the Netherlands

Appendix 1 to the National Water Programme 2022-2027

Marine Strategy for the Dutch section of the North Sea 2022-2027 (part 3)

MSFD programme of measures

Contents

Contents

Summary

The European Marine Strategy Framework Directive (MSFD) has been elaborated for the Dutch section of the North Sea in the Marine Strategy. The aim of the Marine Strategy is to protect and restore the North Sea and to promote sustainable use. The Marine Strategy part 3 comprises the programme of measures that contributes towards achieving this aim, describing what is needed to achieve and maintain good environmental status and the environmental goals. This programme of measures is an integral review of the first version adopted in 2015 and forms the final part of the second implementation cycle of the MSFD. The programme has been included in the North Sea Region Programme 2022-2027, which is an appendix to the Dutch National Water Programme 2022-2027, and describes the measures that will be implemented in the planning period of the North Sea Region Programme, 2022-2027.

The MSFD is an organising and task-setting guideline that integrates multiple and diverse policy fields in the domains environmental policy, ecosystem policy and all policies aimed at sustainable use. The MSFD's integrative effect is reflected in the broad spectrum of the eleven descriptors used to determine good environmental status and assess actual environmental status. These descriptors relate to the themes of biodiversity, alien species, (commercial) fish stocks, food webs, seafloor integrity, hydrographical conditions, contaminants and eutrophication, litter, and energy, including underwater noise.

Basic principles for this programme of measures

The marine strategy for the North Sea is based on a vision of the future, a North Sea that will be clean, healthy and productive in the future, with an ecosystem that functions optimally and is resilient, with sustainable use of the sea in the face of increasing use. Such a North Sea offers a good basis and development prospects for both nature and the environment and economic sectors. Basic principles for this programme of measures are:

1. Updating the Marine Strategy part 1 (2018)

The challenges as included in the update of the Marine Strategy part 1 (2018) determine the need to include additional measures in this programme of measures. For each descriptor, it is determined whether the existing measures (Marine Strategy part 3 [2015]) must be continued and whether extra efforts are required to achieve the environmental goals.

2. Building on existing directives and agreements

The programme of measures builds on existing measures from the Common Fisheries Policy (CFP), the Water Framework Directive (WFD), the Nitrate 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 from international agreements relating to OSPAR or IMO.

The programme of measures is also in line with international biodiversity agreements that follow from the Convention on biological diversity (CBD), the EU Biodiversity Strategy, the European Birds Directive and Habitats Directive, and the Green Deal Roadmap. This concerns the goals of the common European and international policy to stop loss of biodiversity and strengthen Natura 2000 policy. Agreements on area-based protection and nature restoration from the EU Biodiversity strategy are being further elaborated in a European context. For the aspect of biodiversity, the programme of measure also relies on international agreements, for example the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS) and OSPAR.

The programme of measures has various similarities with the North Sea Agreement. Agreements in the North Sea Agreement about area-based protection and species protection, for example, are continued in this programme.

3. Factoring in the consequences of climate change and ocean acidification

This programme of measures factors in accelerated climate change, driven by the increase in the concentration of greenhouse gases in the atmosphere, such as CO_2. These changes in the physical environment can affect the ecosystem of the North Sea in various ways. The three most important effects are: increase in seawater temperature, rise in sea level, and increase in CO_2 absorption by seawater (acidification).

International coordination

The cabinet is focusing on the further expansion of international coordination and collaboration. Because the quality of the ecosystem and the marine environment in parts of the North Sea which are the responsibility of different nationalities, are not separate from each other. Use of the North Sea is also highly transboundary. Policy and regulations are strongly embedded internationally. The MSFD therefore requires the member states to adopt a regional approach. In the context of OSPAR too, the international collaboration and coordinated approach to the marine strategy are becoming more important. The international coordination and collaboration between the countries in OSPAR with respect to measures for the various MSFD descriptors so far was established at the beginning of 2016 in the OSPAR Joint Documentation on Coordination of Measures (MSFD).

Continuation of existing measures

The previous programme of measures (2015) included measures adopted on the basis of other policy frameworks. These concern measures previously established under EU regulation or as part of other international agreements, such as OSPAR, IMO or the international river commissions. Additional measures have been established that are important for achieving and maintaining good environmental status. All these measures are continued in this programme of measures and constitute the basis for further development.

Policy task

Despite implementation of the measures from the previous programme of measures (2015), the Marine Strategy part 1 (2018) concludes that there is still a task for the descriptors of biodiversity, seafloor integrity, litter and underwater noise. Additional measures are required to achieve good environmental status for these descriptors. Good environmental status has already been achieved for the descriptors alien species, hydrographical conditions and contaminants. For the descriptor commercially exploited fish and shellfish, existing policy suffices to realise good environmental status in the coming years. The implementation of existing policy gives the maximum effort possible from the Netherlands, working with other countries, to achieve the good environmental status for the descriptors eutrophication and contaminants, in terms of measures on land (such as implementation of the WFD) and at sea. No (additional) technical measures will be taken to nullify that presence of eutrophicating and contaminating substances in the Netherlands section of the North Sea. The descriptor food webs is a result of the other descriptors, with the logical consequence that all measures and tasks described under those descriptors are also about achieving the good environmental status for food webs.

Additional measures

In order to achieve good environmental status for the descriptors biodiversity, seabed integrity, litter and energy, including underwater noise, additional measures are needed in addition to the existing measures. Below is a succinct overview of these additional measures.

Biodiversity and seafloor integrity

Area-based protection

The development of an ecological network of protected areas is one of the main instruments to maintain and restore the ecosystem in the North Sea. In the Dutch part of the North Sea, a cohesive and representative network of protected marine areas is being created, whereby the diversity of the various ecosystems is adequately covered. In the North Sea Agreement, the following agreements were made about area-based measures:

- Existing agreements about designating and protecting offshore nature areas are implemented and enforced.
- In 2023, 13.7 percent of the ecologically valuable areas in the Dutch North Sea will be completely free from seabed disturbance caused by fishing. This percentage will rise to 15 percent in 2030. Within this area, a section the size of 2.8 percent of the North Sea will be closed to all forms of fisheries.
- Enlargement of the area on the Dogger Bank closed to seabed-disturbing fishery by 557 km². Ban on Scottish and Danish seining in the management zones of the Dogger Bank. Enlargement of the management zones on the Cleaver Bank, as a result of which an additional area of 552 km² will be closed to all forms of seabed-disturbing fishery.
- The MSFD areas Central Oyster Grounds and Frisian Front will be enlarged by 1062 km² and 1014 km², respectively. The part that overlaps with the BD area Frisian Front will be closed to all forms of fisheries. This part will be expanded to 1649 km².
- The new soil protection area Borkumse Stenen has a surface area of 653 km².
- Designation of 100 km² area for oyster recovery within the no fishery zone of the Frisian Front.

- Additional area-based measures for birds from the North Sea Agreement are:
  - The Brown Ridge was designated as a Natura 2000 area under the Birds Directive in 2021.
  - Before 2025, independent research will be conducted to establish whether the Hollandse Kust, Vlakte van de Raan, Borkumse Stenen, Cleaver Bank, Dogger Bank and the Central Oyster Grounds fulfil the selection criteria for designation as Birds Directive area. Areas that fulfil these selection criteria will then be designated as soon as possible.

In addition to the agreements in the North Sea Agreement, the area-based protection in the Natura2000 area 'North Sea Coastal Zone' will be changed. The areas where an existing ban on seabed-disturbing fishery already applies and the areas to which a general ban on fishing applies will be changed, in accordance with the agreements in the VIBEG steering committee. The conservation measures in these areas will be implemented via the Article 11 procedure from the Common Fisheries Policy.

Species protection

- Apart from area-based protection, more generic species protection is important for long-lived and vulnerable species, such as seabirds, marine mammals and certain types of sharks and rays. The following agreements under the North Sea Agreement are aimed at intensifying more generic species protection:
  - Existing action and species protection plans will be implemented. The progress of the implementation of the plans is evaluated every two years.
  - For vulnerable species, including birds, marine mammals, fish and benthic animals which are identified based on international guidelines and the Framework for the Assessment of Ecological and Cumulative Effects (FAECE), species protection plans are developed and implemented. These plans will describe pressure factors and generic protection measures. The implementation of the plans will be evaluated every two years.
- Marine mammals: The Porpoise Protection Plan was updated in 2020. This plan aims to contribute to the good environmental status of the porpoise. Actions included in this plan will be implemented in this planning period. For seals, an improved stranding registration is being elaborated in the framework of the Seal Agreement (2020).
- Fish and squid: The MSFD shark action plan was evaluated in 2021 and will be followed up for another period of six years.
- Asof 2020, independent research will be conducted into the abundance and distribution of honeycomb worm reefs. If that research leads to applicable conclusions, relevant locations will be protected via spatial protection measures under the Habitats Directive or Marine Strategy Framework Directive.

Integral nature reinforcement

When developing offshore activities - supplementary to the statutory mitigation measures - instructions, measures and actions can be identified as early as possible in the design phase which contribute to the strengthening and restoration of the ecosystem. Wind farms, for example, have the potential to contribute to nature reinforcement. Due to the lack of concrete nature reinforcement measures, it will be investigated which additional measures can contribute to nature restoration in addition to area-based protection.

Litter

The approach to litter is divided into six clusters: education and awareness, beaches, river basin districts, sea-going shipping, fisheries, and plastic products. The programme of measures presents a set of additional measures within these clusters.

Beaches

- The Clean Beaches Programme replaces the Green Deal Clean Beaches. This programme focuses on knowledge exchange, support for collaboration projects and improvement of local collaboration between municipalities and entrepreneurs.
- Website and newsletter by KIMO for knowledge transfer and informing beach stakeholders.
- Activity monitoring among beach stakeholders. The information is made accessible to all parties to facilitate knowledge exchange, coordination and collaboration.
- Contribute to national meetings about the beach for the purpose of knowledge exchange and network reinforcement.

River basin districts

- Continuation and expansion of the partnerships within river basin districts and sub-basin districts with the aim of a ambitiously pursuing a structural and broad approach to litter ('cleaning' and 'keeping clean') and, where possible, concrete goals for each partnership.
- Embedding the Litter collection regulation in the regular management and maintenance of main water systems by Rijkswaterstaat.
- Put litter problem on the agenda and safeguard a broad approach to litter. This measure is aimed at increasing awareness of the litter problem among site and water managers along rivers with the aim of increasing (administrative) support for taking structural measures in management areas. In support of this measure, the responsibilities of national and local government authorities are being examined and how these responsibilities and the approach to litter relate to European regulations.

Shipping

- Implementation of the duty to deliver persistent floating cargo residue. From 1 January 2021, all ships that unload their cargo in a European port within the designated sea area, indicated in MARPOL Annex II, Regulation 13, deliver washing water with persistent floating cargo residue such as paraffin wax, to the port.
- On top of MARPOL legislation, the Netherlands has taken additional measures for washing the discharged tanks. The companies involved have made voluntary agreements about this. The improved pre-wash procedure will be brought to the attention of the International Maritime Organization.

Fisheries

- The Fisheries for a Clean Sea Programme is the follow-up to the Green Deal Fisheries for a Clean Sea. This programme is based on the chain approach principle. The Single-Use Plastics directive, in which the manufacturers are given a role in the collection, recycling and raising awareness with respect to fishing gear, will be an important theme for coordination between participating parties.
- Fishing for Litter programme: The revised Port Reception Facilities Directive also requires a regulation for passively caught waste (Fishing for Litter waste). Reception facilities in ports will be made mandatory. During the implementation of the Port Reception Facilities Directive, it will be studied with the Fishing for Litter partners involved how the programme can best be shaped within the new directive.
- Phasing out dolly rope to protect trawling nets, by means of incentive measures. The aim is to encourage the use of alternative solutions and to gradually phase out the use of conventional dolly rope by 2027 by means of:
  - A financial (tax) incentive to make sustainable alternatives for dolly rope financially more attractive and economically feasible.
  - Facilitating/organising activities to promote sustainable alternatives and increase familiarity and awareness.
- Standardisation for circular design and chain approach of fishing gear: Drawing up (voluntary) standards for technical requirements for design, material use and circularity of the fishing gear, but also for collection, monitoring, traceability, repair and recycling of fishing gear.
- Focus on reducing lead in recreational fishing at sea by drawing up an inventory of available alternatives for lead by type of recreational fishing at sea and by more targeted communication with the recreational fishermen to create more awareness of the impact of lead and of possible alternatives.

Plastic products / Land sources of litter at sea

- The cabinet continues to alert municipalities to the policy options they have to reduce the release of balloons. This will be included in Rijkswaterstaat's support for municipalities when it comes to litter. In addition, through the introduction of the SUP directive, producers of balloons are also made aware of their responsibility.
- The cabinet will implement the OSPAR recommendation (expected to be adopted in 2021) to tackle the presence of plastic pellets in the environment. Responsibility for tackling pre-production pellets primarily lies with the industry, which has launched Operation Clean Sweep to this end.

Underwater noise

The measures below are intended to prevent the harmful effects of underwater noises resulting from human action.

- In partnership with industry, an assessment framework for seismic survey will be developed in analogy with the FAECE. This is in line with the agreements in the North Sea Agreement and the Porpoise Protection Plan. A noise budget that regulates the time in which the impulsive noise is permitted may be a condition. The industry will be encouraged to reduce impulsive noise.
- Thanks in part to support from the Netherlands, a procedure is currently under way to revise the IMO guidelines for the reduction of underwater noise from commercial shipping. The Netherlands is committed to more active compliance with these guidelines.

Knowledge questions and programming

For each descriptor, various knowledge questions remain. Some of the knowledge questions are related to the lack of an assessment method, indicators and/or threshold values. This knowledge is required to be able to set goals and monitor progress. In addition, there is a lack of knowledge for taking (more) targeted measures. For example, for the various descriptors, it is not possible to explain a certain trend or assess the impact of future developments or cumulative effects.

This programme of measures lists the knowledge questions. However, it is not possible to address all these questions in this planning period. Because the budget is limited, it is essential to prioritise research. The prioritisation of MSFD research also considers the timely availability of the knowledge. Calibration points for this are the OSPAR Quality Status Report in 2023, and the update of the national assessment of the environmental status of the Dutch part of the North Sea in 2024. The availability and term of financing of, for example, WOZEP, EMVAF, MONS, etc. also are decisive factors in this.

Financing additional measures and research

The additional measures under the themes biodiversity and seafloor integrity arise from the North Sea Agreement. The North Sea Agreement leads to several intensifications of (policy) measures and additional tasks for area-based protection, monitoring and research. The 'Transition Fund' will be called upon for these intensifications if existing or available flows of funds fall short. In the North Sea Consultation, it was agreed that in 2023 it will be investigated whether the goals of the North Sea Agreement will be achieved with the available funding. If further strengthening of the 'Transition Fund' will then prove necessary, parties will discuss this in the North Sea Consultation in an open and realistic conversation.

In addition to existing budgets and the 'Transition Fund', resources are available specifically for MSFD measures and EMFAF research that the Netherlands and the European Commission have under shared management.

The additional measures under the themes litter and underwater noise are covered from the budget of the Ministry of Infrastructure and Water Management. For litter, co-financing will be provided from EMFAF resources.

Financing of the MSFD knowledge questions in the planning period 2022-2027 comes from the budget of the Ministry of Infrastructure and Water Management, the Ministry of Agriculture, Nature and Food Quality, EMFAF resources and the MONS programme.

1 Rationale and objective

1.1 Marine Strategy Framework Directive

The European Marine Strategy Framework Directive (MSFD) has been elaborated for the Dutch section of the North Sea in the Marine Strategy. This programme of measures, which will be implemented in the period 2022-2027, is part of this. It is an integral review of the first version, which was adopted in 2015 for the period 2012-2020 and forms the final part of the second implementation cycle of the MSFD. Due to the relationship with the North Sea Region Programme 2022-2027, the term also starts with this update in 2022.
The MSFD requires the member states to draw up a strategy to achieve a Good Environmental Status (GES) in their marine waters, and to take the necessary measures to achieve or maintain that status. The Directive addresses the integral environmental and ecosystem policy and the sustainable use of the sea. More specifically, it concerns the themes biodiversity, exotic species, commercially exploited types of fish, shellfish, habitat, hydrography, contaminants and eutrophication, litter and energy supply (including underwater noise). The basic principles are the ecosystem approach and the precautionary principle. The influence of human activities on the marine ecosystem may not prevent the achievement of maintenance of the GES.
The Marine Strategy consists of three parts, which are each updated every six years.

Marine Strategy part 1

The Marine Strategy part 1 contains the initial risk assessment of the marine environment (art. 8), the description of the GES (art. 9) and the environmental goals and the associated indicators (art. 10) from which the extent to which the actual status deviates from the good status can be derived. As such, the Marine Strategy establishes the frameworks for the Dutch part of the North Sea for sustainable use within the limiting conditions of the ecosystem, taking international and European legislation into account. The cabinet adopted the updated version of the Marine Strategy part 1 in 2018 and reported to the European Commission.

Marine Strategy part 2

Part 2 of the Marine Strategy is the MSFD monitoring programme (art. 11). This describes how the Netherlands fulfils the requirement to monitor the environmental status in its own part of North Sea and how it incorporates the monitoring task for the implementation of the Birds and Habitats Directive. The starting point is the existing monitoring practice resulting from national and international obligations (such as WFD, VHR/Natura 2000, CFP, IMO, OSPAR). The monitoring programme is updated annually based on the latest developments and new insights emerging from the North Sea Agreement and international coordination in the framework of OSPAR and the International Council for the Exploration of the Sea (ICES). The cabinet adopted the updated document in September 2020. In November 2020, it reported to the European Commission.

Marine Strategy part 3

This part 3 of the Marine Strategy concerns the updating of the 2015 which runs from 2012 to 2020. Part 3 implements article 13 of the MSFD, which requires member states to draw up a programme of measures with which to achieve and maintain the GES. Among others, the Marine Strategy part 3 describes the development process of the programme of measures and the associated analyses performed. The document explains the content and, where possible, the expected effectiveness of the measures. The Marine Strategy part 3 is an appendix to the North Sea Region Programme 2022-2027, which was adopted as part of the National Water Programme (NWP) at the end of 2021.

The MSFD will be revised in 2023. This may lead to adjustments or additions during the planning period to (the implementation of) the policy of the North Sea Region Programme and the implementation of the MSFD as part of it.

1.2 Objective and context

The Netherlands North Sea Policy, as expressed in the North Sea Region Programme 2022-2027, contains all the goals and ambitions for integrated marine policy for the Dutch part of the North Sea. In this, the Marine Strategy integrates the preconditions and ambitions from the various policy areas relating to nature, the environment and sustainable economic developments, and supplements them where necessary to achieve and maintain the good environmental status. This structure fits the European policy context in which the MFSD forms the environmental pillar for the integrated maritime policy (*IMP*).

The integration in the Marine Strategy also relates to policy implemented at national level based on international frameworks, such as the nature policy (Birds and Habitats Directive, the policy for species and the policy relating to exotic species), the water quality policy, environmental aspects of shipping policy, sustainable fisheries and the associated area-based conservation measures.

The North Sea Region Programme 2022-2027 describes as its overarching goal: a North Sea that in future is clean, healthy and productive, with an ecosystem that functions optimally and resiliently, while the use of the sea is sustainable. Such a North Sea offers a good basis and development prospects for both nature and the environment and economic sectors. The programme of measures contributes to this goal.

International and European context

In terms of substance, the programme of measures builds on existing measures from the Common Fisheries Policy (CFP), the Water Framework Directive (WFD), the Nitrate 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 from international agreements relating to OSPAR or IMO.

The programme of measures is also in line with international biodiversity agreements that follow from the Convention on biological diversity (CBD), the EU Biodiversity Strategy, the European Birds Directive and Habitats Directive, and the Green Deal Roadmap. This concerns the goals of common European and international policy to stop loss of biodiversity and strengthen Natura 2000 policy. Agreements on area-based protection and nature restoration from the EU Biodiversity strategy are being further elaborated in a European context. For the aspect of biodiversity, the programme of measure also relies on international agreements, for example the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas, ASCOBANS.

Finally, the programmes of measures which were produced under the Water Framework Directive through cooperation in the four international catchment areas of the Rhine, Meuse, Scheldt and Ems also contribute to the programme of measures of the Marine Strategy. This applies among others to achieving the MSFD objective for eutrophication, contaminants, migratory fish, litter and for achieving a good environmental status in the coastal waters.

Climate change and ocean acidification

When drawing up this programme of measures, attention was devoted to the consequences of climate change. Recent decades have seen accelerated climate change, as a result of the increased concentration of greenhouse gases in the atmosphere, such as CO_2. These changes in the physical environment can affect the ecosystem of the North Sea in various ways. The three most important effects are:

- increased seawater temperature
- rising sea levels and
- rise in the CO_2 absorption by seawater (acidification).

Due to the rise in the sea temperature, the composition of biotic communities will change, with possible consequences for the fisheries and for other ecosystem services in the North Sea. Direct effects of rising sea levels are mainly expected in the shallowest zones along the coast. In the long term, at low tide, banks may be exposed for less time or not at all. This will result in fewer nesting, foraging and resting possibilities for wading birds and essential resting, shedding and nursing places for seals. The acidification of sea water can make it harder for molluscs to form a calcareous skeleton and can lead to the dissolving of existing limestone structures. Particularly in sensitive phases of life (for example the larva phase), certain types of molluscs are very vulnerable and ultimately disappear. Furthermore, not very much is known about the influence of climate change on the marine environment, the ecosystems and the ecosystem services. In OSPAR context, the Netherlands contributes to the effective monitoring and assessment of the trends in the acidification of oceans and its impact on the ecosystem. Climate change also receives attention in the assessments OSPAR performs into the condition of the various (biotic and abiotic) components of the marine environment. The MONS (Monitoring-Research-Nature Reinforcement-Species Protection) programme studies the impact of climate change (rising temperatures) and acidification.

1.3 Process description

Development of programme of measures

The principle for the programme of measures is the policy task as included in the update of the Marine Strategy part 1 (2018) [11]. The tasks determine the necessity for taking additional measures. For each descriptor, it is determined whether the existing measures (included in the programme of measures of 2015) must be continued and whether extra efforts are required to achieve the environmental goals. Extra efforts appear necessary for the goals 'protect the seabed', 'reduce litter' and 'reduce underwater noise'.

The programme of measures has various similarities with the North Sea Agreement. Agreements in the North Sea Agreement about area protection and species protection are continued in this programme.

The programme of measures from the Marine Strategy is part of the package of measures from the North Sea Region Programme 2022-2027. For this package, an environmental impact assessment, a pre-assessment based on the Nature Conservation Act and an appropriate assessment was drawn up. For new MSFD measures, where possible a social cost-benefit analysis is performed to determine who best to shape these measures.

National and international coordination

Updating the Marine Strategy part 3 was coordinated at national and international level. In the Netherlands, the departments involved coordinate the MSFD implementation under the direction of the Interdepartmental Directors North Sea Consultative Body (IDON). Coordination with social (lobby) organisation was conducted from 20 October to 10 November 2020 by means of a written consultation in the Physical Environment Consultative Council (OFL). The programme of measures was also discussed with stakeholders during individual discussions and during a stakeholder meeting on 15 October 2020. The draft North Sea Region Programme 2022-2027,

International coordination

The cabinet is focusing on the further expansion of international coordination and collaboration. Because the quality of the ecosystem and the marine environment in parts of the North Sea which are the responsibility of different nationalities, are not separate from each other. The MSFD therefore requires the member states to adopt a regional approach. In the context of OSPAR too, the international collaboration and coordinated approach to the marine strategy are becoming more important. The international coordination and collaboration between the countries in OSPAR with respect to measures for the various MSFD descriptors so far was established at the beginning of 2016 in the OSPAR Joint Documentation on Coordination of Measures (MSFD).

The OSPAR North-East Atlantic Environment Strategy 2030 (NEAES) was adopted in October 2021. This comprises twelve strategic objectives that should lead to the good environmental status of the North-East Atlantic. These objectives relate to:

- Clean seas: eutrophication, hazardous substances, radioactive substances, marine litter, including microplastics.
- Biologically diverse and healthy seas: protect and conserve biodiversity, ecosystems and their services, restore degraded habitats.
- Sustainably used seas: cumulative impact of uses, underwater noise, seafloor integrity
- Climate change and ocean acidification: raise awareness by monitoring and analysing, considering additional pressures when developing programmes, actions and measures, oceans' contribution to mitigation.

OSPAR-NEAES will be operationalised and implemented by the Contracting Parties in the planning period 2022-2027. The Netherlands will contribute to this within the framework of the North Sea Region Programme, and in particular the tasks and requirements in relation to the implementation of the MSFD. Decisions in OSPAR on the elaboration of the NEAES will, where necessary, have an impact on adjusting or supplementing (the implementation of) the policy of the North Sea Region Programme and the implementation of the MSFD as part of it.

The Netherlands actively supports initiatives for international collaboration in OSPAR, the EU and other relevant international frameworks. The active support of the Netherlands for international collaboration is seen among others in its leadership of various OSPAR working groups and the various initiatives that are being taken to achieve knowledge sharing and development at international level, such as drawing up the OSPAR Science Needs Agenda and the international research project Jomopans.

including the draft programme of measures and the associated SEA were available for inspection from 22 March 2021 to 22 September 2021 as part of the National Water Programme (NWP). Everyone was able to present their opinions on it. During this period, the OSPAR contracting parties and the legally designated organisations or organisational structures for the MSFD also had the opportunity to submit their opinions. After the public inspection period, the opinions submitted were answered by means of an official reply, and where necessary incorporated into the text of this programme of measures. The cabinet adopted the NWP, including the programme of measures, in March 2022. After adoption, the programme of measures will be reported to the European Commission.

The state secretary from the Ministry of Infrastructure and Water Management (I&W) is responsible for the preparation and timely and correct implementation of the Marine Strategy for the Dutch part of the North Sea. Pursuant to the Water Act, the Minister for I&W shares this responsibility with the Minister of Agriculture, Nature and Food Quality (LNV), who is responsible for the policy areas biodiversity, nature and fisheries.

International coordination takes place via OSPAR an Marine Strategy Coordination Group working groups. Both platforms play an important role in the international coordination of the content of Marine Strategy parts 1, 2 and 3 and implementing a regional approach. Since the 1970s, the Netherlands has been working with the European Union and fourteen countries in the framework of OSPAR on the protection of the marine environment of the North-East Atlantic.

1.4 How to interpret this document

Chapter 2 addresses the socio-economic importance of the North Sea and expected developments in this field. It gives insight into the pressure factors on the marine environment, which relate to the current and expected developments. Chapter 3 briefly describes per descriptor the good environmental status (GES) and related goals, the current measures, the current environmental status, any residual policy tasks (*gap analysis*), necessary additional measures, any exploration and knowledge tasks. Chapter 4 contains a summary overview of the gaps in knowledge and available research programmes. Finally, Chapter 5 provides an overview of the ways of funding the additional measures.

2 Socio-economic importance of the North Sea

The developments in the load of the marine environment (in terms of emissions to water, fisheries and other pressure factors) are strongly determined by developments in the extent of socio-economic industry on and along the North Sea. Conversely, various economic activities strongly depend on a well-functioning ecosystem. This chapter therefore describes the economic development experienced by sectors which are strongly dependent on the North Sea in recent years, and which are expected to experience in the coming years. This chapter also shows the significance for the Dutch economy of the various economic activities in and around the Netherlands Exclusive Economic Zone (EEZ). At sea, it concerns: oil and gas production, fisheries, shipping, sand and gravel extraction, and the activities related to offshore wind energy. It also describes sectors and related activities on land which are strongly dependent on the sea, such as port activities and recreation.

General

The Netherlands part of the North Sea is one of the most intensively used parts of the North Sea. There is fishing and shipping (both commercial and recreational), oil, gas, sand and gravel are extracted and in recent years increasing amounts of wind energy. The economic value of the North Sea for sea-related sectors and activities on land and sea has increased significantly in recent years (see table 1). This total value is expected to further increase in the coming years. However, the extent will vary strongly per sector or activity. For example, the economic value of the relatively large oil and gas industry has clearly fallen, while the value of the smaller wind energy at sea sector is increasing. The expectation is that as a result of the energy transition, both developments will continue in the coming years [1].

Shipping

The extremely intensive shipping on the North Sea involves both freight and passenger transport. Barges also sometimes use the EEZ, but they make up a negligible part of the total shipping on the North Sea. Many ships which use the EEZ are exploited by foreign shipping companies and do not contribute to the Dutch economy. The economic value of this part of the shipping on the North Sea is therefore not included in the description of this sector.

Shipping can have negative effects on the environmental due to accidents and lost cargo. To limit these effects, there are specific shipping routes which cross certain areas. Furthermore, discharging ballast water sometimes introduces alien species (D2). To tackle this, measures have been taken in the framework of the Ballast Water Management Convention. In recent years, there has been increasing attention for the possible effects of underwater noise caused by ships (D11) [2].

Between 2010 and 2015, there was a clear increase with respect to shipping for all economic indicators (see Table 1). That rise corresponds with the developments in international maritime trade. Between 2015 and 2017, the values for the various economic indicators fall, but measured over the whole period 2010-2017, there is a growth in this sector.

The shipping industry and ports are economically vital to the Netherlands. This will not change in the future. Transport over the North Sea is expected to increase in the coming decades. The pace of that growth depends on the further globalisation of the economy. As a result of continued scale increases in the shipping sector, the number of shipping movements is not expected to rise so fast. An increase in *short sea shipping* is also predicted. Furthermore, partly as a result of climate change, the possibility of more shipping movements towards the north is also being taken into account [2].

Fisheries

Fisheries is a vital sector that is characteristic for a sea-oriented country like the Netherlands. Besides the direct economic importance of the fishermen who operate in the Dutch part of the North Sea, various activities in the port are also directly or indirectly dependent on the fisheries. For some communities in vulnerable shrinking regions, fisheries activities have a great socio-economic significance due to the employment and regional identity linked with the fisheries. The quality and size of the fish stocks in the North Sea strongly depends on the quality and functioning of the marine ecosystem. A well-functioning ecosystem is therefore also important to the fisheries. Depending on the applied technology, fisheries can also harm the ecosystem. Fisheries can have an impact on habitats and species under the Birds Directive and Habitats Directive (D1). To limit this, in some areas like the Natura 2000 areas the Voordelta, the Vlakte

van de Raan and the North Sea coastal zone, there are limitations with respect to seabed-disturbing fisheries. In addition, fuel consumption by the fisheries sector leads to emissions [1]. Through innovation in the sector relating to fisheries technology as well as in the field of shipbuilding, damage to the ecosystem can be limited.

While there was an increase in turnover and economic results of the supply sector between 2010 and 2016, returns and income have been declining since 2017. The prognosis is that this decline in turnover and revenue will continue in the coming years. The future of fisheries in the North Sea faces great challenges. The consequences of Brexit are still uncertain. At the end of 2020, it was agreed that EU fishing boats would continue to have access to British waters for the coming 5.5 years (from 2021). After that, the United Kingdom can decide annually about access for EU fishermen as is also the case for other coastal states like Norway. It has also been agreed that 25% of EU boats' fishing rights in UK Waters will be transferred to the UK fishing fleet over the next five years. Access to other areas (international and national) will be limited by the claims to space of wind farms at sea where no trawl net fishing is permitted and fishery-limiting measures will be taken in areas designated under the Birds Directive, Habitats Directive and/or the Marine Strategy Framework Directive. The innovative pulse trawler is not permitted under the Technical Measures Regulation (Regulation (EU) 2019/1241) (pulse trawl ban). This may mean that fisheries that used pulse trawling must return to the beam trawler with tickler chains. Climate change and the related heating up of the sea causes migration of fish to other areas [2].

There are also opportunities. Where wind farms and nature areas are closed for seabed-disturbing fisheries, there is room for forms of fisheries which are safe in wind farms and which do not have a significant effect on the nature values to be preserved in nature areas. There is also room for aquaculture in wind farms and in nature areas. This concerns aquaculture activities for both commercial exploitation and nature restoration. The application of substrate in nature reserves is a human intervention that aims to increase the production of certain marine resources, for example oyster recovery. This activity, which is still limited in extent, may become more extensive in the coming years, although this is still a niche market that does not offer a complete alternative for beam trawling. Agreements on this have been made in the North Sea Agreement. The transition to sustainable fisheries is a national interest and requires a reorientation and ultimate restructuring of the fishing fleet. Improved sustainability is one of the conditions for being able to maintain a dynamic fisheries sector in the long term too. The Vision for Trawler Fisheries (Appreciation with the advice Public for sustainable trawler fisheries on the North Sea, 19 June 2020) focuses on an economically healthy sector which fishes with respect for nature and the environment and is also socially recognised for doing so. Innovation is an important theme here, for example the development of a zero-impact cutter to enable fishing with less disturbance of the seabed, less undesired by-catch, lower emissions of greenhouse gases and less waste.

Oil and gas production

The Netherlands has significant reserves of natural gas and several smaller oil stocks. Since their discovery, these stocks have been exploited to meet national demand. Some is exported. Oil and gas production in recent decades have made an important contribution to the national income and economic growth. On the Dutch section of the North Sea, there are around 160 production locations. Of the joint production capacity, 93 percent is used to extract gas and 7 percent to extract oil [3].

A possible effect of oil and gas production on the environment concerns the emissions of contaminants during the discharge of production water by oil and gas installations (D8). This water usually contains oil, heavy metals and polycyclic aromatic hydrocarbons (PAHs). In the Netherlands Exclusive Economic Zone (EEZ), the sector is required to purify and test and this water before it is discharged [1]. In recent years, there has been increasing attention for the possible effects of underwater noise caused by seismic research (D11).

The production of oil and gas on the North Sea has clearly fallen in recent years. Between 2010 and 2015, there was a relatively limited fall, but in the two subsequent years this continued more strongly. Between 2010 and 2017, the added value fell more strongly than the production value. This can be seen in Figure 2.1 [4].

The amount of oil and gas produced in the North Sea is expected to fall further in the coming years. The pace and underlying cause of that development partly depend on the economic growth and speed of the transition to alternative forms of energy extraction. The Netherlands Environmental Assessment Agency [5] expects that oil and gas production will have declined to zero in 2050. Partly due to future developments in the fossil fuel prices, the still present oil and gas stocks may or may not fully used. The decision to end gas production from the Groningen field made the discussion about continuing gas production from the small fields versus import of gas extra relevant. The cabinet prefers gas production from the small Dutch fields, both on land and at sea, over importing natural gas. The current policy is therefore to use the small fields at sea as much as possible, until they are exhausted.

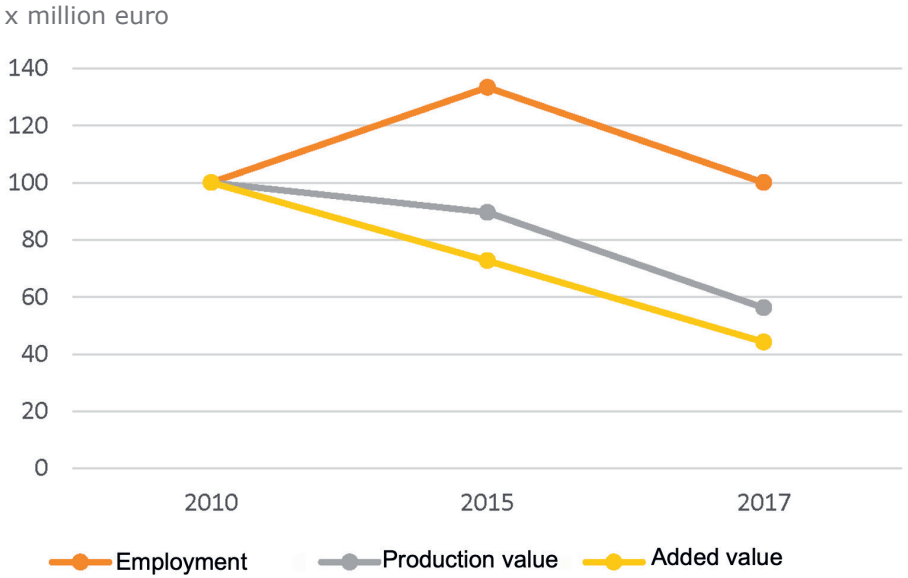

Figure 2.1: Development in production value, employment and added value in oil and gas production in the North Sea over the period 2010-2017 (based on CBS, 2020 [4]).

Use of empty gas fields - Carbon Capture and Storage (CCS) and storage of hydrogen

In the Climate Agreement, it was agreed that CO_2 would only be stored in the seabed. In the coming decades, capacity is available under the North Sea for the storage of around 1600 Mton[1] of CO_2. That capacity is present in gas fields that have been exhausted. CO_2 is expected to be transported to the North Sea from the large industrial clusters by pipeline or by ship. Until 2030, it is estimated that a maximum 7.2 Mton of industrial CO_2, supplemented by a maximum of 3Mton of CO_2 will be from the electricity sector.

Besides CO_2 storage, gas fields can also be used to store hydrogen. Hydrogen can be considered a storage and transport medium which, in a future of purely renewable energy sources, gives the required flexibility to continue matching supply and demand of energy. The Climate Agreement formulated the ambition for upscaling of electrolysis to around 500 MW installed capacity in 2025 and 3 to 4 GW of installed capacity in 2030. In view of its wind energy potential, existing gas infrastructure and the availability of space, the North Sea is the ideal area in which to fulfil these ambitions.

[1] Include reference to the last study by TNO and EBN (2020) (still in draft)

Offshore wind energy

Since 2006, the NCP is used to generate wind energy and that function has become increasingly important in recent years.

Offshore wind energy can help reduce CO_2 emissions, but wind farms at sea can also have negative effects on various species of animal. For example, the construction of wind farms produces underwater noise (D11), and during operation, birds can be killed by rotating blades (D1). To tackle the effects of underwater noise, there are limitations with respect to when the foundations for wind farms may be laid. In addition, when designating areas for wind farms, the effects on different species of animals are explicitly considered.

This increase in the production of energy from offshore wind farms has resulted in a strong increase of production value and added value. The change between 2015 and 2017 is the most notable: the production and gross added value have more than tripled (see also Figure 2.2). The capital-intensive character of the operation and maintenance of the turbines explains why this activity does not contribute much to employment [4].

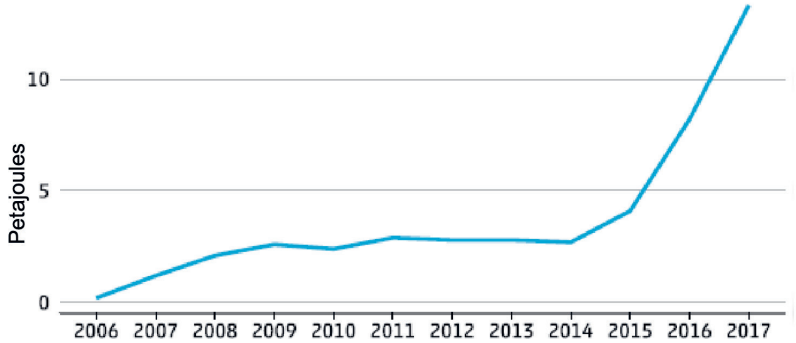

Figure 2.2: The production of wind energy in the EEZ in petajoules in the period 2006-2017 [4]

In a European context, it was agreed that in 2030 the CO_2 emissions must have decreased by at least 55 percent compared with emissions in 1990, and that sustainable energy in the EU must amount to at least 32 percent of the total energy supply.

For the Dutch situation, the construction of wind farms on the North Sea plays a major role in improving the sustainability of energy production. In the Energy Agreement of 2014, it was

agreed that by 2023 there would be around 3.5 GW extra wind power at sea. In 2018, the cabinet expanded [6] the route map for wind energy with a section for the years 2024 to 2030 inclusive. The wind farms until 2030 will be built in wind energy areas which were designated in the North Sea Policy Document 2016-2021, part of the National Water Plan. This will lead to a total capacity of around 11.5 GW in wind energy at sea in 2030.

At the end of 2020, it became clear that the planned roll-out of the route map wind energy at sea 2030 is still insufficient to achieve the contribution agreed in the Climate Agreement of 49 TWh in 2030 [7]. In addition, in the autumn of 2020, both the European Commission and the European Parliament expressed support for a more ambitious CO_2 reduction objective in 2030. This is all expected to lead to a Government Decision for planning the construction of extra wind farms at sea in the period up to 2030.

In the North Sea Agreement, it was agreed that space must be found for the installation of an additional 20 to 40 GW of wind energy at sea. In the North Sea Region Programme 2022-2027, the previously designated wind energy areas Hollandse Kust northwest and Hollandse Kust southwest have been definitively eliminated. IJmuiden Ver has been reconfirmed and areas 1, 2 and 5 east have been designated as wind energy areas. With this designation, space has been reserved for 16 GW on top of the previously agreed 11.5 GW, of which a maximum of 10 GW will be realised until 2030.

A partial revision of the North Sea Region Programme will start in 2022 in order to reserve additional space for after 2030, where necessary.In addition to wind energy at sea, there are also opportunities for solar energy at sea, but it is not yet clear whether this will actually be an attractive option in the long run. The first pilot on the North Sea has been taking place since autumn 2019. In the wind farm Hollandse Kust (north), there will also be an experiment with solar energy at sea. Besides the ambitions of the EU for solar energy at sea and the request of the House of Representatives for a route map, these developments are reason for in-depth research into the opportunities and limitations of sun at sea.

Extraction of sand and gravel

From its part of the North Sea, the Netherlands extracts over 25 million m³ of sand per year. These are partly shallow (<2 metres) and partly deep (>2 metres) extractions. Around half of the extracted sand is used as replenishment sand to maintain the coast, while the other half is used as fill sand for construction and infrastructure and for flood protection measures of low-lying areas.

Sand extraction can have negative effects on organisms in the seabed (D1) and the stability of the coastal foundation. To counter these effects, this activity is limited to certain areas. In addition, sand extraction can lead to cloudiness. This can be limited by using specific types of dredging equipment.

Economic figures about sand and gravel extraction at sea are relatively uncertain because they can only be estimated. This is because 'sand and gravel extraction' is not a separate economic sector with the classification of CBS. The figures show that between 2010 and 2015, there was a slight decline in the production and the added value (see Table 2.1). In 2017, however, all the indicators mentioned increased again compared with 2015 [4].

The future demand for sea sand also depends on the actual rise in sea levels and on economic growth. If sea levels rise by 15 to 35 centimetres between now and 2050, the required volume of replenishment sand will increase in that period from the current 12 million m³ to between 18 and 48 million m³. The demand for replenishment sand will also rise significantly if the Port of Rotterdam is expanded, for example, and if energy islands are created for the sustainable generation of electricity and/or hydrogen. In the case of limited economic growth and a shrinking population, the demand for fill sand will probably remain almost the same as the current 13 million m3 per year. However, if the economy and population both grow, the demand for fill sand may rise to around 18 million m³ [8].

Ports

The Port of Rotterdam is the biggest port in Europe for the transhipment of goods. As shown in Figure 2.3, the added value of the port of Rotterdam is greater than that of all the other Dutch seaports together [4].

In general, transport, storage and communication are the most important activities in the seaport sector. They generate nearly half of the added value and make an important contribution to the growth of the added value of the seaports between 2010 and 2017. With nearly 37 percent, the 'industry' sector also has a large share, but this sector is growing the least (less than 8 percent). In terms of production value, this sector is the biggest sector. This total picture conceals big differences in the distribution of the various sectors over the different ports. More details on this are available in the CBS report [4].

If economic growth is limited in the coming years, the global significance of the ports of Rotterdam and Amsterdam may decline. The number of shipping movements will then not

increase much. Strong economic growth, on the other hand, is expected to benefit the global position of the ports. The Dutch ports will then benefit, among others, from the greater depth of shipping channels, wide port basins and continuing automation and robotisation [2].

If the environmental ambitions become significantly higher in the coming years and the switch to a low carbon economy really gets going, this will have major consequences for the storage and transhipment of fossil fuels. Such a switch is not expected to be possible without carbon storage as an intermediary step. Here again, the ports could play an important role [2]. However, this requires the necessary space. Furthermore, due to safety requirements, large-scale storage and transhipment of hydrogen in the form of ammoniac of liquid hydrogen will not be possible in any random location. Offshore transhipment off the Maasvlakte could be a serious solution.

Other sea-related activities in the coastal zone

To give an impression of several sea-related activities in the North Sea coastal zone (up to 1 km off the coast), here is an economic description of the sectors 'hotels and restaurants', 'fisheries', 'recreation, culture and sport' and 'retail'.[2]

Recreation and tourism depend on the good quality of the marine environment. Conversely, recreation and tourism can also have negative effects on the marine environment, such as leaving behind waste that ultimately ends up in the sea (D10). To tackle this, awareness creation campaigns are being launched and waste is actively being removed from the beaches by coastal municipalities [1].

In the period 2010-2017, the added value of 'hotels and restaurants' increased, while that of 'fisheries' declined. The sector 'hotels and restaurants' has the largest share of the coastal area whilst 'fisheries' only has a small share. The total added value which is generated in the coastal zone has therefore grown. Figure 2.3 shows this. The other sectors show little change: the sector 'recreation, culture and sport' shows a slight decline in the gross added value and 'retail' a small rise [4].

The number of leisure boats in the Netherlands may fall significantly if the coming years are characterised by low economic growth, shrinking population, ageing and a shift to other forms of recreation and holidays. But the reverse trend could also occur if there is a further rise in welfare,

[2] Fisheries in the coastal zone includes all fisheries activities (anywhere in the world) of fishing companies based in the coastal zone. Because there is partial overlap between fishing in the coastal zone and fishing at sea as described above as part of activities at sea, the two figures should not be added together due to possible double counting.

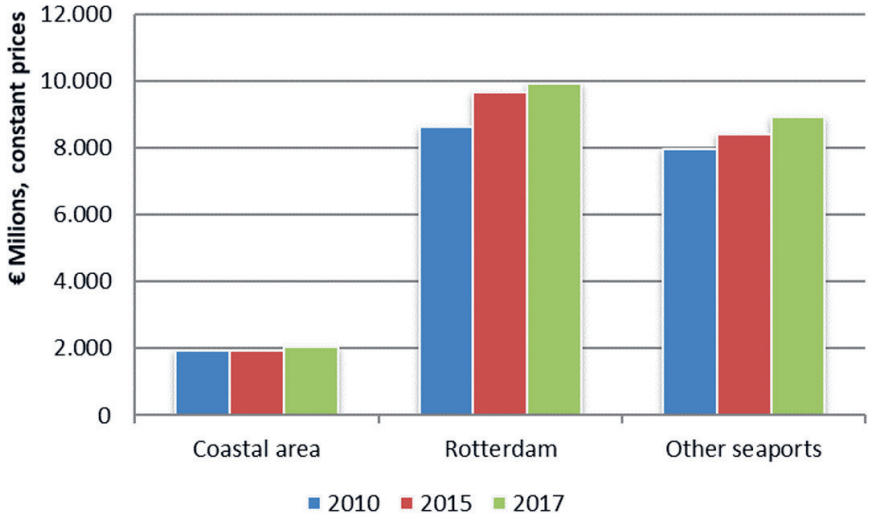

Figure 2.3: Development in added value over time of activities on land [4]

an increase in the population increases and the number of pensioners [2]. In view of the increasing size of leisure boats and thus their suitability for sailing on the sea, in future there will be more shipping movements of leisure boats on the sea.

With the increase in the number of older people, there is also a definite trend towards more luxury hotels, restaurants and wellness centres on the Dutch coast. Particularly in Zeeland, this is expected to contribute to the economic development. Furthermore, an increase in sustainable tourism and nature tourism is expected. The public is becoming more aware of the value of the natural environment. The Dutch coasts offer the preconditions for such development. However, it is unclear how much this will contribute to the Dutch economy [9].

Indirect importance of the North Sea for society: Ecosystem services

The ecosystems on the planet have numerous functions for humans, for the food produced by agriculture, for the purification of air and water and regulation of the climate. Such social benefits that humans derive from ecosystems are called ecosystem services [10].

Ecosystem services involve the following services:

- Production services: ecosystems deliver products, such as food, water, wood and genetic sources.
- Regulatory services: people use the regulatory capacity of ecosystems, for example in organic pest control in agriculture, capturing carbon from trees or cross-pollination by insects.
- Cultural services: ecosystems deliver non-material services, such as recreation, health, historic, ethical and aesthetic services.
- Supporting services: services which are necessary for the other ecosystem services, such as soil formation, the nutrients cycle and primary production.

For many years, Dutch ecosystems have delivered services of social importance. These are not just ecosystems in nature areas which deliver such services. The agricultural area, the rivers, sea and the city also deliver ecosystem services. For example, more than half of the oxygen we breathe comes from marine organisms, a quarter of the annual CO_2 emissions in the atmosphere produced by humans is absorbed by marine waters. Here, the following applies: the higher the biodiversity, the better nature can guarantee the ecosystem services.
Marine and coastal ecosystems therefore deliver a range of ecosystem services, from fisheries to carbon storage and flood protection. However, pollution, overfishing, climate change and habitat destruction have negative consequences and can affect the capacity of the marine ecosystem to deliver these services, the natural capital of the North Sea.

Sector	Indicator	2010	2015	2017	2021	2030	2050
					% related to 2017		
Shipping	Employment	9.1	9.5	9.2	0	7-13	20-33
	Production value	5,035	6,601	6,059	3-5	10-16	21-40
	Added value	1,281	1,907	1,687	0-5	10	15-35
Fisheries	Employment	0.7	0.8	0.7	0	-20	-60
	Production value	142	153	132	-7 -13	-20 -27	-60 -73
	Added value	78	89	95	-10	-20 -30	-60 -80
Oil and gas production	Employment	3	4	2.9	-8	-24	-100
	Production value	5,597	5,013	3,144	-8	-24	-100
	Added value	4,686	3,405	2,071	-8	-24	-100
Wind energy	Employment	0.04	0.06	0.14	200 – 400	400–1400 1400	1100–5900
	Production value	90	116	356	159 – 288	197 – 884	531 - 3063
	Added value	35	46	149	106 - 213	31 - 338	-13 - 350
Sand extraction	Employment	0.3	0.3	0.4	0 - 33	33 - 67	67 - 167
	Production value	145.6	135.9	208.3	0 - 16	11 - 53	32 - 142
	Added value	63.8	48.5	79.1	0	0 - 40	20 - 120
Total at sea	Employment	13.14	14.66	13.34			
	Production value	11,009.6	12,018.9	9,899.3			
	Added value	6,143.8	5,495.5	4,081.1			
Ports	Employment	128	127	128			
	Production value	71,137	72,971	76,122			
	Added value	14,996	18,065	19,068			
Coastal zone	Employment	37	39	42			
	Production value	3,210	3,660	4,080			
	Added value	1,695	1,940	2,188			
Total on land	Employment	165	166	170			
	Production value	74,347	76,631	80,202			
	Added value	16,691	20,005	21,256			

Table 2.1. Economic importance of the North Sea (2010-2017; source: CBS (2020) [4]; 2021 – 2050 calculated based on WEcR (2019) [2])[3]

[3] For the activities at sea, the figures in the table only relate to the activities on the NCP in so far as these contribute to the Dutch economy. This means, for example, that the economic value of foreign shipping is not calculated in the shipping figures. Conversely, much of the economic value of the Dutch fisheries is not included because it takes place outside the NCP. The reason for only presenting figures relating to the NCP is because the MSFD requirement for the Netherlands relates to the Dutch part of the North Sea.

Furthermore, for wind energy, the CBS figures only relate to the operation phase. The estimate of the future trend is therefore also based on the direct economic effects in the operation phase. WEcR also presents figures for the expected economic effects of the construction phase. These are expected to be significant, but they are not therefore included in the above figures. Nor are the indirect effects of the different activities included in these figures. This might concern employment generated in the ports for building wind turbines at sea, as well as any fall in employment due to the closure of a coal-fired power station following the switch to wind energy.

3 Policy tasks and measures

3.1 Introduction to this chapter

Much of the programme of measures was reported in the previous policy cycle and will be continued. In addition, based on the remaining policy tasks, additional measures are included in this chapter. The measures are divided by descriptor:

- Descriptor 1 Biodiversity
- Descriptor 2 Alien species
- Descriptor 3 Commercial fish and fish products
- Descriptor 4 Food webs
- Descriptor 5 Eutrophication
- Descriptor 6 Seafloor integrity
- Descriptor 7 Hydrographical conditions
- Descriptor 8 Contaminants
- Descriptor 9 Contaminants in fish
- Descriptor 10 Litter
- Descriptor 11 Energy supply, including underwater noise

Of these eleven descriptors, the three descriptors about biodiversity, food webs and integrity of the seabed are crucial, in terms of the ecosystem approach. These three describe the structure, function and processes in the marine ecosystem. The other descriptors relate to disturbances of the marine ecosystem (also called pressure factors) resulting from human activities.

For each descriptor, the environmental status and environmental goals are summarised based on the update of the Marine Strategy part 1 (2018) [11]. This is followed by a description of the measures which were implemented in the recent period. The next paragraph addresses the current environmental status and the expected development therein, partly under the influence of economic developments and other developments, such as supply from big rivers and climate change. Based on this, it is determined whether there is a possible policy task (*gap analysis*), and whether additional measures are required. The principle here is the update of the Marine Strategy part 1 (2018). The development of these measures partly depends on available knowledge. For each descriptor, a knowledge agenda is therefore included. This knowledge agenda contains the key knowledge questions that will be investigated in the period 2022-2027.

Based on article 14 of the Marine Strategy Framework Directive, member states must indicate in their programme of measures if good environmental status cannot be achieved by means of the measures. One cause might be that the member state is not responsible for a certain measure or lack of measure. However, natural circumstances, force majeure or changes in physical properties of marine waters can also mean that the environmental status does not improve in time. The MSFD stipulates that member states are not required to act if there is no significant risk to the environment, or if the costs of the action are disproportionally high in relation to the risk for the marine environment. However, no further deterioration must occur. The relevant paragraph addresses such situations.

3.2 Biodiversity (D1)

Good environmental status and goals

According to part 1 of the Marine Strategy (2018), the good environmental status for biodiversity is achieved if the biodiversity is preserved and if the presence and quality of habitats and the distribution and density of species correspond with the prevalent physiographical, geographical and climatological circumstances.

The Netherlands has divided the descriptor Biodiversity (D1) into four sub descriptors: birds, marine mammals, fish and squid, and pelagic habitats. The sub descriptor benthic habitats should also be in D1. However, the Dutch interpretation of the Marine Strategy, together with descriptor D6 (Seafloor integrity), it is allocated and justified in this document in paragraph 3.7. The following table presents an overview of the environmental status and environmental goals per sub descriptor.

Birds	
Good environmental status	Overarching: population densities and demography of bird populations indicate healthy populations. • D1C2: for each functional group, the population size of at least 75 percent of the species is above the threshold value of 1992 (OSPAR assessment value). • D1C2: populations of sea birds must fulfil national goals from the BD. • D1C3: for each species, lack of breeding success must not occur in more than three of the six years (OSPAR assessment value).
Environmental goals	• D1T1: contribution to the further development of the assessment of bird populations and identification of the main pressure factors at regional level (OSPAR). • D1T2: restoration of peace for marine mammals and birds by reducing fisheries on the Vlakte van de Raan and in the North Sea coastal zone (in the framework of the VIBEG agreement). • D1T3: achieve conservation goals for habitat types and species in the Natura 2000 areas at sea (BD and HD). • D1T7: monitoring bird collisions with wind turbines in the framework of Wozep.
Sea mammals	
Good environmental status	Overarching: the population densities and demography of populations of marine mammals indicate healthy populations. • D1C1: by-catch of porpoises is lower than 1 percent of the best available population estimates (ASCOBANS). • D1C2: the population of grey seals (H1364), common seal (H1365) and the porpoise (H1351) must fulfil favourable reference ranges for the population size (FRP) from the Habitats Directive. • D1C3: no decline in birth figures of the grey seal of more than 1 percent since the last assessment and no more than 25 percent decline since 1992 (OSPAR assessment value). • D11C1: for impulsive noise: spatial distribution, duration and noise levels of loud impulsive sources are such that direct and indirect effects of loud impulsive noise cannot endanger the favourable state of conservation of species (see further elaboration at D11). • D1C4: distribution of porpoises and common seal fulfils the favourable reference range for the distribution (FRR) from the Habitats Directive. The extent to which the area and the quality of habitats of marine mammals develop is also relevant: • D1C5: preservation of the size and quality of the habitat of the grey seal (H1364), the common seal (H1365) and the porpoise (H1351) (HD).

Environmental goals	• D1T2: restoration of peace for marine mammals and birds by reducing fisheries on the Vlakte van de Raan and in the North Sea coastal zone (in the framework of the VIBEG agreement). • D1T3: achieve conservation goals for habitat types and species in the Natura 2000 areas at sea (BD and HD). • D1T4: implement mitigating measures in the framework of the Porpoise Protection Plan of 2011. • D1T8: further research into cumulative effects in OSPAR context.
Fish and squid	
Good environmental status	Overarching: the population densities and demography of populations of fish indicate healthy populations. • D1C2: Commercial fish populations: see D3C1 and D3C2 - Commercial fish • D1C2[4]: increase in number of vulnerable fish species in the fish population (OSPAR assessment value). • D1C2: the population of migratory fish must fulfil favourable reference ranges for the population size (FRP) from the Habitats Directive. • D1C2: improve the population size of sharks and rays in the North Sea and particularly in the coastal zone. • D1C3: increase in number of big fish in the fish population (OSPAR assessment value). • D1C4: distribution of migratory fish in the river area fulfils the favourable reference range for the distribution (FRR) from the Habitats Directive. • D1C5: reduction of barriers in the migratory routes, so that by 2027 they are not an obstruction for sustainable populations in the river basin districts (WFD).
Environmental goals	• D1T5: research into sharks and rays in combination with mitigating measures as adopted in the MSFD shark action plan: communication and education reduction in undesired by-catch improved survival • D1T6: tackle remaining fish migration issues in the Netherlands to repair the connectivity between water systems (WFD). • D1T8: research into the need for fishing-free zones around structures to promote the migration options for migratory fish (WFD). • D3T1: D3T2: the management of all commercially fished stocks fulfils F≤FMSY and a spawning mass stock above the precautionary margin MSY Btrigger. • D1T3: achieve conservation goals for habitat types and species in the Natura 2000 areas at sea (BHD).
Pelagic habitats	
Good environmental status	D1C6: for pelagic habitats, the good environmental status is achieved when the spatial and temporal variation in the plankton population remains within a range which indicates a good environmental status. The ranges to be used must be adopted regionally in the second cycle.
Environmental goals	D6T4: developing further and testing regional assessment methods which can be used in the future for assessing benthic and pelagic habitats.

[4] The criteria D1C1, D1C2 and D1C3 must not just be elaborated for fish species, but also for squid species (cephalopod). This has not yet been done, partly because there is not much information available about these species. In 2022, it will be studied how this can be done. See further paragraph 3.4 for the good environmental status of commercial fish populations (D3C1 and D3C2).

Implemented measures

Birds and marine mammals

In 2017, the Nature Conservation Act came into force. This replaces the Flora and Fauna Act and the Nature Protection Act (1998) and implements the EU Birds Directive (BD) and Habitats Directive (HD). The Act provides for generic protection of species of birds and marine mammals, among others the ban on killing and disturbing animals. Based on the Offshore Wind Energy Act, exemptions can be granted for the construction and operation of wind farms – under conditions – for disturbing or killing species of birds, marine mammals and/or bats. The Nature Conservation Act also arranges the designation of protected BD and HD areas (Natura 2000 areas) for species of birds and marine mammals.

In designated Natura 2000 areas, limited activities are allowed, partly to prevent and to mitigate significant effects on species of birds and marine mammals based on the BD and HD. This is or soon will be the case for birds in BD areas North Sea coastal zone, Voordelta and Frisian Front. This concerns the following (proposed) measures:

- Frisian Front: seasonal closures for gillnet fishing due to guillemot foraging;
- North sea coastal zone: closure of zone 1 areas (established under the VIBEG-II agreement) for all fisheries, to prevent disturbance of protected bird species;
- Voordelta: resting areas for birds, where no activities are allowed, or only under certain conditions.

Sea mammals are protected in the designated HD areas North Sea coastal zone, Voordelta, Vlakte van de Raan, Dogger Bank and Cleaver Bank. In four Natura 2000 areas, including the Voordelta, the porpoise was recently added to the Standard Data Form and should therefore also be included in the management plans for those areas, in accordance with Articles 6.1 and 6.2 of the HD. The management plans for the Natura 2000 areas along the coast stipulate that the presence of bird nesting locations must be considered during beach replenishment, cables and pipeline maintenance and beach management. In addition, activities in the coastal zone are regulated with permit requirements, mitigating measures like codes of conduct and exemption conditions. Areas can also be totally or partially closed for activities. It is expected that the conservation measures (measures limiting fishing) that are proposed in the management zones of the Bird Directive area Frisian Front will be implemented by 2022 by means of a delegated act. They will be implemented in combination with research and monitoring for further knowledge development.

Adopted OSPAR recommendations based on the OSPAR list of endangered species and habitats have been or are being implemented.

For a mobile species like the porpoise, it has been decided that, besides area-based measures in Natura 2000 areas, generic species protection measures are more appropriate. In 2011, the first Porpoise Protection Plan was drawn up for this. Of the measures included in this protection plan, the following have been carried out, partly in the framework of the Marine Strategy, part 3 [12]:

- Establishment (2013) of the national scientific Porpoise Advisory Committee, which monitors the implementation of the prioritised knowledge agenda.
- Implementation of population monitoring of porpoises via the MSFD monitoring programme (Marine Strategy, part 2, from 2014 and its optimisation in the updated Marine Strategy, part 2, from 2020).
- Implementation of a scientific by-catch observation programme (2013-2017).
- Research into the controlled application of pingers.
- Amendment of the relevant European fisheries legislation, whereby it becomes more applicable to the Dutch situation.

In 2020, the Porpoise Protection Plan from 2011 was updated, see supplementary measures – species protection.

Fish and squid

In the context of the Water Framework Directive, the Haringvliet Sluices Management Decision officially came into force in 2018. This means that the Haringvliet sluices are opened slightly in the case of incoming tide. Thanks to the opening, migratory fish which spend a large part of their lives in the sea, including salmon, eel, sea lamprey, sea trout and twait shad, can pass through the sluices and swim upstream to their spawning areas.

Another measure for fish migration is the construction of a fish migration river in the Afsluitdijk. This makes it possible for migrating species to swim freely between the Wadden Sea and the IJsselmeer lake. The preparatory work for this measure started in May 2020. Construction started in 2021, after which the first fish will swim through the river in mid 2023.

As from 2022, fishing-free zones will be introduced around structures like weirs, sluices and pumping stations with a fish migration provision such as a fish ladder or fish passage or with fish-friendly turbine or fish-friendly weir and sluice management. Migration points at freshwater-seawater transition areas will also be fishing free. Specific to the entry points on the Haringvliet and both sluices in the Afsluitdijk, a dimensioning will be chosen which suits the local circumstances and the great importance of these locations for the migration of migratory fish between sea and the inland waterways.
In the context of the MSFD shark action plan, an information package was developed for

professional fishermen, fishing schools and fish auction employees. In addition, an exception was introduced for the landing obligation for rays. A code of conduct with respect to not landing the by-catch of sharks and rays in recreational fishing is now part of the identification card for sharks and rays. In the context of Life IP Deltanatuur, a project was started that studies the distribution of shark and ray populations in the North Sea and Wadden Sea. A supplementary study will also be carried out in the period 2021-2023 into the distribution and survival in the fishing for sharks and rays in the North Sea, among others to further explore the use of Natura 2000 areas and obtain information for the exception of rays in the landing obligation.

Current environmental status

Birds

The Dutch sea and coast are important for both nesting and migratory birds: as a source of food and for finding breeding grounds. For millions of migratory birds, it is an important area to spend the winter. According to part 1 of the Marine Strategy (2018) [11], the good environmental status for birds has not yet been achieved. That is the conclusion based on the most recent OSPAR assessments of numbers of breeding birds, breeding success and numbers of non-breeding birds.

According to the underlying – regional – OSPAR assessment, the status for breeding success among breeding birds is deteriorating. This mainly concerns waders and species which find their food on the water surface and for which the supply of food is an important issue. Furthermore, breeding birds also have problems with the limited availability of suitable breeding places. The Netherlands Birds Directive and Habitats Directive report (2019) [13] shows variations in the national development among coastal breeding birds. For example, the Kentish plover, Common tern, Sandwich tern and Little tern are in difficulty because the dynamic environments in which they breed are disappearing or have become unsuitable as a result of recreational pressure.

According to the – regional – OSPAR assessment, the relative abundance of migratory and wintering coastal birds has also declined sharply. In the – international – North Sea, however, such species appear to be doing better: the numbers of 75 percent or more of the species are above the reference values for this species in the period 1991-2015. The Netherlands Birds Directive and Habitats Directive report 2019 [13] shows that national trends among migratory birds from sea and coast are overwhelmingly positive. However, certain species in the Delta, in particular the Eastern Scheldt, are under pressure due to the decline in mud flats.
The Dutch and international tasks for the development of sustainable offshore energy can put further pressure on the good environmental status for birds, due to the risk of collisions or loss of habitat. The Offshore Wind Ecological Programme (Wozep) monitors and evaluates the effects of wind farms on seabirds, looking at bird strikes, barrier effects and habitat loss, among other things. The landing obligation for fishermen, which came into effect in 2019, may also have a negative impact on the numbers of certain seabird species, because birds can no longer forage on by-catch that was previously thrown overboard.

Marine mammals

The good environmental status for marine mammals has still not been achieved, but the situation is improving. In the Dutch part of the North Sea, the size of the grey seal and common seal populations is developing in a positive sense. The size of the porpoise population is stable.

In 2019, in the Birds Directive and Habitats Directive 2019 report [13], the Netherlands reported the state of conservation of the common seal, grey seal and porpoise to the European Commission as 'favourable'. With respect to the porpoise, it was added that the future prospects were 'unknown'. This is because the effects of the large-scale roll-out of wind at sea are not yet well known. Furthermore, there are still many uncertainties about the development of the population, despite the fact that it has been stable and at a good level in recent years. The national Red List of Sea Mammals 2020 [14] has noted porpoises and the two types of seal in the North Sea as 'currently not endangered'.

The further development of sustainable energy at sea puts pressure on the good environmental status for all marine mammals. Pile driving during the construction of wind farms can lead to them avoiding areas, disturbance of behaviour and to physiological effects. But continuous noise during the operational phase of wind turbines can also have effects in the longer term.

Fish and squid

The fish population does not yet have good environmental status. The OSPAR assessment shows that the deterioration of the composition of fish populations from the past has stopped. In some areas in the North-East Atlantic Ocean, there seems to be some recovery. According to the assessment, the number of big fish is still too small, but is recovering.

The current status of many shark and ray species is still cause for concern. The Netherlands Red List of Fish (2015) [15] lists the status 'disappeared' for the common skate, 'seriously endangered' for the spiny dogfish and 'endangered' for the spotted ray. Spiny dogfish, spotted ray, thornback ray and common skate, along with the angel shark are also on the OSPAR list of endangered

species and habitats (2008). The numbers of small-spotted catshark and starry smooth-hound also seem to be increasing.

Of the five species of fish which migrate between sea and freshwater (diadromous fish) and about which the Netherlands reported in 2019 for the EU Habitats Directive [13], three (sea lamprey, twait shad and salmon) had a 'very unfavourable' conservancy status and two (houting and European river lamprey) a 'moderately unfavourable' status.

Of the squid species in the Dutch North Sea, five originate here. Two of these are significant for the fishing industry. Eight squid species are incidentally or periodically found in the Dutch North Sea, of which one is also significant for the fishing industry. The available squid sighting and catch data are not yet suitable for implementing Commission Decision 2017/848/EU. Implementation in 2024 (for the update of the Marine Strategy part 1) requires a further analysis of the available data. This analysis will be launched in 2022.

Pelagic habitats

According to Marine Strategy part 1 (2018) [11], the current environmental status of pelagic habitats is unknown. The possibilities to monitor and assess pelagic habitats are not sufficiently well developed yet. A pragmatic approach has therefore been chosen for now. The status of zooplankton and phytoplankton is assessed based on data provided by the United Kingdom in OSPAR context to the Netherlands. This data is collected with the Continuous Plankton Recorder. However, the monitoring methodology and ecological interpretation are still being developed. The Netherlands is also setting up a monitoring network for this goal. This network can provide additional information for the OSPAR assessments. The joint goal is to create the most cohesive possible international system of monitoring and evaluation and to extend the number of measuring points

Additional policy task

Birds and marine mammals

The Marine Strategy part 1 (2018) [11] suggests a potential additional policy task for birds and marine mammals because existing policy may not be sufficient. There is also a knowledge task aimed at obtaining more insight into the reasons behind the deterioration of birds and to gather more knowledge about cumulation and possible mitigation of the effects of wind farms. A project is also being planned for monitoring and mitigation of by-catch of all sensitive species.

Fish and squid

The Marine Strategy part 1 (2018) [11] indicates that there is no additional policy task for the fish population (including D3 - commercial fish and shellfish), because existing policy is satisfactory. In the framework of the further elaboration of the North Sea Agreement, it will be studied whether an additional task (knowledge task and possibly measures) is required.

Pelagic habitats

According to the Marine Strategy part 1 (2018) [11], the additional policy task for pelagic habitats is unknown. However, there is a knowledge task for the development of an assessment method.

Additional measures

Area-based measures

The development of an ecological network of protected areas is one of the main instruments to maintain and restore the ecosystem in the North Sea. In the Dutch part of the North Sea, a cohesive and representative network of protected marine areas is being created, whereby the diversity of the various ecosystems is adequately covered.

In the North Sea Agreement (NSA) [16], the following agreements were made about area measures:

- Agreements about designating and protecting offshore nature areas are implemented and enforced.
- Nature goals for the North Sea must not only be formulated quantitatively (percentage of protected area), but also qualitatively. which nature areas are worth protecting and how can they be protected? Here, the scale of areas must justify the nature goal.
- Protecting nature must be based on an integral consideration of the ecological qualities of an area, taking the socio-economic (integral MSFD assessment framework) consequences into account, and with the application of *other effective area-based measures*.
- Nature values to be protected in an area form the basis for acceptable co-use, taking the precautionary principle into account. Forms of co-use, including fishing, which do not have a significant impact on defined nature values, are permitted. If the nature values justify complete exemption from potentially harmful activities, the agreements mentioned in 3.7 about fishing in nature areas are observed.
- On balance, gas production in Natura 2000 areas will decline. The practice that gas can be extracted in Natura 2000 areas under strict conditions will be continued. These conditions fulfil the to-be-formulated supra-statutory Best Available Techniques for environmentally protecting and nature-enhancing building and exploitation, which will be periodically recorded in the governance structure of the North Sea Consultation.

Paragraph 3.7 gives the other agreements about additional measures relating to area-based protection.

Species protection

Apart from area-based protection, more generic species protection is important for long-lived and vulnerable species, such as seabirds, marine mammals and certain types of sharks and rays. The following agreements in the NSA ('extra miles to a healthy North Sea') are aimed at intensification of more generic species protection:

- Existing action and species protection plans (for example for sharks, porpoises and seabirds) are being carried out. The progress of the implementation of the plans is evaluated every two years.
- For vulnerable species, including birds, marine mammals, fish and benthic animals which are identified based on international guidelines and the Framework for the Assessment of Ecological and Cumulative Effects (FAECE), species protection plans are developed and implemented. Priority is given to the planning (period 2019-2022) and implementation (period 2023-2030) of plans for species which have already been identified in the FAECE as vulnerable for effects of offshore wind farms. Within two years at the latest of agreeing the NSA, a list will be drawn up of other species for which protection plans will be made and implemented, including the timeline of the plans.
- Species protection plans will describe pressure factors and generic protection measures. These might include measures aimed at reproduction, the availability of food, safety and tackling existing threats. These measures must be considered and monitored in developments on the North Sea.
- The Government (Ministry of LNV) draws up the species protection plans in collaboration with relevant social organisations and scientific organisations. The implementation of the plans will be evaluated every two years.
- An action plan is being developed for the agreements for species protection plans and habitat reinforcement, including a timeline for implementation, evaluation and review of these plans.
- Asof 2020, independent research will be conducted into the abundance and distribution of honeycomb worm reefs. If that research leads to applicable conclusions, relevant locations will be protected via spatial protection measures under the Habitats Directive or Marine Strategy Framework Directive.

Integral nature reinforcement

When developing offshore activities – supplementary to the statutory mitigation measures – instructions, measures and actions can be identified as early as possible in the design phase which contribute to the strengthening and restoration of the ecosystem. Wind farms, for example, have the potential to contribute to nature reinforcement. Actions relating to nature reinforcement or nature restoration within a wind energy area are recorded in the area passport.

Due to the lack of concrete nature reinforcement measures, it will be investigated which additional measures can contribute to nature restoration in addition to area-based protection.

Sea mammals

The Porpoise Protection Plan [17] was updated in 2020. This plan aims to contribute to the good environmental status of the porpoise. Actions included in this plan will be implemented in this planning period. The main actions are:

- Application of an optimised design for (aircraft) counting and making better use of different data flows, also from neighbouring countries.
- Alternative methods for studying population, ecology and abundance, including transmitting and passive acoustic monitoring (PAM).
- Improvement of the registration of strandings.
- Development of an OSPAR indicator for contaminants in porpoises.
- Cumulate other noise sources than wind, including seismic survey.
- An international approach to reducing by-catch.

For seals, in the framework of the Seal Agreement (2020) [29], an improved stranding registration is being elaborated.

Birds

Additional area-based measures for birds from the NSA are:

- *New Birds Directive area and Brown Ridge conservation measures*
  The Brown Ridge was designated as a Natura 2000 area under the Birds Directive in 2021. Conservation measures are being prepared as part of the CFP Article 11 Procedure.
- *Research Birds Directive areas*
  Before 2025, independent research will be conducted to establish whether the Hollandse Kust, Vlakte van de Raan, Borkumse Stenen, Cleaver Bank, Dogger Bank and the Central Oyster Grounds fulfil the selection criteria for designation as Birds Directive area. Areas that fulfil these selection criteria will then be designated as soon as possible.

Fish and squid

The MSFD shark action plan will be evaluated in 2022. It can then be continued for a new period of six years.

Knowledge agenda

This section contains the key knowledge questions about biodiversity that will be investigated in the period 2022-2027.

1. What are the cumulative effects of (the most relevant) pressures on the populations of seabirds, bats, marine mammals and fish?
2. Is the basic data on marine mammals, birds, fish and benthic species in place to be able to adjust the monitoring in time with a view to expected developments with regard to increasing use of the North Sea?
3. Little is known about the distribution and presence (abundance) of small pelagic fish, and thus about the availability of fish food on the temporal and spatial dynamics of birds and marine mammals in the North Sea.
4. Various studies into sharks and rays are carried out as part of the MSFD Shark Action Plan, LIFE IP, EMFF and LIFE CIBRiNA (see also knowledge question 7). These studies provide research data with which an indicator for D1 Fish (cartilaginous fish/elasmobranchs) is to be developed. The interpretation of research data and the development of an indicator is a knowledge question that will be investigated in 2024.
5. What is the relative contribution of different pressure factors (such as food availability, habitat loss, etc.) to seabird populations on the NCP and what measures can be taken to protect seabird populations on the NCP?
6. Research into different forms of gillnetting that are and are not suitable in specific (closed) areas and in relation to protected bird and mammal species. This is a national knowledge question that could possibly be combined with the CIBRiNA EU LIFE By-catch proposal submitted at the end of 2021. This project, aimed at improving monitoring and mitigation of by-catch of vulnerable species, will be carried out in the period 2022-2027 and financed from the Ministry of LNV and IenW's own resources. The project is a collaboration between ministries, fisheries organisations, scientific institutes and nature organisations from 13 countries.
7. The key knowledge questions in the Action Plan from the Harbour Porpoise Protection Plan (2020) [17] focus on habitat quality and food availability, the cumulative effects of various activities and by-catch.
8. The status of 'pelagic habitats' (D1C6) is determined by the plankton community. Research is required into the phytoplankton and zooplankton composition and the ranges that indicate good environmental status.

3.3 Alien species (D2)

Good environmental status and goals

According to the Marine Strategy part 1 (2018) [11], a good environmental status for alien species is achieved when the species introduced by human activities do not bring about a change in the ecosystem. The following table presents an overview of the environmental status and environmental goals.

Implemented measures

Good environmental status	Overarching: alien species (exotic species) introduced by human activities occur at a level whereby the ecosystem does not change. • D2C1: declining trend in the number of introductions of alien species per policy period (six years; OSPAR).
Environmental goals	• D2T1: minimise the risk of new introductions of alien species via shellfish transports, ballast water and fouling on ship's hulls.

After the introduction in 2015 of the EU regulation (1143/2014) on the prevention and management of the introduction and spread of invasive alien species [18], the Netherlands submitted several pathway action plans to the European Commission (2020) to tackle the routes along which alien species are introduced. Measures against unintentional introductions of marine invasive alien species from the pathway action plans concern the Policy rules relating to shellfish movements, also referred to below, and measures within the framework of international agreements in relation to ballast water and hull fouling.

Policy rules relating to shellfish movements (2012); amended in 2017) [19] are also seen as an action plan. The policy rules set conditions to permits based on the Nature Conservation Act for importing and sowing of marine shellfish in the Eastern Scheldt and for the transport of mussel seeds from the Eastern Scheldt to the Wadden Sea. Measures are also included in the management plans of the Natura 2000 areas to prevent the import of alien species and to tackle the presence and abundance of invasive alien species. The type of measures varies per Natura 2000 area and depends on the nature goals. Regular checks are conducted for enforcement. The manager may intervene in the event of the introduction of invasive alien species. The risk of alien species moving to Natura 2000 areas is thus minimised.

In addition, the Regulation for the use of alien and locally absent species in aquaculture [33] bans the movement of alien and locally absent species in aquaculture without a permit from the Minister of LNV.

In 2017, the Netherlands implemented the IMO Ballast Water Management Convention in national legislation. This convention requires ship owners to treat their ballast water. The Netherlands has also made efforts to secure additional international agreements about hull fouling. These agreements are still voluntary and are being evaluated in IMO context. This evaluation will have to show whether additional measures are required.

Current environmental status

The Marine Strategy part 1 (2018) [11] indicates that the good environmental status seems to have been achieved. The number of observations of new alien species has declined since 2012. In the period 2012-2017, one new introduction was discovered (the amphipod Monocorophium uenoi). The primary introduction of alien species mainly occurs via ballast water, hull fouling and transport of shellfish, including oysters.

Additional policy task

Marine Strategy part 1 (2018) [11] indicates that there is no additional policy task; the existing policy is satisfactory, but there is a knowledge task concerning the increase of hard substrate. The Netherlands considers the presence of already established alien species as irreversible. It is not possible to tackle established alien species cost effectively and without considerable harm to the ecosystem. This means that achieving a good environmental status is the same as striving not to change the current ecosystem by new introductions. Minimising new introductions is therefore the goal.

One attention point is the disposal of foreign hard substrate in the North Sea, for example to protect the foundations of wind turbines from erosion. This activity may involve a risk of introducing alien species.

A new attention point concerns possible initiatives for the cultivation in open sea of refined native seaweed species or alien seaweed species. This development, also due to the precautionary principle, must be considered undesirable.

Additional measures

The current policy is satisfactory. There is therefore currently no need to take additional measures. However, it must be explored whether further measures are necessary to prevent alien or refined seaweed species from being cultivated in open seawater like the North Sea.

3.4 Commercially exploited species of fish and shellfish (D3)

Good environmental status and goals

According to Marine Strategy part 1 (2018) [11], there is a good environmental status for commercially exploited fish and shellfish when the populations of all commercially exploited species remain within safe biological boundaries. The length and age distribution and the size of these populations show a structure which is characteristic for healthy stocks.

Paragraph 3.2 gives criteria for the good environmental status and environmental goals for the entire fish population, including commercial species. The table below presents the goals for achieving the good environmental status of commercial fish.

Good environmental status	Overarching: gradual recovery and maintenance of populations of fish populations above a biomass level that can generate the optimal sustainable yield. • D3C1: for all commercially fished fish stock, mortality due to fishing (F) on the value or less than the value remains at a Maximum Sustainable Yield, MSY): F≤Fmsy (CFP). • D3C2: Spawning Stock Biomass (SSB) of commercially-fished fish or shellfish is above the precautionary margin MSY Btrigger (in line with ICES catch advice; CFP). There is an international agreement that the good environmental status for commercial fish is achieved when for each commercially fished stock, both these criteria are met. If that is not the case, the species will not have a good environmental status.
Environmental goals	• D3T1: the management of all commercially fished stocks fulfils F≤FMSY and a spawning mass stock above the precautionary margin MSY Btrigger.

The indicator for length-age distribution in fish populations (D3C3) is not currently used because there is no agreement at international level. The Netherlands wants to work nationally to obtain more knowledge about length and age distribution of commercial fish stocks, possibly with an international elaboration. see knowledge agenda.

Implemented measures

The above-mentioned goals have been internationally agreed. Measures from the Common Fisheries Policy (Regulation (EU) 1380/2013) are leading for achieving these goals.

The measures described in the programme of measures 2015-2021 will be continued. This means:

- Continue collecting the Statutory Research Tasks (WOT) information about fish stocks in the North Sea for international quota management (TAC & Quota).
- In the context of the landing obligation, continue focusing on minimising and phasing out discards.
- Continue to stimulate innovation in the sector. For example, the Vision for Trawler Fisheries, and national and international resources in the form of the European Maritime Fisheries and Aquaculture Fund (EMFAF) which make innovation possible. The Vision for Trawler Fisheries focuses on an economically healthy sector which fishes with respect for nature and the environment and is also socially recognised for doing so. Innovation is an important theme here, for example the development of a zero-impact cutter to enable fishing with less disturbance of the seabed, less undesired by-catch, lower emissions of greenhouse gases and less waste.
- Continue issuing certificates which stimulate fishing to improve sustainability.

Current environmental status

As mentioned in paragraph 3.2, the fish population does not yet have good environmental status. The OSPAR assessment shows that the deterioration of the composition of fish populations from the past has stopped and that in some areas in the northeast Atlantic Ocean there has been a slight recovery. According to the assessment, the number of big fish is still too small, but is recovering. Furthermore not all commercial species are fished with a F≤Fmsy.

The current environmental status is subject to global developments like climate change. This has led to warming of the (surface) water as a result. The changes in the ecosystem could lead to migration of fish species to other regions or to deeper parts in the North Sea.

Additional policy task

Based on the available data and knowledge, the conclusion is that it is possible to achieve the goals 'fish less than or equal to MSY' (D3C1) and 'maintain a spawning biomass larger than the precautionary margin' (D3C2). The North Sea long-term plan and the Common Fisheries Policy takes socio-economic aspects of fishery management into account. In mixed fishery, practical difficulties arise for fishing all species F≤Fmsy. This is because of the so-called *choke species*, species for which the available quota are exceeded (long) before the quote are exceeded of (several) other species with which they are caught together. The Netherlands therefore continues to support policy aimed at selectivity and survival chance after returning by-catch.

Additional measures

For the duration of this programme of measures, no additional measures are taken. The existing measures are continued. It is expected that with this policy, the good environmental status can be achieved.

Knowledge agenda

This section contains the key knowledge questions about commercially exploited species of fish and shellfish that will be investigated in the period 2022-2027.

- Length and age distribution in the commercial species landed by the Dutch fishing fleet and the way in which a more natural length and age distribution can be achieved in the fished populations. Delivery of this research is 2023, with a view to updating the description of the environmental status of the North Sea in the Marine Strategy part 1, in 2024. After a national inventory, it will be progressed in ICES context.
- The influence of infrastructure around the wind farms on the presence, the reproduction and survival success of juvenile fish and on the availability of food for (commercial) fish species.
- Effects of the area closures on the fishing industry as well as the side effects on the areas surrounding the closed areas (displacement research). This is a national knowledge question with an international component in terms of area closures in other North Sea countries.

3.5 Food webs (D4)

Good environmental status and goals

The good environmental status of food webs is achieved if all the elements of the marine food chains - insofar as these are known - occur in normal densities and diversity and at levels which guarantee the density of the species in the long term and the preservation of their full reproduction capacity. The sub goal for food webs is the reduction of the effect of human interventions on interactions between different trophic levels.

Descriptor 4 has a special position in relation to all the other descriptors. Achieving the good environmental status in the other descriptors is a condition for achieving a good environmental status in descriptor 4. In other words: disturbance of biodiversity and habitats must be sufficiently reduced, the risks associated with alien species limited and the pollution of the environment has been sufficiently reduced. The functioning of the food web is therefore the ultimate litmus test for achieving a (generally) good environmental status.

Good environmental status	Overarching: the effect of human interventions on interactions between different trophic levels in the food web is reduced. • D4C1: the diversity (species composition and the abundance) of at least three selected trophic guilds is at a level or within a margin which indicates a good environmental status. The trophic guilds to be used and the levels and margins must be adopted regionally in the second cycle. • D4C2: the relationship in abundance between at least three selected trophic guilds is at a level or within a margin which indicates a good environmental status. The trophic guilds to be used and the levels and margins must be adopted regionally in the second cycle. • D4C3: the size structure (length) of the fish population is above the historic minimum value.
Environmental goals	• D4T1: develop and test regional assessment methods which can be used in the future for assessing the status of food webs. • Goals for birds, fish, benthic and pelagic habitats (D1T2, D1T3, D1T4, D1T5, D1T6, D3T1, D6T1, D6T2, D6T5).

Implemented measures

For food webs specifically, no measures were formulated in the previous edition of Marine Strategy part 3. Measures for the descriptors birds, marine mammals, fish, pelagic and benthic habitats implicitly contribute to the good environmental status of food webs.

Current environmental status

Due to the lack of sufficient indicators for descriptor 4, food webs, it cannot yet be established to what extent the good environmental status has been achieved. From the assessments in Marine Strategy part 1 (2012, 2018) [20, 11], it appeared that physical disturbance of the living environment, particularly that of soil fauna, and associated effects of climate change have the biggest negative impact on the marine ecosystem and the food web. An increasingly important pressure factor for marine mammals, but possibly also for other organisms, are sound pulses under water. The expected increase in the number of wind farms in the Dutch part of the North Sea is expected to create more pressure on this descriptor, largely due to the assumed impact caused by physical, hydraulic effects. On the other hand, the construction of wind farms can mean that a larger area of the EEZ will be closed to seabed-disturbing fishery, which can have a positive impact on the development of benthos populations.

Additional policy task and measures

The character of descriptor 4 as a result of the other descriptors has the logical consequence that all measures and tasks described under those descriptors are also about achieving the good environmental status for food webs. It is therefore not easy to formulate policy and measures which focus specifically and solely on this descriptor. The assessments performed in 2012 and 2018 create the impression that the measures aimed at limiting soil disturbance and designating protected areas and habitats are of relative importance for descriptor 4.

However, that does not mean that there is no room or necessity for action concerning descriptor 4. Because this descriptor can place the success of measures for other descriptors in a more integrated, holistic perspective, it is important that there are enough indicators now and to be developed to be able to adequately assess the environmental status based on this descriptor. Due to the complexity of the interactions and the layers of the system, as well as a lack of scientific insights, the development of sufficient indicators has been delayed.

Together with other countries, in the context of OSPAR, the Netherlands is developing indicators for descriptor 4. An example of this is the indicator 'Size distribution in Fish Populations'. Work is currently ongoing on the application on the North Sea of indicators which have been developed for other OSPAR regions. In addition, new indicators are being prepared, aimed at trophic interactions between organisms, at trophic levels of organisms and at more model-based analysis of the monitoring data which are being made available in the framework of descriptor 1 (biodiversity) and descriptor 2 (invasive species).

The North Sea Agreement also centres on system understanding, cumulation of effects, carrying capacity and ecosystem thinking, and agreements have been made about this. Research offers chances to take steps, together with the international partners in OSPAR, in monitoring and assessing the status of food webs. The influence of more autonomous developments, like climate change, is also receiving more attention.

Knowledge agenda

This section contains the key knowledge questions about food webs that will be investigated in the period 2022-2027.

- The relationship between all parts of the marine food web is one of the most difficult analyses in marine strategy. It is not yet possible to assess whether the "diversity (species composition and their relative abundance) of the trophic guild is not adversely affected due to anthropogenic pressures" (D4C1), and whether "the balance of total abundance between the trophic guilds is not adversely affected due to anthropogenic pressures" (D4C2). Research is therefore needed into the relationships between trophic levels, in particular to gain more insight into the basis of the food web (primary production).
- To what extent is it possible to use the currently available monitoring data (both national and international) to develop indicators that can test the D4 criteria in a very targeted way? Which data gaps does this reveal?

3.6 Eutrophication (D5)

Good environmental status and goals

Eutrophication is caused by an abundant supply of nutrients (mainly nitrogen and phosphate) and leads to the loss of biodiversity, harm to the ecosystem, harmful algal bloom and lack of oxygen in the waterbed. The good environmental status is achieved by minimising eutrophication caused by humans. The following environmental goals apply:

Good environmental status	Overarching: the concentrations of winter DIN and DIP are below the level that indicates harmful eutrophication effects. • D5C1 (coastal waters): winter concentrations of nutrients in the coastal waters fulfil the WFD standards. • D5C1 (offshore waters): winter concentrations of nutrients in the coastal waters fulfil the OSPAR assessment values. Overarching: algal biomass (established based on chlorophyl-a measurements) is not at a level that indicates harmful effects of enriching with nutrients, according to the assessment based on the WFD and OSPAR. • D5C2: algal biomass (established based on chlorophyl-a measurements) in the coastal waters is not higher than the good status based on the WFD for the relevant coastal water types. • D5C2: algal biomass (established based on chlorophyl-a measurements) in the offshore waters fulfils the OSPAR assessment values. Overarching: no lack of oxygen resulting from eutrophication in lowest water layer (stratified waters) or in the surface layer of mixed waters. • D5C5 (coastal waters): lowest water layer (stratified waters) or in the surface layer of mixed waters in the coastal waters is saturated with at least 60 percent oxygen. • D5C5 (offshore waters): in the offshore waters, in the lowest water layer (stratified waters) or in the surface layer of mixed waters, at least 6 mg/l oxygen is found.
Environmental goals	• D5T1: lower supply of nutrients where they do not fulfil WFD goals in accordance with the timeframe of the management plans for river basin districts. • D5T2: do not allow an increase of concentrations of nutrients which already fulfil the WFD standards and try to lower their supply if possible.

Implemented measures

The last Marine Strategy part 3 included measures which relate to the main sources of eutrophication, namely:

- Shipping: The pollution of the sea by shipping is regulated in the international MARPOL convention, drawn up by the IMO. MARPOL regulates the emissions from substances and chemicals to the air and water and the discharge of household waste. Enforcing this convention by means of the Law preventing pollution by ships will reduce nitrogen.
- Agriculture: On 1 January 2014, the cabinet introduced the compulsory manure processing. Measures relating to agriculture are included in the Fifth Action Programme Nitrate Directive. These measures are continued via the Manure Law. To supplement the Fifth Action Programme Nitrate Directive, the agricultural and horticultural sector drew up the Delta Plan Agricultural Water Management. This delta plan will be continued on a voluntary basis but is not free of obligation. The goals of the Nitrate Guideline must be achieved. Reduction of livestock is also being worked on. The accent lies on reducing nitrogen concentrations, but the measures will certainly have an impact on phosphate concentrations.
- Urban wastewater: The Netherlands has implemented the EU Urban Wastewater Treatment Directive and fulfils the minimum area yield requirements for phosphorous and nitrogen. The treatment of urban wastewater is included in the Water Decree, Environmental Management Act. In 21 installations distributed over eleven water boards, the effluent can also undergo complete further treatment for phosphorous and nitrogen. The improvement of the treatment efficiency of the wastewater treatment plants will be voluntarily continued. In relation to the EU Urban Wastewater Treatment Directive, this is not free of obligation and will lead to the reduction of nitrogen and phosphate concentrations.
- River basin districts: Nutrient supply from the rivers to the sea also has foreign sources. The implementation of the programmes of measures under the WFD management plan for river basin districts in the Netherlands and our neighbouring countries means a big step towards achieving the WFD goals and the reduction of nutrients in the transitional and coastal waters designated as surface water bodies.

In the middle of 2019, it was established that the nitrogen concentrations in nature areas are too high. New policy was consequently developed and is (partly) still under development to reduce these concentrations. Some measures have already been implemented: reduction of the maximum speed on roads and restructuring the number of farms with livestock. This last aspect also has an important effect on phosphate emissions.

Current environmental status

Eutrophication still occurs in the North Sea but is much less extensive than previously. In the North Sea, over 50 percent of the eutrophication of the coastal waters is caused by fertilisers from agriculture in the river basin districts. This has remained virtually constant since 2005. Throughout the northeast Atlantic Ocean area, atmospheric deposition from various sources on land and sea contributes to a third of the eutrophication. The contribution of shipping is not exactly known but is estimated to be considerable.

The interaction between climate change and eutrophication is complex and not always the same everywhere. Changes in rainfall, and thus runoff and river drainage can lead to changes in the transports of nutrients to the sea, for example. These can either increase (heavy rainfall) or decrease (drought). In recent years, however, no clear trend has been observed in annual transports which can be associated with this. The increasing rise in the temperature of seawater and the changing light climate promote the growth of algae. There are signs that the growth season is starting earlier in the year. This can lead to higher chlorophyl values which are characteristic for the increase of eutrophication.

Additional policy task

It is uncertain whether the current measures are enough to maintain the good environmental status. Since 2003/2004, the downward trend of nitrogen concentrations in the coastal waters has levelled off and no further improvement has been measured. In freshwater too, the fall has levelled off. Some WFD coastal waters have gone from a good to moderate eutrophication status. In these waters, the nitrogen concentrations are therefore close to the threshold value. This means that a slight rise can change the assessment from favourable to unfavourable. The downward trend in phosphate concentrations is also levelling off. In a considerable part of the WFD coastal waters, a shift from quality class for particularly chlorophyl-a has recently taken place. The assessment of the eutrophication status according to the OSPAR/MSFD is currently being reviewed, striving to achieve coherence between the North Sea countries. This can also lead to change in the eutrophication status in MSFD areas.

In the implementation plan of the OSPAR *North-East Atlantic Environment Strategy* NEAES (2020–2030),[5] operational goals are included to obtain better insight into the eutrophication status. The goals

[5] The NEAES was adopted by OSPAR on 1 October 2021: https://www.ospar.org/convention/strategy

focus on more uniformity in reporting and assessment of eutrophication between the different countries, consensus about the contributions of sources of nutrients, the join adoption of reduction goals and establishing measures to achieve these goals. Where possible, the effects of the changing climate are also taken into account.

Additional measures

The implementation of existing policy gives the maximum effort possible from the Netherlands, working with other countries, to achieve the good environmental status for the descriptor eutrophication, in terms of measures on land (implementation WFD) and at sea. No (additional) technical measures will be taken to nullify that presence of eutrophicating substances in the Netherlands part of the North Sea.

Exceptional situations pursuant to Article 14 of the MSFD

With respect to nutrients from agriculture, the Nitrate Action Programmes will contribute to achieving a good environmental status. It is estimated that the current Nitrate Action Programme, in combination with measures for other sources, will eventually lead to the good environmental status. For that reason, further intensification of measures for the agricultural sector is currently considered disproportionally expensive. On that basis, Art. 14.4 of the MSFD is applied. However, the development of the status will be monitored, and additional measures considered if necessary.

Due to natural circumstances, it will take several years before the effects of the policy to reduce nutrients in the environment become visible. The presence of high levels of nutrients in the soil means that these will leach into rivers and into the sea for some years to come. On that basis, Art. 14.1e (natural circumstances) MSFD will be applied.

Some of the nutrients in the Dutch rivers come from upstream areas abroad. The limits the possibilities for the Netherlands to include sufficient measures in its programme of measures to achieve a good environmental status in the Dutch part of the North Sea. For that reason, the Netherlands is appealing to the exemptions under Art. 14.1a of the MSFD.

Knowledge agenda

This section contains the knowledge questions about eutrophication that will be investigated in the period 2022-2027.

- What are possible additional technical measures that can reduce the presence of eutrophication substances in the Dutch part of the North Sea. At European level, model studies are being performed which, based on the effectiveness of measures and possible additional measures, could be guiding.
- The influence of the primary production capacity of the North Sea ecosystem due to the declining eutrophication. This question is in line with knowledge question 1 under section 3.5 Food webs (D4).
- Effect of climate change on eutrophication such as increased algal blooms. On the basis of the available knowledge about this question, the question will be further specified during the second half of the planning period and then investigated.

3.7 Sea-floor integrity / benthic habitats (D6)

Good environmental status and goals

Soil-disturbing fishery, sand and shell extraction and beach suppletion can physically disturb the seabed. Some human activities can also lead to the loss of seabed areas.

According to the Marine Strategy part 1 (2018) [11], the good environmental status for benthic habitats is achieved if physical disturbance and loss of the seabed by human activities is limited to ensure that the extent, condition and general distribution of populations of the characteristic benthic species increases and that goals for specific habitats are achieved.

Benthic habitats	
Good environmental status	Overarching: improvement of the extent, condition and general distribution of populations of benthic species. • D6C3: improvement of the quality of the assessed areas and habitats in the Dutch part of the North Sea (Benthic Indicator Species Index). • D6C5: the diversity of benthos does not display a downward trend in the assessed areas (OSPAR assessment value).
Environmental goals	• D6T1: 10-15 percent of the surface of the Dutch part of the North Sea is not significantly disturbed by human activities. • D6T2: improvement of the quality of the assessed areas and habitats. • D6T4: further develop and test regional assessment methods (OSPAR and ICES) which can be used in the future for assessing benthic and pelagic habitats. • D6T5: return and recovery of biogenic reefs, including flat oyster beds • D1T3: achieve conservation goals for habitat types and species in the Natura 2000 areas at sea (BD and HD).
Physical disturbance of the seabed	
Good environmental status	Overarching: physical disturbance of the seabed by human activities is limited to ensure that the extent, condition and general distribution of populations of the characteristic benthic species increases and that goals for specific habitats are achieved. • D6C2: no significant increase in the physical disturbance in time on the total seabed of the entire North Sea and the EEZ. • D6C3: no increase in the physical disturbance in time over the habitats described in the framework of the MSFD. • D6C3: the conservation goals apply for the habitats described in the framework of the Habitats Directive.
Environmental goals	• D6T1: 10-15 percent of the surface of the Dutch part of the North Sea is not significantly disturbed by human activities. • D6T3: no increase in the physical disturbance by fisheries activities in time of the total seabed of the EEZ and of the habitats described in the framework of the MSFD. • D1T3: achieve conservation goals for habitat types and species in the Natura 2000 areas at sea (BD and HD).
Physical destruction of the seabed	
Good environmental status	Overarching: physical loss of the seabed by human activities is limited to ensure that the extent, condition and general distribution of populations of the characteristic benthic species increases and that goals for specific habitats are achieved. • D6C1: no significant loss of the natural seabed compared with the situation in 2012 resulting from human activities. • D6C4: no significant loss as a result of human activities of the habitats described in the framework of the MSFD.
Environmental goals	See physical disturbance.

Current environmental status

Benthic habitats

The Dutch seabed is still substantially disturbed (see paragraph 3.4.2 of Marine Strategy part 1 (2018) [11]. The OSPAR assessment of the benthic populations shows that the deeper offshore waters have a higher benthos quality than the relatively shallower offshore waters and coastal waters. The national assessment of the benthos populations shows that the long-lived, sensitive species are clearly less present than desired, and that biodiversity is still insufficient. This situation is largely a result of soil disturbance by (beam trawl) fisheries. It is still to soon to observe the effects of the (proposed) measures.

The Habitats Directive report from 2019 [13] shows that the distribution and area of permanently flooded sandbanks (habitat type 1110) and reefs (habitat type 1170) are sufficient, but that the quality of the habitats is not satisfactory and has even been assessed as very unfavourable.
The good environmental status for benthic habitats has not yet been achieved, although for part of the Dutch North Sea it is not possible to make any statements due to gaps in knowledge.

Physical disturbance

Around 54 percent of the (international) North Sea bed has been disturbed. This is according to the *Fishing Pressure Indicator*, (assessment year 2015; see also Marine Strategy, part 1 (2018)). Because no threshold values have been set, it cannot be assessed whether and to what extent there is a good environmental status. Compared with the entire North Sea, the Dutch part is more disturbed.

Physical loss

Physical damage by offshore oil and gas platforms, new wind farms or the disappearance of the seabed due to land reclamation is local in nature and relatively minor. All these activities require permits and undergo an E.I.A. procedure.

Due to the small extent of the damage, the current environmental status for 'physical loss' meets the requirements for good environmental status.

Implemented measures

For the Natura 2000 areas North Sea Coastal Zone, Voordelta, Vlakte van de Raan, Dogger Bank, Cleaver Bank and Frisian Front (BD and HD areas in the Dutch EEZ) and the MSFD areas the Central Oyster Grounds and Frisian Front, internationally coordinated conservation measures have been submitted to the European Commission within the framework of Article 11 of the CFP. The Commission must convert the common recommendations into a delegated act. This concerns limiting seabed-disturbing fishery in the HD and MSFD areas to protect the soil habitat.

Large-scale interventions in the North Sea, such as land reclamation, sand extraction and replenishment and dredging are subject to licensing. For this, an Environmental Impact Assessment is mandatory. The consequences of these interventions on the biodiversity are mitigated or compensated. Activities which may have an impact on the Natura 2000 conservation goals are also subject to licensing.

Additional policy task

Environmental goal D6T1 stipulates: '10-15 percent of the surface of the Dutch part of the North Sea is not significantly disturbed by human activities'. To further achieve this environmental goal, additional area-based measures are required. This is an additional policy task.

In addition, with respect to cumulative effects, the knowledge task has been formulated to draw up threshold values in an international context (EU/OSPAR) for, among other things, soil disturbance (TG-SEABED).

Additional measures

Area-based measures North Sea Agreement (NSA) [16]

- In the NSA, it is agreed that in 2023, in the Dutch North Sea 13.7 percent of the ecologically valuable areas will be fully exempt from soil disturbance by fisheries. This percentage will rise to 15 percent in 2030. Within this area, a section the size of 2.8 percent of the North Sea will be closed to all forms of fisheries. The area-based measures were recorded in the NSA, but have not yet been fully implemented.
- *Expansion Natura 2000 area, limitations to fishing Dogger Bank and shift management zones Cleaver Bank*
  In the NSA, it is announced that on the Dogger Bank, the area in which seabed-disturbing fishery is banned will be expanded by 557 km². As such, the border of the Natura-2000 area Dogger Bank will need to be extended. The designation order will be changed, and the conservation measures will be amended in accordance with the Article 11 procedure from the Common Fisheries Policy, so that they apply to the extended area. There will also be a ban on

Scottish and Danish seining in the management zones of the Dogger Bank. The management plan will be amended accordingly.
Furthermore, the management zones on the Cleaver Bank will be extended, whereby an additional area of 552 km² will be closed to all forms of seabed-disturbing fishery. To implement this change, conservation measures will be adjusted in accordance with the Article 11 procedure from the Common Fisheries Policy. The management plan will be amended accordingly.

- *Extension on ban on seabed-disturbing fishery in the Central Oyster Grounds and Frisian Front, fishing ban for part Frisian Front, and new designation Borkumse Stenen*
  In accordance with the NSA, the MSFD areas the Central Oyster Grounds and Frisian Front will be expanded and a new MSFD area will be designated on the Borkumse Stenen. The MSFD area the Central Oyster Grounds will be expanded by 1062 km². The eastern MSFD area Frisian Front will be expanded by 1014 km². In the part that overlaps with the BD area Frisian Front, there will be a ban on all forms of fisheries. This part will be expanded to 1649 km². The new soil protection area Borkumse Stenen has a surface area of 653 km². This area overlaps the soil protection area as agreed in the framework of the VIBEG agreement.
- *Change in areas with a ban on seabed-disturbing fisheries North Sea coastal zone*
  The areas where there is a ban on seabed-disturbing fishery and the areas on which there is a general ban on fishing will be changed. This was decided in the VIBEG consultation in 2018 (VIBEG2). The conservation measures in these areas will be implemented via the Article 11 procedure from the Common Fisheries Policy.
- *Oyster recovery Frisian Front*
  One of the measures from the NZA is the designation of a 100 km² area for oyster recovery within the no fishery zone on the Frisian Front. This measure contributes to achieving environmental target D6T5 (return and recovery of biogenic reefs, including flat oyster beds).

MSFD areas

In addition to the already designated MSFD areas Frisian Front and the Central Oyster Grounds, the Borkumse Stenen area will also be designated as a protected MSFD area (measure in accordance with MSFD Article 13.4). The recovery of substantial parts of the seabed ecosystem from a disturbed state to a natural state can be supported by protecting these areas against activities that contribute to this disturbed state, such as fishing activities, sand extraction or drilling. Measures related to fishing activities are adopted through the CFP Article 11 Procedure. One of the knowledge tasks concerns the need for additional measures for activities other than fishing.

Nature reinforcement of benthos and offshore wind energy

With the roll-out of offshore wind farms, due to the presence of hard substrate in the form of armour rock and the fact that they are closed to soil-disturbing activities, there is also the potential to contribute to integral nature reinforcement. For the reinforcement of species populations and habitats which naturally occur in the North Sea, since 2015 the focus has been on nature-inclusive design and building new offshore wind farms and the implementation of nature restoration projects in wind farms. This targets species and habitats from the EU Habitats Directive which are not nationally in a favourable state of conservation, species on national red lists and species or habitats on the OSPAR List of Threatened and/or Declining Species and Habitats for which recommendations have been adopted. Nature-inclusive building is still in a development phase. In this planning period, the concept will be further operationalised.

Knowledge agenda

This section contains the key knowledge questions about seafloor integrity / benthic habitats that will be investigated in the period 2022-2027.

- Necessity for additional measures for other activities than fisheries in the protected areas under MSFD (national).
- Ecological consequences (among others for fish and benthos) of the increasing sand extraction and bigger replenishment volumes and how these consequences can be minimised (national).
- Effects of scaling up of wind farms on the status of benthic habitats. This knowledge question will be addressed in conjunction with the following generic knowledge question: What is the effect of scaling up wind farms on the environmental status (the marine ecosystem at NCP level)?
- Follow developments benthos hard and soft substrate around wind turbines via a monitoring plan that has yet to be drawn up. Also with the aim of gaining insight into whether the introduction of hard substrate can lead to nature reinforcement of biogenic reefs and other hard substrate species.
- Research into the presence and distribution of honeycomb worm reefs.
- Develop innovative techniques and installations (hatcheries) for cultivating flat oysters to put back into the wild for nature restoration purposes.

3.8 Hydrographical conditions (D7)

Good environmental status and goals

Change of hydrographical conditions such as currents and waves can affect the physical and chemical properties of the sea. For example, salt level, temperature and transport of sediment. Such changes are relevant if they occur on a large scale. The good environmental status is achieved if a permanent change in the hydrographical conditions does not cause permanent damage to the marine ecosystems.

Activities which can affect the hydrographical conditions include the construction of coastal defence works, land reclamation, damming big rivers, large-scale sand extraction and installing structures in coastal waters or open sea, such as large-scale aquacultures or wind turbine parks and other installations for energy generation.

The environmental goal is aimed at ensuring that human activities do not cause changes in hydrographical conditions that lead to permanent large-scale negative effects on the marine environment.

Good environmental status	The marine ecosystem does not experience any negative effects as a result of permanent changes in the hydrographical conditions as a result of human activities.
Environmental goals	D7T1: all developments must satisfy the requirements of the existing legislative regime (for example the Environmental Management Act and the Nature Conservation Act) and statutory assessments must be carried out in such a way that potential effects of permanent changes in hydrographical conditions, including cumulative effects, are considered at the most appropriate spatial scale level, on the basis of the guidelines developed for this purpose. (EUNIS-level 3, reference year 2012).

Implemented measures

To prevent changes in hydrographic conditions having permanent negative effects on the ecosystem, the previous Marine Strategy part 3 [12] stipulated that an assessment of hydrographic interventions must be performed and, if necessary, compensation of effects. The effects of new large-scale hydrographic interventions must be studied in the environmental impact assessments, as prescribed at European level. In the Netherlands, this EU policy is implemented in Section 7 of the Environmental Management Act and in the EIA Decree. If this shows that the effects of the intervention do not cause permanent large-scale and irreversible changes to the ecosystem, no further action need be taken. In this procedure, it is important to study cumulation of effects and the effects outside the coastal waters. In the coastal waters, the requirements of the Water Framework Directive must be fulfilled.

Current environmental status

The initial assessment (2012) [20] indicated that the downward trend in the seabed ecosystem and in the diadromous fish species in the coastal zone can partly be explained by permanent hydrographic effects of the Delta Works and Maasvlakte 1 and 2. These works are of national importance and are considered irreversible. In 2012, it was therefore concluded that there is a new reference for good environmental status. As indicated in the updated Marine Strategy part 1 (2018) [11], the good environmental status was achieved in 2012 and retained since.

Additional policy task

The construction of offshore wind energy farms is one of the most important developments expected in the Dutch part of the North Sea in the coming years. The cumulative effects of the construction of these wind farms in combination with sand extraction and beach suppletion may be significant.

Additional measures

For new activities, the current policy guarantees the retention of the good environmental status and focuses on preventing permanent effects. The Netherlands is not taking additional measures.

Knowledge agenda

This section contains the key knowledge questions about hydrographical conditions that will be investigated in the period 2022-2027. D7 states that the marine ecosystem should not suffer any negative effects as a result of permanent changes to the hydrographical conditions. The effect of offshore wind farms on the hydrographical conditions of the North Sea will be investigated, and what changes can be expected (on what scale) from the scaling up of wind farms.

3.9 Contaminants (D8)

Good environmental status and goals

The good environmental status for the descriptor contaminants will be achieved on the North Sea if the concentrations of contaminants in water, sediment and biota are lower than the concentrations whereby negative effects can occur or if the concentrations show a downward trend. The following table presents an overview of the good environmental status and goals.

Among contaminants which have a negative impact on the marine ecosystem, in particular substances which are poorly biodegradable and which accumulate in food webs may spread over large distances. They form a threat to the marine environment. OSPAR has drawn up a list of 26 contaminants which, based on these properties and the extent to which they are used, will be subject to action first. These include certain (organo)metals, organohalogens, pesticides, phenols, plasticisers, PAHs and several pharmaceutical substances. The WFD sets environmental goals for many of these substances. In addition, the WFD has designated some of the substances as priority dangerous. These partly overlap with the OSPAR list. According to the WFD, the discharge of these substances must be ended by 2027.

Good environmental status	Overarching: the concentrations of relevant contaminating substances for the marine environment, measured in the most appropriate compartment (water, sediment or biota) are lower than the concentrations whereby negative effects can occur or which show a downward trend. • D8C1 (coastal waters): the concentrations of relevant contaminating substances for the marine environment, measured in the most appropriate compartment (water or biota) fulfil the environmental quality requirements used by the WFD in the 12-mile zone (for priority substances) or in the 1-mile zone respectively (for the specific contaminant). • D8C1 (offshore waters): the concentrations of relevant contaminating substances for the marine environment, measured in the most appropriate compartment (sediment or biota) fulfil the Environmental Assessment Criteria, (EAC) and/or Background Assessment Criteria (BAC) of OSPAR, or, where these target values have not yet been formulated, show a downward trend (in compliance with OSPAR).

	Overarching: the health of the species is not damaged by contaminants. • D8C2: downward trend compared with 2012 of imposex. • D8C3: the spatial extent and the duration of the significant, serious contamination is kept to a minimum.
Environmental goals	• D8T1 (coastal waters): reduction in the input of contaminants not yet meeting WFD targets, pursuant to the timeline of the river basin management plans. Do not allow an increase of concentrations of contaminants which already fulfil the WFD standards. • D8T2 (offshore): wherever possible, reducing concentrations of contaminants. • D8T4: reducing input of heavy metals to the marine environment. • D8T3: regional monitoring of copper concentrations, now that this heavy metal is used as a replacement for TBT (OSPAR). • D8T5: as quickly as possible eradicating acute pollution, wherever necessary in collaboration within the Bonn Agreement. • D8T6: reduce the use of lead, for example in sport fishing (WFD).

Implemented measures

The use of the above programme of measures was focused on reducing the concentrations of contaminants in the sea and on preventing the occurrence of contaminant effects of substances like TBT. In the River Basin District Management Plans 2016-2021 Rhine, Meuse, Scheldt and Ems, which were drawn up in the framework of the WFD, measures have been included to further reduce the emission of contaminants to ground and surface water. In recent years, more measures have been taken to reduce industrial emissions, contamination by pesticides and discharges by inland shipping.

Under the Industrial Emissions Directive, measures have been taken with respect to permit requirements, application of state-of-the-art technology, application of provisions as included in the European reference documents (BREFs) and application of the emission/immission assessment when assessing emissions to surface water. With these programmes of measures, industrial emissions to surface water is reduced. The Action Plan Sustainable Pesticides leads to reduction of contamination by pesticides. Discharges of wastewater by inland shipping are reduced by the Ship Waste Decree Rhine and Inland Waterways and the Ship Waste Rhine and Inland Waterways Regulation. Other measures are focused on limiting discharges at sea due to incidents and disasters, oil and gas production and from ships (MARPOL). Via the MARPOL convention, rules have been imposed on discharges of water and emissions to the air. A ban on TBT has also been introduced. The prevention of contaminants from wind farms is assured via the environmental impact assessment (EIA) in the permit procedure.

In addition to the above programme of measures, the policy for the approach of Substances of Very High Concern has been developed with respect to water. In 2016 and 2019, the Immission Assessment Manual was updated, including the associated assessment instruments/tools. In addition to the existing requirements for wastewater treatment plants, in recent years the Netherlands has worked on the approach to chemical substances, including many that were not standardised under the WFD. This concerns, for example, medicine residues and so-called 'emerging substances', such as PFAS. 60 million euros is being invested in pilot projects for extra waste treatment. These amendments to the water quality policy ensure that emissions of new substances and substances which are a problem for the water quality via permits (with priority) are minimised.

The Ministry of Infrastructure and Water Management (I&W) has also launched a training programme for permit issuers from Rijkswaterstaat, water boards, environmental services and water supply companies. This safeguards (in the long term) better permits, resulting in better water quality. These measures contribute to a reduction of the emissions from the sources in the Netherlands and therefore also of emissions to the sea.

Current environmental status

The OSPAR assessment shows that the concentrations of contaminants have been significantly reduced and still show a downward trend or are stable. What remains are mainly persistent, bioaccumulating and toxic substances such as PAHs, PBDEs, PCBs and organotin compounds (mainly TBT). Measures have already been taken to limit or end the emissions of these substances but because they are persistent and pervasive, they will be found in the marine environment for a long time to come. The use of copper as a substitute for TBT has risen significantly. The possible consequences for the marine environment have been put on the agenda in the context of OSPAR.

Additional policy task

There is no additional policy task. As indicated in the updated Marine Strategy part 1 [11], the good environmental status will probably be achieved for most substances in the period 2022-2028. The effects of the policy are only difficult to show for the persistent substances. The development of the concentration of substances, including the increase of copper, is being closely monitored.

Additional measures

Via the Green Deal Sports Fisheries Lead-Free, the emissions from fishing sinkers to marine waters will be reduced, see paragraph 3.11.

Exceptional situations pursuant to Article 14 of the MSFD

This programme of measures presents the maximum possible use of measures on the land (implementation WFD) and at sea to achieve the good environmental status for the descriptor hazardous substances. Sources on land are an important source for the outflow of priority and specific substances to the sea. The measures referred to are aimed at achieving water quality standards locally and upstream, including the sea. Despite the measures taken, these goals cannot always be achieved. On entering the Netherlands from abroad, concentrations upstream may already be too high, such as mercury. In addition, the presence of high levels of nutrients in the soil means that these will leach into rivers and into the sea for some years to come.
These substances belong to the group of priority and specific contaminants under the Water Framework Directive. For these substances, no technical measures are available to reduce their concentration in surface water or in the sea. Natural circumstances do not allow the status of this part of the North Sea to improve in time. This is therefore an exceptional situation as referred to in Article 14, section under e (natural circumstances) of the WFD.

Knowledge agenda

The most important knowledge question concerning contaminants relates to the consequences of the use of copper as a substitute for TBT for the marine environment. This knowledge question is on the agenda in OSPAR context.

3.10 Contaminants in fish and other fisheries products (D9)

Good environmental status and goals

The good environmental status is achieved if the levels of contaminants in fish and fisheries products from the North Sea do not exceed the maximum levels established in the Commission Regulation (EC) No. 1881/2006. The environmental goal is included in the following table.

Good environmental status	Overarching: the levels of contaminants (including PAHs, dioxins and heavy metals) in fish and fisheries products from the North Sea do not exceed the maximum levels established in the Commission Regulation (EC) No. 1881/2006.
Environmental goals	D9T1: do not allow an increase in the levels of contaminants in fish and fisheries products which comply with national and international legislation and reduce them further if possible.

Implemented measures

National and international legislation imposes standards on the levels of contaminants in fish and fish products[6], among others Commission Regulation (EC) no. 1881/2006 and Commission Regulation (EC) no. 396/2005. Standards have also been set at European level for radioactive substances[7].

[6] Including Commission Regulation (EC) No. 1881/2006 of 19 December 2006 setting maximum levels for certain contaminants in foodstuffs (2006) and Commission Regulation (EC) No. 396/2005 of the European Parliament and of 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 Council Directive 91/414/EEC (2005).

[7] Council Regulation (Euratom) No. 3954/87 of 22 December 1987 establishing maximum permitted levels of radioactive contamination of foodstuffs and animal feed following a nuclear accident or any other case of radiological emergency (1987).

Current environmental status

Since 2006, the levels of contaminants are examined every year in 15 to 18 samples of sea fish and shellfish, some from near the coast, some from the pelagic part of the North Sea. Until now, the levels of contaminants in each individually examined sample have met the standards for maximum levels. In OSPAR context, it has also been shown that the doses of radioactive radiation in fisheries products are far below the international standards for human exposure.

Policy task

The current legislation is effective. The current levels of contaminants in fish and fish products do not exceed the standards of national and international legislation. As such, there is a good environmental status. This is expected to remain the case. The Netherlands should be able to maintain this status with an unchanged policy.

Adapted and additional measures

Because the good environmental status is achieved, no additional measures are required.

3.11 Marine litter (D10)

Good environmental status and goals

Marine litter comes from human activities on the sea and on land. Awareness of the problem of plastics and other litter in the sea is growing worldwide. In recent years, it has therefore received increasing attention. The cross-border nature of the litter problem in seas and oceans makes international collaboration essential. The Netherlands tackles the problem of marine litter at all levels: local, national, regional and global.

The good environmental status for litter on and along the North Sea will be achieved if the amount of litter and micro waste at sea over time. At regional (North Sea) level, the environmental goals are focused on achieving quantitative (regional) targets (*threshold values*) for beach litter and for plastic in the stomachs of northern fulmars, and on developing an indicator for microplastics in sediment. The amount of waste and micro waste absorbed by sea animals must be at a level that is not harmful to the health of the species involved. At the time of writing this programme of measures, a EU proposal has been adopted for a Threshold Value for beach litter of 20 items per 100 m beach. The principle is that litter does not belong in the sea.

Good environmental status	Overarching: the amount of litter at sea declines over time. • D10C1 (beach): significant downward trends in the total of the most common categories of waste (which contribute to 80 percent of the total amount of waste) which is found on the beach. • D10C1 (floating, short term): a significant downward trend in the number of northern fulmars with more than 0.1 gram of plastic particles in the stomach during the past ten years. • D10C1 (seabed waste): significant decline in the amount of litter on the seabed. Overarching: the amount of micro waste at sea declines over time. • No quantitative description yet due to the lack of an indicator for microplastics and associated baseline. Overarching: the amount of waste and micro waste absorbed by sea animals must be at a level that is not harmful to the health of the species involved. • D10C3: see D10C1.

Environmental goals	• D10T1: at regional level, work towards quantitative (regional) targets for beach litter and plastic in the stomachs of northern fulmars (10 percent of the birds; OSPAR EcoQO). • D10T2: at regional North Sea level, work on the development of an indicator for microplastics in sediment.

Implemented measures

This paragraph gives an overview of the measures implemented in the period 2012-2020. Litter is a "young" policy area with a relatively large number of measures which largely emerge from the MSFD. In addition, there are similarities with other policy mentioned in this paragraph.

The measures have considerably reduced the amount of litter in the North Sea and the Dutch rivers. The Netherlands is hereby focusing on prevention by means of an integral source approach, awareness and closing product chains. Collaboration between government, business, knowledge institutes and civilian groups is essential. The Government therefore focused on signing Green Deals[8]. To tackle litter, international coordination and collaboration are important for sharing knowledge, harmonising monitoring, and developing effective measures.

Registration of items found on the beach (top ten) is important for understanding the scope of the problem, formulating measures, and analysing the effectiveness of the policy. In the previous programme of measures, the main sources of the items found were listed. Based on this, the measures were divided into six clusters: education and awareness, beaches, river basin districts, sea-going shipping, fisheries and plastic products. The original sea-going shipping cluster was change into shipping, so that measures for inland shipping and recreational shipping are also included in this cluster. For each cluster, the implemented and additionally introduced measures in the previous planning period are summarised below.

[8] With the Green Deal approach, the cabinet provides scope for innovative initiatives from society to speed up the transition to a sustainable economy. In the implementation of new sustainable initiatives, various barriers may be encountered. This approach may remove some of these barriers. The role of the government varies per initiative, but it might involve removing obstacles in legislation, providing access to networks, supporting access to the capital market or contributing knowledge. Green Deals have an average duration of two to three years.

Education and awareness

Via (clean-up) campaigns, attention was paid at national and local level to tackling litter. Municipalities are now aware of the litter problem and have incorporated an approach in their policy. Initiatives were also developed to influence behaviour that causes litter.

Putting the issue on the agenda and awareness of the litter problem at schools were key to the 'Waste at School' programme With co-funding by the European Maritime and Fisheries Fund (EMFF), 140 (primary and secondary) schools were supported in waste education, waste separation and waste prevention. Several knowledge products and tools were also developed (www.slimmetschoolafval.nl). For communication and knowledge sharing with the target groups (nature & environmental education centres, municipalities, waste collectors and schools), a project page (www.afvalopschool.nl) was set up. With funding from the Packaging Waste Fund, several smaller educational projects were also carried out. The focus here was on sharing knowledge about waste separation and on a customised approach by municipalities.

Beaches

Stakeholders and coastal municipalities are responsible for cleaning and maintaining the Dutch North Sea beaches. Social organisations and the public also organise their own clean-up campaigns. For example, the North Sea Foundation organises an annual Beach Clean-up tour on the beaches along the entire Dutch North Sea coast.

In 2014, coastal municipalities, businesses, volunteers and social organisations signed the Green Deal Clean Beaches (GDCB) to reduce litter on beaches. They do this with clean-up campaigns, installing clear-up and disposal facilities on beaches and introducing the Green Key quality mark for beach pavilions. The GDCB is a good example of the joint input and coordination of different parties for cleaning and maintaining the Dutch North Sea beaches. Initiatives and campaigns like the Cleanest Beach competition (including the required monitoring) affect the inclusion of these issues on municipal agendas and boost awareness among beach visitors.

River basin districts

The subject of water-borne litter is on the agenda of the Dutch water managers. Led by the Association of Regional Water Authorities, the litter theme group was founded which focuses on sharing knowledge about litter in water. In the southern Netherlands, the Limburg water board and Rijkswaterstaat participate in the cross-border EU Interreg project LIVES (Euregio Meuse-Rhine) for tackling litter in the Meuse [35]. At Rijkswaterstaat, the subject of litter is also

receiving more attention. The organisation has facilitated a litter knowledge centre and participates in all the joint ventures for clean rivers and organises workshops, networking days and peer review meetings. The main goal of the knowledge centre is to maintain networks for knowledge exchange at national and international level and to communicate about best practices. In addition, Rijkswaterstaat has developed a Litter framework that directs management and maintenance tasks relating to state highways, kerb management, service areas along canals, waste at sluices and weirs and the big rivers.

The area-based approach to litter involves stakeholders such as provinces, site managers, water boards, municipalities and NGOs. They are responsible for preventing and clearing up waste in the rivers. Characteristic is the integral approach to litter in and around the water. Each party contributes from their own area of expertise and influence. Continuing the Clean Meuse Limburg approach, joint ventures have been launched to tackle litter in the main (sub) river basin districts: Waal, Rhine, Lek, IJssel, Scheldt, Haringvliet and the ports of Rotterdam. A Plastic-Free Wadden Sea Community is active around the Wadden Sea, and a Community of Practice Plastics (CoPP) has been established around the Rhine-Meuse delta.

In 2018, Rijkswaterstaat introduced the Litter collection regulation (ZOR). The aim of the regulation is to support the Clean Rivers partnerships and initiatives by facilitating the collection and processing of litter collected along riverbanks by third parties. The evaluation of the ZOR shows that the regulation is still only used to a limited extent. How often the ZOR is used partly depends on the success of the joint ventures and the willingness of municipalities to dispose of and process the collected waste at their own expense. These measures will be continued. They are explained in the paragraph about the adapted and additional measures.

In OSPAR context, the Netherlands is mainly focusing on reducing the waste flow from the rivers to the sea through collaboration with river committees. In 2016, OSPAR published an inventory of knowledge about waste in rivers and the measures to tackle the problem [21]. Based on this report, in 2017 a workshop was organised for knowledge sharing between OSPAR experts and river committees.

Shipping

On 1 January 2013 – partly on the initiative of the Netherlands – the revised Annex V of the MARPOL convention came into force. The revision introduces a *total ban on waste discharge by ships*, with (under conditions) the exception of food waste.

On the initiative of the Netherlands in the IMO, the *marine environmental awareness* course, based on the example of the ProSea organisation, has become part of maritime education.

In 2014, the Green Deal Ship waste chain was signed with various parties in the maritime chain, such as port authorities, ship suppliers, government authorities and social organisations. In this agreement, concrete arrangements were made about closing the maritime waste cycle by waste prevention in stocking, optimising monitoring, optimising waste discharge in the seaports and recycling plastic ship waste on land.

In the OSPAR context, the Netherlands has focused on reducing illegal pollution of the marine environment from ships and on improving the facilities for accepting ship waste. As a result of the OSPAR collaboration, in 2016 a background document was published about the improvement of the ISO standard in relation to the port reception facilities [22].

Fisheries

In the Green Deal Fisheries for a Clean Sea, the fisheries sector is looking for ways to close the waste circle together with other parties (the Ministry of Infrastructure and Water Management, ports, waste processors). This involves presenting and transporting household waste, nets and cables, improving collection facilities in the port and recycling nets. The Green Deal network is used for collaboration relating to the VisPluisvrij project, Fishing for Litter, and awareness in the fisheries sector. The Netherlands has contributed the experience and knowledge acquired in this joint venture to OSPAR. Since 2014, our country has been one of the leaders of the OSPAR campaigns to tackle waste from the fisheries in the OSPAR area and has helped write OSPAR's *Scoping Study Design and Recycling of Fishing Gear* [23].

In the VisPluisvrij project, since 2013 the fisheries, NGOs, research institutes and governments have been working together to find a sustainable alternative to dolly rope. A lot of materials have been tested, with varying success. No widely applicable alternative has been found. This measure will be continued. Further details follow in the paragraph about the adapted and additional measures.

The Fishing for Litter programme, which was launched as a pilot project in the Netherlands in 2000, has now been extended in Europe. Fishermen can take waste that they get on board as by-catch to the ports for collection, with no costs for transport and processing. More than 130 ships take part in the Fishing for Litter programme by now. This measure will be continued. Further details follow in the paragraph about the adapted and additional measures.

In OSPAR context, the Netherlands has worked to extend Fishing for Litter to the entire OSPAR area. The result is the OSPAR *Recommendation 2016/01 on the reduction of marine litter through the implementation of fishing for litter initiatives* and update to the associate *guidelines*. In 2019, OSPAR

established the goal of increasing the number of ships in the maritime area of OSPAR taking part in *Fishing for Litter* by 100 percent between 2017 and 2021.

To raise awareness of the waste problem at sea in the fisheries sector, the ProSea organisation set up an education programme. For trainee fishermen at fisheries schools, a four-day course 'Fishing with future' has been developed. One of the sections is about preventing waste. For fishermen who are already working, there is a series of workshops about 'current challenges at sea', one of which is waste. The courses *marine awareness* for the fisheries are secured in the qualification dossiers of OCW. National experiences have led to the Netherlands focusing on sustainable fisheries education in the OSPAR area. In 2019, at the initiative of the Netherlands, OSPAR issued a recommendation about the reduction of marine litter by means of sustainability education programmes for fishermen [24].

The exploration 'Reducing interaction with fixed fishing gear' was implemented as part of the previous programme of measures. In the framework of this exploration, in 2016 an IMARES research report (Jak, 2016) was published. The main recommendation was to facilitate better communication between gillnetting fisheries and other users of the coastal zone. In the Netherlands, gillnetting fishermen have (social) media contact with other coastal fishermen. The improved communication has led to less damage to fishing gear and thus to less litter (such as ghost nets).

In the Green Deal Lead-free Fishing, signed on 22 May 2018, the sector works alongside the Ministries involved (EZK, LNV, IenW, VWS) towards the eventual phasing out of lead in sport fishing in 2028. Sportvisserij Nederland and Dibevo are working to achieve sufficient availability of attractive and sustainable alternatives for lead. They actively promote these alternatives among sport fishermen and stimulate their use. The alternatives to lead may not result in a change to another polluting or scarce material that harms the environment or public health. Although a period of ten years is taken to achieve the objective, the Green Deal continues to 31 December 2021. This must result in a 30 percent reduction in lead use in 2021 and in a total phasing out of lead in sports fishing in 2027.

Plastic products / Land sources of litter at sea

The measures in the above programme of measures specifically related to reducing emissions of microplastics in cosmetics and detergents (via a EU ban) and reducing balloons.
Emissions of microplastics in cosmetics fell in the Netherlands and other European countries because cosmetic companies have voluntarily phased out plastic microbeads . The Netherlands urged the EU to adopt this in the Plastics Strategy (January 2018). Research by Cosmetics Europe shows that plastic microbeads in cosmetics and beauty products were almost totally phased out in the period 2012-2017. In doing so, the European cosmetics industry is anticipating a European restriction on deliberately added microplastics. This restriction is expected to limit the use of microbeads as well as other forms of microplastics. Internationally, in an OSPAR context, the Netherlands has focused on tackling microbeads in the sea by participating in the dialogue with Cosmetics Europe.

To tackle the problem of balloon debris in the environment, in more than 60 percent of the municipalities there is a ban on or a policy discouraging the release of balloons. There has consequently been a reduction in balloon debris on the measurement beaches. This measure will be continued and further explained in the paragraph about the adapted and additional measures.

In the programme of measures, an exploration is announced into the possibilities of reducing emissions of microplastics from car tyres, abrasive detergents and paint at national level. Based on this exploration and RIVM studies, the 'microplastics policy programme' (June 2018) and the 'communal approach to plastics in the rivers' (November 2018) were formulated. In the period up to 2021, the following measures[9] were implemented:

- Research into health effects of microplastics: the research results of the 1-year breakthrough projects into the ability of microplastics to cross the intestinal wall, lungs, placenta and blood-brain barrier and have a disruptive effect on bodily functions prompt further investigation of the possible health effects. The researchers of ZonMW (the Netherlands Organisation for Health Research and Development) are developing methods to determine the presence of plastic particles in placenta, amniotic fluid and blood. Microplastics in surface water also proved to be an effective carrier of pathogenic bacteria, viruses and fungi. The related health risk are as yet uncertain. A strategic knowledge agenda has been developed that drives the required research.
- Tackling plastic litter in rivers: experiment with capturing litter in the river, prevent litter by working with area managers on a source approach to waste (including recreational, construction, business waste) and by promoting behaviour change among the public on riverbanks and developing a monitoring system for microplastics in rivers.
- The Netherlands is urging a European approach to microplastics from car tyres and communicates about the importance of the right tyre tension via the campaign 'Choose the right tyre'. At the European level, a delegated act has been assigned to the European Commission

[9] For more information on the Microplastics Policy Programme, see https://www.tweedekamer.nl/kamerstukken/detail?id=2021D25682&did=2021D25682

Results and effectiveness Green Deals

The Green Deals Clean Beaches, Fisheries for a Clean Sea and Ship waste chain were evaluated in 2019 [37]. The conclusion was that the Green Deals have contributed to the reduction of litter on Dutch beaches and in the North Sea. However, there is no hard data to support this conclusion. From the OSPAR monitoring, a significant downward trend can only be established for a limited number of items. This may be because plastic remains in the environment for a long time and has an international impact, whilst the reach of the measures is limited to the Netherlands. Neither does the data show whether less waste ends up on the beach or whether there is better and more frequent cleaning. The Green Deal Recreational Fishing Lead Free was evaluated in 2021.

By far the greatest added value of the Green Deals is in the network function and the associate knowledge sharing. The central coordination and availability of pilot funding are also important. Furthermore, the Green Deals have a great publicity value. Organisations can communicate their sustainability ambitions via the Green Deal platform. Within the Green Deals, there are different ideas about continuation after 2020. A certain degree of coordination is desired, but the form can vary per network. The Green Deal Clean Beaches ran through 2020. Concrete results proved difficult to measure due to the lack of SMART objectives. Consequently, it cannot be established whether the beaches have become cleaner due to the Green Deal Clean Beaches.

However, it has been established that the number of participants has risen every year and that actions concerning management and knowledge sharing have been implemented well. Abridged OSPAR measurements performed on tourist beaches after the evaluation have shown a strong decrease in the number of litter items found over the years[10]. Ensuring that beach visitors handle waste responsibly can be encouraged more effectively. The influencing mainly consisted of information and installing extra waste facilities.

Within the Green Deal Ship Waste chain, the results of separate disposal, transport and processing of plastics by ships in Dutch ports come very close to what was envisaged. Relatively low-threshold actions, such as separate collection of plastic waste, have all been implemented. In addition, a financial incentive was introduced in Amsterdam and Rotterdam for the separate delivery of clean plastic which was then collected free of charge by the waste collector. The more complex activities, such as coordinating waste collection at stocking, were less successful and proved more feasible in smaller ports.

The evaluation of the Green Deal Fisheries for a Clean Sea [37] showed a positive attitude towards achieving most goals. The waste management facilities have been improved in most ports, it proved possible to collect different waste flows, and big steps have been taken in integral waste management and the processing of different waste flows. In addition, in eight Dutch ports, end-of-life fishing gear is collected separately and recycled where possible. In five ports, dolly rope can be handed in separately. Nevertheless, there are still challenges for the future. A particular challenge concerns awareness measures and facilitating recycling. During 2020, this was elaborated with the partners and incorporated in a new form of collaboration.

Since the Green Deal Recreational Fishing Lead Free started, there has been targeted communication via the communication channels of sport fishing about the possibilities of reducing lead use (website, journals, angling shops and trade fairs). More and more fishing competitions are 'lead free'. Information signs have been placed around fishing waters. Exchange campaigns invite sport fishermen to switch to alternatives for lead. Many of these campaigns were initially aimed at sport fishing on freshwater. However, 76 percent of the lead loss comes from sport fishing at sea. Communication also targeted this branch about reduction of the use of lead, but this programme needs to be continued.

[10] See: schonestranden.nl for more information

Consequences of the incident with the MSC Zoë

In the night of 1-2 January 2019, the MSC Zoe lost 342 containers. The weight of the lost containers plus their contents is around 3260 tons. During around 1800 salvage operati ons, 300 containers and over 2400 tons were salvaged. Much of the waste that originated from the MSC Zoe was removed from North Sea beaches and the banks of the Wadden Sea in the period up to mid-2020. The remaining waste that could not be salvaged may be observed during litter at sea monitoring over the coming years.
Such an incident can affect the good environmental status of the North Sea. The explora tion of the long-term ecological effects was completed in 2021. The results show that there are no significant negative effects of the microplastics studied on the (seafloor) ecology of the Wadden Sea [38].

There are various procedures to prevent such incidents in the future and, if another incident does occur, to clear it up faster and more effectively. The North Sea and Wadden Sea disaster plans will be improved ("respond faster"). Options to reduce the risk of loss from containers near the cost have already been implemented and are being further explored. For example, container ships in the area above the Wadden in both directions will be warned about the risk of container loss during certain weather conditions and specific information about wave direction and period will be issued in the area. The role of various government authorities in the aftermath of an incident will also be studied to facilitate a timely clear up. The *Implementation Framework for Combating Coastal Pollution Rijkswaterstaat* (UBKR), formerly *Cooperation Agreement for Combating Coastal Pollution RWS Services* (SBK), is being revised in consultation with municipalities, with the aim of minimising the environmental damage reducing of a future maritime accident involving plastics at sea. The amended scheme is expected to come into effect in 2022. Above a threshold value to be determined, municipalities can call on Rijkswaterstaat for assistance in clearing pollution after maritime incidents. Further conditions and the design of the assistance are elaborated in the UBKR. Finally, the board of Rijkswaterstaat took the decision on 22 October 2021 that volunteers can be specifically deployed in a crisis. Volunteers are always deployed in consultation with the relevant Security Region(s). This decision will be further implemented and operationalised in 2022.

In IMO context, the Netherlands is focusing on:
- an improved information position of the crew on board container ships.
- the obligation to have an electronic inclinometer on container ships, which measures and registers the yaw angle.
- putting the development of measures to detect and report lost containers on the agenda.

Finally, there will be an analysis with respect to the usefulness of further investigation and additional proposals in the IMO, for example in relation to loading and lashing of containers or stricter guidelines for the transport of pellets. A complete overview of the actions taken by the Netherlands in the IMO to reduce container losses was sent to the House of Representatives on 21 June 2021 [38].

to add it to the European tyre label as soon as there is a uniform measurement method for tyre wear.
- Wear and tear of clothing: RIVM research shows that an approach on multiple fronts is required to prevent microplastic fibres in textiles. The Government is therefore working on a joint approach with all parties in the textile chain. The first steps are aimed at the exchange of knowledge and the development of a joint measurement method, so that measures can be tested and compared. European action could provide welcome support.
- In 2020, RIVM studied the most promising possibilities for tackling microplastics in paint, focusing on the role of innovation in this. The Netherlands will put this on the European agenda.
- At the request of the European Commission, the European Chemicals Agency (ECHA) has been working since 2018 on a restriction under the REACH programme of deliberately added microplastics in fertiliser, cosmetics and abrasive detergents. The Netherlands has encou- raged this development in Europe and looks forward to the Commission's ultimate proposal.

The letter to the House of Representatives of 25 June 2021 [36] reports in more detail about the measures as part of the microplastics policy programme. In an OSPAR context, the Netherlands has actively contributed to drawing up an assessment document in 2017 about microplastics from sources on land which end up in the marine environment [25]. Two years earlier, in 2015, our country worked with OSPAR to organise a conference about tackling microplastics in the marine environment. On 1 October 2021, OSPAR adopted a recommendation to eliminate pre-production pellets in the environment.

Other policy that contributes to MSFD goals

Besides the measures described above, the global, European and Dutch waste and plastic policy also contributes to tackling marine litter.

International

The United Nations Environment Assembly (UNEA) is working on more awareness and an effective global approach and has adopted four resolutions for this goal since 2014. Based on the report of the *Ad Hoc: Open Ended Working Group*, UNEA 5 will explore future steps in 2022 that could lead to a global convention. The Global Partnership of Marine Litter brings together stakeholders to share knowledge and experiences.

In 2018, the IMO adopted an action plan aimed at reducing marine litter originating from shipping. The Netherlands is working on the implementation of these measures.
The Netherlands is also working on stimulating the regional approach to marine litter. Besides the active participation in OSPAR, the Netherlands also supports regional initiatives such as drawing up a regional action plan in the Arctic Area and monitoring in the Dutch Caribbean.

European and national

Effective prevention of marine litter requires well considered, effective and well organised waste management. The Dutch waste policy is enshrined in European and national regulations. In recent years, various proposals and guidelines have been adopted in Europe, including the revision of the Waste Framework Directive, the Single-Use Plastics Directive and the revised Port Reception Facilities Directive.

Dutch legislation for collecting household and commercial waste is largely based on the **European Waste Framework Directive**. In 2018, the EU amended this directive. Under the motto of waste prevention, all EU member states must take measures to prevent waste production (Arts. 33 and 35). The measures to be taken also include preventing and removing litter on land and in water. This is incorporated in the National Waste Plan and the Waste Prevention Plan, which is currently being updated.

Building on the results of the implemented Education measures, the role of education will be further reinforced with the VANG-Buitenshuis programme which, from 2020, will further distribute knowledge from the 'Waste at school' programme via regional meetings in the network of schools, NME nature and environment education centres, municipalities and waste collectors. Part of the task involves exploring how higher education can be better supported to produce less waste and to promote circular business operations.

After the forthcoming implementation of the Port Reception Facilities Directive, (EU/2019/883) fully indirect financing will apply for the collection and removal of refuse, fishing nets and passively fished waste. This means that a waste fee will be requested from any ship, regardless of the amount of waste it produces. In addition, a waste reception certificate will be introduced with which shipping companies or captains can report the presentation of their waste at *Safe Sea Net*. Fishing The new Port Reception Facilities Directive also requires a regulation for passively caught waste, also known as *Fishing for Litter* waste. Facilities will be made mandatory in the ports and funded by indirect financing.

The EU member states must now convert the **Single-Use Plastics** (SUP) **Council Directive** (EU/2019/904) into national legislation. This involves implementing measures to reduce the effects of certain plastic products on the environment. For example, a ban was imposed on 3 July 2021 on various plastic disposable products that are frequently found on beaches and for which alternatives are available. These are cotton buds, cutlery, stirrers, straws, plates and balloon sticks. Food and drink containers of expanded polystyrene and all products made from oxo-degradable plastic have also been banned. The directive also requires producers and importers of cigarette filters, balloons, fishing gear, specific food drink packaging and light plastic carrier bags to pay for awareness-improvement measures and for the cost of clearing litter.

The SUP directive has an important link with the MSFD. The measures from the SUP directive focus on the items that are found most frequently during beach litter monitoring according to the OSPAR protocol. The approach to fishing gear in sea from the SUP has an important link with the MSF measures for the fisheries sector. Some of the items in the top 80 percent are tackled by the SUP guideline itself. For that reason, no additional measures will be taken from the MSFD. Over the coming year, the impact of the SUP measures on the top 80 percent most found items will become clear and what this means for the 'good environmental status' targeted by the MSFD.

The EU Directive for reducing the use of **light plastic bag**s (EU) 2015/720 requires the member states to take sustainable measures to significantly reduce the use of these bags, without leading to a general rise in the production of packaging.

Pursuant to this directive, on 1 January 2016 the Netherlands introduced a ban on the free distribution of plastic bags. An evaluation in 2019 showed that 80 percent fewer plastic bags are used and that 60 percent fewer plastic bags are found in litter.

With respect to the further sustainability of packaging, the Packaging Waste Framework Agreement makes producers responsible for the return and recycling of packaging. In addition to these measures, a deposit on small plastic bottles was introduced on 1 July 2021 and it was decided to also introduce a deposit on cans as of 31 December 2022. With the implementation of the SUP Directive, producers are also responsible for the costs of litter and awareness measures. Manufacturers of single-use plastic food and drink packaging, lightweight plastic carrier bags, wet wipes, balloons and tobacco filters are required to contribute to the costs incurred by public area managers in cleaning up litter. The letter to the House of Representatives of 26 October 2021 [39] explains the operation of extended producer responsibility (EPR) in more detail. As part of EPR, these producers are also required to take awareness-raising measures aimed at preventing litter. This is in addition to the communication from the government about litter and the communication from many social parties. Many of these parties participate in the Shoulders under Clean platform. This platform was established in 2020 for the benefit of knowledge exchange, coordination and collaboration, with the aim of ensuring more effective communication.

Further developments

In the Netherlands Circular in 2050 programme, the national government indicates how it will make the transition with stakeholders to a fully circular economy in 2050, for a future in which no more plastics enter the environment. This transition is under way with, among others, the Plastics transition agenda. The Dutch Plastic Pact is part of that agenda. This pact, which was signed in February 2019, stimulates the reuse of plastic at national level and tackles the unnecessary use of plastic. Eventually, the goal is to close the plastic chain. This approach was adopted at European level in the European Plastic Pact, which has been signed by thirteen countries and 66 European businesses. With the European Commission as observer, there are also prospects of a contribution to the new European plastic policy in the framework of the European Green Deal.

Current environmental status

The OSPAR assessments of beach waste, waste on the seabed and plastic in the stomachs of northern fulmars show that waste (mainly plastic) is frequently found on the beaches, in the water column and on the bed of the North Sea [26 and 27]. At North Sea level, there is still no significant decline in beach waste. On the Dutch beaches, in the period 2014-2019, significant reductions were established for some specific waste items and a nearly significant reduction in the total number of waste items.

In the most recent OSPAR assessment of plastics in the stomachs of northern fulmars [30], a significant reduction in plastics was found. Among northern fulmars washed up on the Dutch coast, over the period 2002-2019 there was a significant reduction in the plastic found in their stomachs [31].

The beach waste monitoring figures show a reduction in the total number of items found on beaches. The score fell from 231 items per hundred metres of beach in 2012 to 140 items per 100 metres in 2019 (table 3.1), a reduction of nearly 40%[11]. Although there are limited direct data to support the reduction of marine litter being the result of the measures taken, several trends can be identified (table 3.2)[12]. In the period between 2014-2019, the number of items in the category fishing gear fell by an average 6.47 items per 100 metres per year (table 3.3). Measures such as the Green Deal Fisheries for a Clean Sea, the Fishing for Litter programme and the improvement of the port reception facilities probably contributed to the reduction of the absolute amount of beach waste originating from the fisheries sector. In relative terms, fisheries items are the most frequently found (45%). Since the introduction of the ban on free plastic bags, there has been a clear reduction in the number of plastic bags found on beaches. In the previous programme of measures, plastic bags were in third place of the most found items. Now they are no longer among the 80 percent of most found items. Also there has been a reduction in the average number of balloons found. This can partly be the result of the policy discouraging their use or the municipal ban on releasing balloons.

Method	Average + meso-plastics	Average - meso-plastics	Median + meso-plastics	Median - meso-plastics
2012	315	293	259	**231**
2019	251	209	168	**140**
Reduction	20%	29%	35%	**39%**
2019 compared with 2012	20%	29%	35%	39%
Comment	Old method			EU/OSPAR 2020 method

Tabel 3.1. Averages and medians (with and without meso-plastics) of the total number of items per 100 m beach, aggregated for the four Dutch monitoring beaches (2019 and 2012).

[11] Monitoring data amended by removing meso-plastics (0.5-2.5 cm), in line with the latest EU advice (Hanke et al, 2019) and OSPAR CEMP Guidelines Marine Monitoring of Beach litter (OSPAR 2020). It is expected that a separate analysis will be made for the small pieces in the future.

[12] For the items in bold in table 1, significant reductions were found.

Rank	Litter type	Median	% of total amount	Trend [number/ year]
1	**Plastic: string [32]**	59	34.3	**-6.79**
2	Plastic: plastic_large [46]	15	9.02	**-1.14**
3	Plastic: caps [15]	9	5.96	**-0.4**
4	Plastic: foam_sponge [45]	6	5.22	0
5	Plastic: crisp [19]	8	4.83	0
6	**Plastic: fishing_net_small [115]**	4	4.62	**0.909**
7	Plastic: tangled [33]	6	3.95	-0.251
8	**Plastic: industrial [40]**	6	3.46	**-0.505**
9	**Rubber: balloons [49]**	6	3.09	**-0.836**
10	Plastic: cutlery [22]	2	1.76	0
11	Sanitary: buds [98]	2	1.61	0

Tabel 3.2. Top 80% most commonly found items along the Dutch coast in the period 2014-2019 [32]. Significant trends are in bold.

Material category	Median	% of total amount	Trend [number/ year]
Single-Use Plastics (SUP)	45	25.5	-3.08
	-3.08	45.5	**-6.47**
Fishing related litter (FISH)	85	45.5	
	-6.47		

Tabel 3.3. Average numbers (median) and trends of Single-Use Plastics (SUP) and Fisheries-related items (FISH). The significant trend (FISH) is printed bold (period 2014-2019).

Due to the lack of the necessary knowledge to exactly determine the good environmental status and from the need to gain more insight into the sources of litter, various knowledge programmes for river waste and microplastics have been implemented in the recent period. Various studies relating to river waste provided insight into items, quantities and sources (table 3.4).

The river waste study is part of the (citizen science) project Clean Rivers, an initiative of IVN Nature Education, the North Sea Foundation and the Plastic Soup Foundation. Using citizen

#	Type	Average number per 100 m riverbank	Indication sources
1	Unidentifiable pieces soft/hard plastic and plastic foil < 50 cm (including Styrofoam)	217	Various sources
2	Sweets, snacks and crisp packaging and lollypop sticks	29	Recreation/industry
3	Plastic drinks packaging (bottles, wrappers and lids)	27	Recreation/industry
	Plastic food packaging (incl. chip trays)	9	Recreation/industry
4	Plastic food packaging (incl. chip trays)	9	Recreation/industry
5	Plastic cotton buds	8	Sewer overflow
6	Various recognisable plastic pieces	8	Recreation/dumping/ industry
7	Various textile (incl. sanitary pads)	8	Recreation/dumping
8	Pieces of string with diameter < 1 cm	6	Recreation (incl. sport fishing)/industry
9	Glass jars and/or parts including from food and drinks packaging	6	Recreation/dumping
10	Drinks cans	4	Recreation
11	Plastic cups or parts of cups	4	Recreation
12	Cigarette filters	4	Recreation
13	Sanitary pads or packaging	3	Sewer overflow
14	Plastic cutlery	2	Recreation
15	Plastic toys	2	Recreation/dumping

Tabel 3.4. Top 15 river waste and source indication: what washes up on riverbanks? Results of two years of waste monitoring on the banks of the Meuse and the Waal. Clean Rivers (IVN/Plastic Soup Foundation/ Stichting de Noordzee), 2019.

science, they have been collecting data on the amount, composition and origin of river waste since 2017. There are now 1,113 active voluntary river waste researchers who carry out measurements in the spring and autumn. The study is the largest waste study in the Dutch river delta.

In 2020, river waste research will be scaled up and there are now research locations on the banks of all major Dutch rivers. In the spring of 2021, 512 measurements were carried out. On average,

409 pieces of waste were found on 100 metres of riverbank, of which 84% consisted of plastic. This includes plastic sanitary and medical waste such as cotton buds and blister packaging. Unidentifiable pieces of plastic (including Styrofoam) were most commonly found. These pieces cannot be traced back to a source. The main indicative sources are industry, including the plastics sector (at many measuring points pellets were found), the construction sector and the transport sector (particularly inland shipping), sand extraction and soil relocation when filling in sand extraction lakes (with dredging material/soil containing plastic) and recreation (intentional or unintentional leaving of waste, often disposable plastic). The top 15 of most commonly found types of waste comprised six types of disposable plastics that fall under the Single-Use Plastics (SUP).

More knowledge is gained all the time about the sources of microplastics and about the presence and effects of microplastics in the sea. A distinction can be made between primary microplastics and secondary microplastics. Primary microplastics are plastic particles which are deliberately added to products, such as cosmetics, detergents, paint and fertilisers. Plastic pellets which are used to make products are also primary microplastics. Secondary microplastics are created by wear and tear of products such as car tyres, litter, paint or textiles or the perishing/disintegration of plastic (disposable) products. Microplastics get into the sea due to emissions from sources on land to the water. They are also created in the sea because plastic litter that is already present in the marine environment disintegrates into smaller particles. There are signs of potential harmful effects for sea animals (including accumulation, inflammations, oxidative stress) and of transfer within the food chain. Recent research shows that microplastics are found in varying amounts in all compartments (water, sediment, biota) of the marine environment. This is a basis for the development of an (OSPAR) indicator for microplastics in sediment. More research into the presence and environmental impact of microplastics is required, including the degree of exposure and the consequences.

Additional policy task

The paragraph 'implemented measures' indicates that in the recent period, a lot has been done in the Netherlands to address the litter problem and to achieve a better environmental status. The paragraph “other policies contributing to the MSFD” outlines other relevant policy developments that are expected to contribute to the reduction of marine litter. In the coming years, the implementation of the SUP guideline, for example, will ensure a reduction of litter. In this process, the Netherlands is also aiming at synergy between the transition to a circular sustainable economy and the approach to marine litter. Despite this focus, there is still a policy task for the coming years.

The principle for the cabinet is that litter does not belong in the sea. Although the amount of litter in the Dutch part of the North Sea seems to be declining, the freight which impacts on the marine environment is still considerable. Furthermore, a lot is still unknown about the sources and distribution routes and about the effects on the ecosystem. Plastics are persistent substances which do not or are difficult to biodegrade in a natural way. This waste continues to accumulate in the marine environment over a longer period. In view of developments in other policy areas, the adapted and additional measures in this revised Dutch Marine Strategy Part 3 emphasise the fight against waste that ends up in the sea from the beaches and from the fisheries sector and to a lesser extent from shipping and plastic products. Special attention is still needed for waste (particularly including microplastics) that continues to flow to the sea via the rivers. Little is known about the exact volume of the sources and loads. However, research has already provided an initial indication of the extent of primary and secondary sources and of transport via the Dutch rivers, but additional research is still essential. That also applies to knowledge about the effects of microplastics.

The monitoring data and the assessment point to further decline of litter in the Dutch part of the North Sea. As a result of the existing policy, (intended) measures and initiatives from society, this trend is expected to continue. However, the effectiveness and the pace of the measures are not easy to demonstrate. For that reason, it has been decided to continue the policy from 2012 in the Marine Strategy part 1 (2018) [11]. Adaptation and/or supplementation of measures is nevertheless required and the implementation of other policy that contributes to the MSFD goals, such as the SUP directive, must also be considered.

Adapted and additional measures

In this paragraph, the adapted and additional measures are presented per cluster. Various measures and actions which were introduced under the previous programmes of measures will be continued in an adapted form in the coming years. In addition, new additional measures will be taken for most clusters. These are new programmes or actions which are required to further reduce the pollution through litter and thus contribute to achieving a better environmental status. National and international collaboration between government authorities, industry, knowledge institutes and social organisations is essential here. For an effective implementation of the measures, expected results,

indicators and timelines will be further elaborated. In addition to the measures for each cluster as explained below, work is also under way on a revised scheme for cleaning up coastal pollution after maritime incidents, with the aim of minimising environmental damage[13].

In many areas, public and private parties are taking action to resolve the problem of litter in the sea. The programme of measures supplements existing initiatives and policy wherever possible and thus reduce the amount of marine litter. The policy context has changing rapidly, among others due to the implementation of the SUP directive and implementation of the microplastics policy programme. It is important to regularly assess whether adaptations or additions are necessary in the goals and measures of the MSFD (adaptive management).

Beaches

The approach to litter that ends up in the sea from beaches builds on the experiences and network of the Green Deal Clean Beaches. Additional focus is being devoted to some actions. The measures to tackle beach waste are expected to lead to a further decrease in the amount of waste on tourist beaches, among other things due to the availability of high-quality waste facilities at most beach pavilions.

Adapted measures

The Green Deal Clean Beaches has been replaced by a Clean Beaches Programme. This programme focuses on knowledge exchange, support for collaboration projects and improvement of local collaboration between municipalities and entrepreneurs. The next set of measures must lead to structurally maintaining clean beaches in the Netherlands.

- Adjustment/refinement and implementation of the monitoring of tourist beaches. The aim is also to gain insight into the waste cleared and transported by the managers. This monitoring is linked to the annual Clean Beaches publication. The results are available per municipality/entrance and pavilion at www.strandinspecties.nl. The municipalities and pavilions use the results collected by the beach inspections to take additional actions.
- To promote knowledge exchange between various organisations, knowledge sessions are organised every year for the target groups beach municipalities and other managers, pavilion owners and NGOs/voluntary organisations.
- Custom advice to coastal municipalities: support of and knowledge transfer to municipal managers who and pavilions that need it. This is done, among other things, through advice on how behaviour can be influenced, a checklist and addressing and advising less well-performing municipalities and pavilions.
- Support municipalities, pavilion owners and NGOs in innovative pilots for cleaning beaches.
- Influencing behaviour and encouraging participation, for example by means of reward apps. The aim is to raise awareness among the large numbers of visitors about the importance of keeping our beaches clean and thus influencing their behaviour, perception and participation. This will consciously and subconsciously influence their willingness to contribute to preventing litter in their own living and working environments.
- Contributing knowledge about cleaning beaches and any Sustainable Beaches covenant.

Additional measures

- Website (existing) and newsletter from KIMO (new) for knowledge transfer an informing the target groups mentioned above. See www.schonestranden.nl.
- Activity monitoring among beach stakeholders. The information is made accessible to all parties to facilitate knowledge exchange, coordination and collaboration.
- Contribute to national meetings about the beach for the purpose of knowledge exchange and network reinforcement. This takes place during the National Beach Day and through the national platform 'Shoulders Under Clean' (www.schoudersonderschoon.nl).

River basin districts

The approach to litter that ends up in the sea from beaches builds on the experiences and network of the river basin district approach to litter and the implementation of the Litter Collection regulation. Increasing information is available about the amount, composition and sources of waste in rivers. In the framework of the Microplastics Policy Programme, pilot projects have been implemented to prevent river waste. At the end of this programme it will investigated how the various parts of the programme can be continued, in particular for combating waste and microplastics in rivers. In addition, based on the MSFD, the focus will be on placing and keeping the litter collection problem on the agenda. In tackling litter in rivers, efforts are being made to strengthen cooperation between parties, which is expected to lead to a decrease in the amount of river waste in the Netherlands. Such effortswill be based on at the administrative level.

Adapted measures

- *River basin district approach to litter*
  As indicated by the implemented measures, in recent years joint ventures have been established along the (sub) river basin districts Meuse, Waal, Rhine, Lek, IJssel, Scheldt, Haringvliet and ports of Rotterdam to tackle litter in rivers. The coordination is largely performed by IVN and Rijkswaterstaat. Continuation and expansion of the collaborations are required to work on a structural and broad approach to litter ('clearing up' and 'keeping clean'). It will be studied whether per joint venture an ambition and – where possible – concrete goals can be set.

[13] See text box 2 (*Consequences of the incident with the MSC Zoe*) in the paragraph 'Implemented measures' for more information.

- *Roll out Litter Collection Regulation*
  In 2018, Rijkswaterstaat launched the Litter collection regulation (ZOR) as a pilot project. The organisation is responsible for transporting and processing litter collected along the banks by third parties. The pilot proved successful and will be further enshrined in the regular management and maintenance of main water systems by Rijkswaterstaat.

Additional measures

- *Put litter problem on the agenda and safeguard a broad approach to litter*
  This measure is aimed at increasing awareness of the litter problem among site and water managers along rivers. Thus more (political) support will be created for taking structural measures in their management area, whereby approach and prevention of litter will become part of the regular management. This can be achieved by including prevention of litter in permits and work processes.
  To achieve a structural (broad) litter approach, riverbank, water and jetty managers and sector organisations will receive support in developing a litter approach and safeguarding it in their own (management) processes. These might include managers and organisations like Rijkswaterstaat, provinces, municipalities, water boards, Forestry Commission, the Society for the Preservation of Nature in the Netherlands, regional nature organisations and sector organisations like Bouwend Nederland and Sportvisserij Nederland.

  To be able to support the inclusion on the agenda and safeguarding of the broad and river basin district approach to litter, more clarity is required about the responsibilities of national and local governments and how these responsibilities and the approach to litter relate to the European regulations (such as MSFD, WFD and KRA). The elaboration is part of this additional measure.

Shipping

The Green Deal Ship's Waste Chain will not be continued. Some actions, such as separate collection of ship's waste, are part of the new Port Reception Facilities directive. However, additional measures will be taken to reduce persistent floating cargo residue in the sea. Because no measures are being taken for inland shipping, the following measures only apply to sea-going shipping.

Additional measures

- *Implementation of the duty to deliver persistent floating cargo residue from 2021*
  Since 1 January 2021, all ships that unload their cargo in a European port within the designated sea area indicated in MARPOL Annex II, Regulation 13 must deliver washing water with persistent floating cargo residue such as paraffin wax to the port. The amendments in Annex II of MARPOL set prewash requirements in a receiving port for specific substances whose cargo residues float after discharge at sea. The new discharge requirements apply to 'persistent floating' substances with a high viscosity. This refers to a viscosity equal to or greater than 50 mPa·s at 20°C and/or with a melting point equal to or higher than 0°C. For these substances, the prewash procedure must be applied after discharge in a receiving port. The residue/water mix produced during the prewash must be transported to a reception facility in a receiving port.
- *Improved prewash procedure*
  In the past, there have been occasions of pollution of Dutch beaches by paraffin wax. On top of MARPOL legislation, the Netherlands has taken additional measures for washing the discharged tanks. The companies involved have made agreements about this[14]. The aim is that less persistent floating residue (such as paraffin wax) gets into the environment, simply because the cargo tanks are better cleaned. The improved pre-wash procedure will be brought to the attention of the International Maritime Organization.

Fisheries

The approach to litter that ends up in the sea from beaches builds on the experiences and network of the Green Deal Fisheries for a Clean Sea and is optimally in line with the implementation of the SUP directive and the Port Reception Facilities directive. Additional focus is being devoted to some actions, namely the reduction of dolly rope and lead in the sea. The measures as part of the fisheries cluster are expected to contribute to a decrease in the amount of waste in the sea from the Dutch fisheries sector.

Adapted measures

- *Fisheries for a Clean Sea Programme*
  This programme is the continuation of the Green Deal Fisheries for a Clean Sea. A particular challenge still concerns awareness measures and facilitating recycling. The programme will build on the basis created with the Green Deal. Four working themes (effective waste management on board ships and in ports, recycling, awareness and education, and coordination and coherence) will work towards the aim to at least continue the reduction of waste from fisheries on beaches by 2027 compared to 2021 and to recycle more waste from fisheries. Starting point is the chain approach. The SUP directive, in which the manufacturers are given a role in the collection, recycling and raising awareness with respect to fishing gear, will be an important theme for coordination between the parties. There will also be coordination with the new Fishing for Litter programme, including the elaboration in the new Port Reception Facilities directive.

[14] The voluntary agreements have been extended until 2023 by means of a letter of intent, in so far as the partners do not agree on a further renewal.

- *Fishing for Litter*
  Fishing for Litter is a way to raise awareness in the fisheries sector. Implementation of the programme leads to the seabed becoming cleaner and that useful data becomes available about litter on the seabed. This is in addition to the regular monitoring surveys concerning litter on the seabed. The revised Port Reception Facilities Directive also requires a regulation for passively caught waste, also known as Fishing for Litter waste. Facilities will be made mandatory in the port. The costs will need to be covered by indirect financing. During the implementation of the Port Reception Facilities Directive, it will be studied with the FFL partners involved how the programme can best be designed within the new directive and how it can be improved, if necessary.

Additional measures

- *Phasing out of dolly rope, with incentive measures*
  Since 2013, the fisheries sector, NGOs, research institutes and government authorities have been working together to find a sustainable alternative to dolly rope. The previous MSFD programme of measures included an exploration of alternatives. Since then, a lot of materials have been tested, with varying success. Biodegradable dolly rope gave good test results, but making it economically feasible is still a challenge. The aim is to encourage the use of alternative solutions and to gradually phase out the use of conventional dolly rope by 2027. This will be done by:
  - Phasing out by means of incentives: a financial (tax) incentive to make sustainable alternatives for dolly rope financially more attractive and economically feasible.
  - Facilitating/organising activities to promote sustainable alternatives and increase familiarity and awareness. This is in line with the awareness measure focused on responsible fishing gear, which must be implemented based on the SUP directive.

  It is being studied whether this measure can be applied in the Kottervisie and the innovation processes for fishing gear that are taking place as part of this. In the elaboration of this, the motion De Groot (2021) [40] will be specified, which calls for a clear roadmap for phasing out conventional dolly rope.

- *Standardisation for circular design and chain approach of fishing gear*
  Within the context of the SUP guideline, NEN provides the secretariat of CEN working group 466, which works on standards for circular design and the waste chain of fishing gear. NEN also facilitates the Dutch shadow group. This involves drawing up (voluntary) standards for technical requirements for design, material use and circularity of the fishing gear, but also for collection, monitoring, traceability, repair and recycling of fishing gear. Such a chain approach fits in well with previous MSFD initiatives like the Green Deal Fisheries for a Clean Sea. The central government supports this initiative financially and in terms of content. Ultimately, the efforts should lead to a CEN standard by the end of 2024 to help contribute to less waste in the sea and a higher degree of recycling of waste from fisheries.
- *Focus on reducing lead in recreational fishing at sea*
  Although the supply of lead-free fishing weights is growing, it is still very limited compared to the wide range of lead-containing fishing weights. Moreover, the offer differs per type of fishing. Consequently, switching to alternatives has only been promoted to a limited degree in communications with recreational fishermen. The target of the Green Deal Recreational Fishing Lead Free for 2021 was a 30 percent reduction (compared to 2018) in lead use by anglers. After the evaluation conducted at the end of 2021, it will be explored whether new steps are needed to achieve the target for phasing out in 2027. The effect of a possible European ban on the use and sale of fishing lead will be included in this.

  To be able to catch up, the following measures are planned:
  - List the available alternatives for lead per type of recreational fishing at sea. The aim is to obtain a more complete overview of the sustainability, functionality, costs and availability of these alternatives compared with lead.
  - The results of this inventory should make it possible to communicate in a more targeted way with recreational fishermen to create more awareness about the impact of lead and about possible alternatives. This might include communication in ports, at trailer ramps, on popular beaches and recreational fishing vessels, as well as in shops, for example by means of posters, folders and magazines.
  - With the proposal from the European Chemicals Agency to the European Commission for a complete ban on the use and sale of fish lead in the EU, concrete steps have been taken to arrive at European regulations. The European Commission is expected to take a decision about this proposal at the end of 2022. The parties to the Green Deal agree that having measures in a European context is a positive development.

Plastic products / Land sources of litter at sea

The amended and additional MSFD measures concern tackling balloons and pre-production pellets. Because much of the approach to plastic products in litter takes place via the SUP Directive and the Plastic Bags Directive, no additional measures are included in the MSFD. However, involvement continues from the MSFD with respect to developments around these directives. If necessary, additional measures may be taken in due course.

Policy efforts to tackle microplastics pollution will be continued. It is up to a new cabinet to invest further in the required knowledge base with regard to microplastics and to continue the actions that have already been started for microplastics and river waste in the context of the microplastics policy programme.

Adapted measures

- *Promote reduction of balloons*
  The cabinet will continue to draw attention to the problem of balloon residues in the environment and will continue to point out to municipalities the policy options they have to reduce the release of balloons. This will be included in Rijkswaterstaat's support for municipalities when it comes to litter. This approach is expected to contribute to a significant decrease in the quantity of balloons in the marine environment compared to 2021. Channels that will be used include waste magazine GRAM, and the platform www.schoudersonderschoon.nl. Led by RWS, this platform is aimed at supporting stakeholders with litter campaigns. Other actions that the central government will consider are meetings about the prevention of balloon waste and the preparation of an international guideline. This also contributes to knowledge exchange. In more than 60 percent of the municipalities, there is now a ban on or a policy discouraging the release of balloons. In addition, through the introduction of the SUP directive, producers of balloons are also made aware of their responsibility.

Additional measures

- *Pre-production pellets*
  The cabinet will implement the OSPAR recommendation 2021/06 to tackle the presence of plastic pellets in the environment. Plastic pellets, also called nurdles or pre-production pellets, can get into the environment as microplastics during production, storage, transport or processing. Responsibility for tackling pre-production pellets primarily lies with the industry, which has launched Operation Clean Sweep to this end. Plastics Europe is currently working on the elaboration of a certification system. The central government is committed to ensuring that as many parties as possible are certified in line with the OSPAR recommendation.

Explorations

The ambition to achieve a healthy and sustainably used sea not only requires measures which resolve the current policy issues, but also continuous awareness of opportunities to increase the sustainable use of the North Sea, to further limit the pressure on the marine environment and the ecosystem and - where possible - to actively restore the North Sea ecosystem. Based on this approach, take opportunities and resolve (potential) problems, several explorations are being performed. The results of the explorations are used as input for the future updates of the MSFD goals and measures or lead to adaptations if that is desirable and possible.

Education and awareness

- *Plastic soup in waste programmes*
  The emphasis in the Waste at school programme lay on education about preventing, reducing and separating waste produced in school. An overarching theme was behavioural change among the pupils: by recognising the value of raw materials, they should deal with waste differently. Behavioural change also affects litter, which is caused by throwing away waste. Litter as a subject received less attention during the programme. A study showed that teachers respond enthusiastically to the theme plastic soup and less enthusiastically to the theme of waste, although both themes are inextricably linked.
  This exploration investigates whether plastic soup can be included more effectively in the education programmes, to increase awareness of the plastic problem. An overview has been made of useful teaching material Websites about waste for students and schools (and anyone else who is interested) - Waste Circular) and contributions have been made to the programmes for different levels of education, which can be found at Getting started with waste.
- *National communication initiative*
  Based on a Parliamentary question, the state secretary has launched a national communication initiative for the approach to litter. This initiative combines the powers of around 30 stakeholders from government authorities, industry and NGOs. The aim is to achieve a broad and broadly supported programme of actions in 2021 and 2022 to further improve the clean behaviour of the public and businesses. The role of the national government is to connect, strengthen and support. The initiative started in the mid-2020. The platform will be developed further in 2021, focusing on: research, knowledge sessions, development of tools, provision of means of communication. An important medium for the provision of information, knowledge, network and tools is the site www.schoudersonderschoon.nl. To meet the wishes of many stakeholders, a national campaign was started at the end of 2021.

Beaches

- *Explore, develop and communicate policy goals for litter on tourist beaches*
  Objectives form the basis for policy and measures. Up to 2020 inclusive, there were no concrete objectives for the 'cleanliness' of tourist beaches. Such objectives are being developed, however, to focus the efforts of the parties involved in the follow-up to the Green Deal Clean Beaches and to measure their effect. Obviously, these must be established in terms that reflect the monitoring method and European and regional developments, such as the EU Threshold Value for beach litter.

Shipping

- *Additional measures for approach to litter in inland shipping*
  From the Source approach project, an inland shipping project was started, which will give a better impression of the problems concerning litter originating from inland shipping. Once the extent of the problem is better known, additional measures can be taken in the period 2022-2027.
- *Explore options approach PUR foam*
  PUR foam is now one of the top 5 most found types of waste. This type of material is mainly used by shipping for various applications. Exploration into the options for taking measures to tackle it. This may extend further than shipping.

Plastic products/Land sources of litter at sea

- *Follow-up policy programme microplastics*
  Before the end of the microplastics policy programme in 2021-2022, it will be examined how the various components of the programme can be continued, in particular for combating waste and microplastics in rivers. It is essential to take European developments into account, such as the announcement by the European Commission to implement a policy for both deliberately added and accidentally emerging microplastics.

Knowledge agenda

Due to a lack of knowledge to exactly determine the good environmental status, and based on the need to gain more insight into the effects of litter, various knowledge programmes for river waste and microplastics have been implemented since 2012. Various studies involving river waste have provided insight into items, volumes and sources. There are signs of possible harmful effects for sea animals and of transfer within the food chain. Recent research shows that microplastics are found in varying amounts in all compartments (water, sediment, biota) of the marine environment. This is a basis for the development of an (OSPAR) indicator for microplastics in sediment.
Many actions arising from the knowledge questions as formulated in the revised Marine Strategy part 1 (2018) [11], revised Marine Strategy part 2 (2020) [34] and Marine Strategy part 3 (2016) [12] are still ongoing and/or are continuous. These are, among others:

- developing new indicators for which various procedures are under way (microplastics in sediment; improve or supplement seabed waste and floating waste indicators; integration of marine litter indicators),
- determining the effects of microplastics / nanoplastics (various procedures are under way, via EU Technical Group Marine Litter but also via ZONMw)[15],
- determining trends and shipments of waste to sea for macro and micro waste. This is done, among other things, through the MICRO project and by developing a monitoring strategy for litter in rivers. This monitoring strategy must answer important policy and management questions about, among other things, quantities, composition, sources and trends. To this end, baseline measurements are performed and measurement techniques and protocols are developed for riverbanks, water surface and water column, in preparation for long-term monitoring.

The Netherlands follows these developments, keeps a finger on the pulse and actively participates in the EU and OSPAR processes. If necessary, additional research will be carried out.
New knowledge questions for the period 2022-2027 concern:
1. Source identification and distribution routes of litter
   - exploring a standardised methodology for source classification of waste sources, especially river waste as a source of marine litter, for a more targeted approach,
   - research into sources of waste, in specific hotspots such as possible at anchorages and hotspots identified by further analysis of Fishing for Litter waste.
2. Ensure better alignment of methods for monitoring microplastics in saltwater and freshwater.
3. Integration of research and monitoring data on litter in water (sea, rivers and estuaries), including specific research into integrating, harmonizing, comparing and exchanging research and measurement data from RWS and stakeholders of river litter/plastics, into one data system and link it with relevant existing measurement and model data.

[15] ZorgOnderzoek Nederland (ZON) en and the field of Medical Sciences (MW) of the Netherlands Organization for Scientific Research (NWO).

3.12 Energy, including underwater noise (D11)

Good environmental status and goals

Noise under water produced by human activities (anthropogenic) has different characteristics than the natural sounds of waves, surf, rainfall and sea animals. Anthropogenic sources of underwater noise include: pile-driving work, seismic investigation and shipping. Sometimes the underwater noise is relatively short, such as pile-driving during construction work at sea, at other times they may last longer. The effects of anthropogenic underwater noise on marine mammals vary from subtle changes in behaviour to avoiding areas and reduced hearing capacity, and - in extreme cases - even to death. Other animals in and on the water can also respond to sound. Fish, for example, are mainly sensitive to low frequencies.
The good environmental status is achieved when the supply of energy, including underwater noise, has a level that does not harm the marine environment. A second condition is that uninterrupted noise with a low frequency and loud impulsive noise with a low and medium frequency resulting from human activities under water do not have harmful effect on ecosystems. The environmental status and goals are summarised in the table below.

Good environmental status	Overarching: spatial distribution, duration and noise levels of loud impulsive sources are such that direct and indirect effects of loud impulsive noise cannot endanger the favourable state of conservation of species. • D11C1: for porpoises, reduction of population growth is prevented by setting a limit to the number of porpoise disruption days. Overarching: spatial distribution, duration and levels of background noise are such that they cannot endanger the favourable state of conservation of species. • D11C2: for this criterion, it is not yet possible to draw up quantitative descriptions of the good environmental status.
Environmental goals	• D11T1: continue the tightened regulation concerning the prevention of harmful effects by impulsive noise. • D11T2: develop a limit for the number of disruption days at regional level (OSPAR). • D11T3: start up an international monitoring programme for continuous noise to chart the level and the distribution of continuous noise.

Implemented measures

The principle for the measures for underwater noise is a reduction at the source. Noise spreads over long distances and is almost impossible to screen at sea. So, only measures at the source are effective.

The licensing process for wind turbine farms has been amended. The Wozep programme (Offshore Wind Ecological Programme) devotes a lot of attention to underwater noise. This has led to a tightening of the licensing conditions and to better insight into the effects of impulsive noise. As a result, the precautionary principle can be applied more precisely. In the Kavelbesluiten, a maximum permissible noise level is prescribed. A framework has been developed (Framework for the Assessment of Ecological and Cumulative Effects, FAECE) [28] to assess the effects of the construction of wind turbine farms and determine the licensing requirements.

The use of sonar systems and explosive ordnance disposal are subject to legislation to ensure that these activities are carried out in a sound manner. The Ministry of Defence invests in knowledge to safeguard permanent responsible use. Specifically for the clearance of explosives, research is being conducted, where possible in an international context, into alternative technology to render dangerous historical ammunition harmless with less effect on sensitive types and thus to ensure safe use of the sea. In addition, CZSK (Naval Forces Command) is working internally with regulations regarding explosives clearance.
Regulations relating to seismic investigation have been amended. For seismic surveys at sea, a license pursuant to the Nature Conservation Act and/or exemption from the Flora and Fauna Act is required. In addition, voluntary guidelines have been drawn up to reduce the effects of platform lights.

Finally, the IMO has adopted guidelines to reduce underwater noise by commercial shipping. In addition, the Netherlands is leading an EU monitoring.

Current situation

Unless additional measures are taken, the increase in human activities on the North Sea will result in an increase in the amount of underwater noise. Since the last Marine Strategy part 3, underwater noise is monitored. At the initiative of OSPAR, at ICES a register for impulsive noise has been created, in which all activities which produce noise are registered. The Jomopans project has generated better insight into the amount and spread of continuous underwater noise. The results of various studies have led to the establishment of limit values for noise production relating to the construction of wind turbine farms.

Additional policy task

It is important to continue the current work and research efforts.

Additional measures

Impulsive noise: Noise budget for seismic survey

One of the impulsive noise sources is the use of air guns in seismic surveys to find oil and gas stores under the seabed. In partnership with industry, an assessment framework for seismic survey will be developed in analogy with the FAECE. Further conditions may be based on this. This is in line with the agreements in the North Sea Agreement and the Porpoise Protection Plan. A noise budget that regulates the time in which the impulsive noise is permitted may be a condition of the assessment framework. The industry will be encouraged to reduce impulsive noise.

Continuous noise: IMO guidelines for the reduction of underwater noise of commercial shipping

Shipping is a global sector. Issues such as problematic underwater noise from ships must therefore be discussed at global level. The shipping sector must be encouraged to reduce the production of underwater noise caused by ships. Thanks in part to Dutch support, the IMO has now started revising the existing guidelines, aiming to complete this in 2023. The Netherlands is working together with the EU to improve and tighten the guidelines. The Netherlands has also brought the Jomopans project to the IMO's attention in support of the request to revise the guidelines.

Continuous noise: Measures in response to Jomopans

Jomopans has mapped out the noise levels, which provide starting points for defining measures. At the time of writing this document, it is too early to determine new measures based on the results. However, the results of Jomopans are currently being implemented within OSPAR, and included in the guidelines that are being developed within the European Technical Group on underwater noise (TG Noise). OSPAR will also draw up a regional action plan (RAP) for underwater noise.

Knowledge agenda

This paragraph contains the key knowledge questions about underwater noise which will be elaborated in this planning period.

- The physical aspects of underwater noise are largely understood, but there is a lack of knowledge relating to the effects of underwater noise on marine species and how these impact on the population and the ecosystem. Ecological models for this are being developed, but validation is a challenge. There has been a lot of attention for marine mammals, particularly porpoises. In the coming years, the focus will mainly be on fish species and other types of animals. In addition to sound pressure, the particle velocity component of underwater noise will then also be examined.
- Combined effects of several activities (cumulation). The effects of cumulation of the same type of source such as multiple wind farms, the cumulation of various source types (pile-driving, seismic survey), and finally the cumulation of different pressure factors (sound, by-catch, chemical pollution).
- With respect to the underwater noise of seismic surveys, several parameters are still unknown. These are related to the other source configuration than for pile-driving noise and the fact that the sources move.
- Insight into continuous underwater noise of recreational shipping.
- Another form of energy supply is the electromagnetic field. This form of energy will increase due to the construction of offshore wind farms and the associated power cables to the mainland. The effect this will have on some fish species, such as sharks and rays, is unknown.

3.13 Results of Strategic Environmental Assessment (SEA) National Water Programme

A SEA was performed for the National Water Plan including North Sea Region Programme and the additional measures in this MSFD programme of measures. Of the additional measures, only the area-based measures included in the North Sea Agreement (see paragraph 3.7) have a spatial impact and are therefore assessed. This concerns conservation measures (fisheries limiting measures) in the Dogger Bank, Cleaver Bank, Central Oyster Grounds, Frisian Front and Borkumse Stenen. The SEA concludes: "Closing parts of the North Sea to (seabed-disturbing) fishery affects the quality of the surface water. Designating areas where no (seabed-disturbing) fishery may take place ensures less disturbance of the seabed. This means the water is less cloudy. It also ensures an improvement of the ecosystem, and thus biodiversity and fish stocks. Some of the areas where (seabed-disturbing) fishery is banned are in Natura 2000 areas. The measures help strengthen the natural system and achieve the nature goals in these areas of the North Sea."

4 Gaps in knowledge

As apparent from the previous chapter, there are knowledge questions for each descriptor. Some of the knowledge questions are related to the lack of an assessment method, indicators and/or threshold values. This knowledge is required to be able to set goals and monitor progress. In addition, knowledge is lacking to take (more) targeted measures. For example, for the various descriptors, it is not possible to explain a certain trend or consequences of future developments or assess cumulative effects. Knowledge about certain substances, river waste, microplastics and the effects on the marine ecosystem is also desired.

Overview additional knowledge questions

Besides the knowledge questions in chapter 3, in the updated Marine Strategy part 1 (2018) [11], the following priorities for the knowledge programme are mentioned:

- Cumulating effects of new wind farms and other human activities on the ecosystem. For wind farms, these are mainly the effects on populations of sea birds and the consequences of underwater noise during the construction phase for populations of marine mammals. For other activities, it mainly concerns the effects of the (relocation of) fisheries on populations of marine mammals, sharks and rays.
- Effects (cumulative) of sand extraction and beach replenishment on seabed life.
- Possibilities for active restoration of (lost) biogenic reefs, such as shellfish banks, in wind farms for example.
- The breeding success of sea birds and factors which could affect this.
- Assessment methods for benthic and pelagic habitats.
- Relationships in the food web in the North Sea, formed by a network of seabed flora and fauna (benthos), small and big fish and marine mammals.
- Consequences of acidification and temperature rise.
- The phosphate-nitrogen ratio.
- Microplastics, copper, pharmaceutical residues and other (emerging) substances.
- Assessment framework for interrelated and representative network of protected areas at sea.

The North Sea Agreement assumes an intensification and change in the use of the North Sea and mentions the extra challenge of achieving the MSFD goals. Several specific research questions/ assignments are mentioned related to MSFD goals, including goals for area and species protection which must be started in the short term. These include the following:

- To support the additional area-protecting measures, additional research will be necessary, partly to prepare the international consultations and support conservation measures. The research questions will (partly) be performed in the framework of the MONS programme.
- Besides the area-based measures proposed in the North Sea Agreement, agreements in the North Sea Agreement aimed at conducting research that may lead to additional area protection will also be implemented.

Before 2025, an independent scientific investigation will be started to establish whether the Hollandse Kust, Vlakte van de Raan, Borkumse Stenen, Cleaver Bank, Dogger Bank and Central Oyster Grounds fulfil the selection criteria for designation as Birds Directive areas. Areas that fulfil the selection criteria of the Birds Directive will be designated as Birds Directive area by 2025. Also within OSPAR and the European Commission, the key knowledge questions have been identified. This shows that the MSFD is a structuring and converging factor: all European member states with a sea area must perform the same tasks at the same time and have the same knowledge gaps. Furthermore, many knowledge questions can only logically be answered on a regional scale. Local differences due to geography, use or regulations create some diversity, despite the considerable interest within OSPAR and at the European Commission to coordinate marine research.

Research programmes

There are various existing programmes in which research and monitoring take place, such as the MWTL (National Surface Water Monitoring Programme), the WOT (statutory research tasks), Wozep (Offshore Wind Ecological Programme) and the strategic research programmes of the knowledge institutions. Knowledge questions can also be financed through the National Scientific Agenda by NWO, the programme of the top sector Water and Maritime, and the mission-driven research programme Agriculture, Water and Food.

In addition to these programmes, as agreed in the North Sea Agreement, an integrated research and monitoring programme has been elaborated, the NZO programme Monitoring-Research-Nature Reinforcement-Species Protection Plans (MONS). For this programme, an inventory has been drawn up for the key knowledge questions for the three central MONS themes Support, Nature Reinforcement and Species, and Effects of Pressure Factors. Knowledge questions that partly have a MSFD character.

There are also European research trajectories and programmes in which North Sea knowledge questions can be addressed. For example, via the new Horizon Europe programme, the EU framework programme for research and innovation, LIFE+ and Interreg. An instrument under Horizon Europe is 'Partnership'. For the marine domain, a Partnership Blue Economy has been drawn up. The Netherlands will take part in this programme as a partner.

EMFF (European Maritime Fisheries and Aquaculture Fund) is important for the MSFD and MONS knowledge questions. In 2020, MSFD-relevant knowledge questions were included in the Operational Programme 2021-2027 for the implementation of the EMFAF. The EMFAF is the European Structural and Investment Fund that supports the maritime sector, fisheries and aquaculture in Europe. The fund co-finances projects that contribute to the European objectives in this theme. EMFAF has four priorities. In the framework of this programme of measures, Union priorities 1 and 4 are relevant.

Union priority 1 is conserving the biological diversity of the sea. The Operational Programme mainly focuses on indicators D1 (biodiversity), D4 (food webs) and D6 (seafloor integrity) and/or data collection and measures to conserve species. Projects in the field of measures, research and monitoring can be financed from the fund, such as:

- Further development of existing assessment frameworks, indicators and/or threshold values as well as strengthening of basic data.
- (Species-specific) protection and restoration of nature values and related research, among others in relation to porpoises, sea birds, sharks and rays, and seabed animals as well as creating room for habitats with a nursery function.
- Development of nature-inclusive building of offshore infrastructure (such as wind farms) in relation to conservation or restoration of nature.
- Development of technology and/or installations to support ecosystem monitoring and conservation and restoration of ecosystem elements.

Union priority 4 is strengthening international ocean management and facilitating safe, secure, clean and sustainably managed seas and oceans. The Operational programme within this theme is aimed at research and monitoring effects of human activities on the ecosystem, to support the implementation of the MSFD - and in relation to that: the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) -, the EU Birds Directive (BD) and the EU Habitats Directive (HR) and contributing to the parts of the North Sea Agreement that are related to these. The joint tasks are summarised as follows:

- Strengthen the monitoring to gather basic knowledge about species, habitats, ecosystem functioning and pressure factors resulting from human use. Ocean acidification and climate change and the consequences are also important subjects.
- Developing integrated monitoring programmes and using innovative techniques to generate data more effectively and cohesively.
- Research to obtain better insight into trophic interactions and ecosystem functioning.
- Research into cumulative effects and the ability of the North Sea ecosystem to support policy and regulate human use of the system. For the North Sea Agreement, particularly cumulation of effects of the construction and use of wind farms, fisheries, cultivation of food and seismic surveys are important.
- Contribute to insight into the effectiveness of measures to protect the marine ecosystem and biodiversity.

Prioritise, finance and coordinate research

The knowledge questions as listed in Chapter 3 will be studied in the planning period 2022-2027. The prioritisation of this research also considers the timely availability of the knowledge. Calibration points for this are the OSPAR Quality Status Report in 2023 and updating the national assessment of the environmental status of the Dutch part of the North Sea in 2024.

The MSFD knowledge questions for the period 2022-2027 are financed from the budget of the Ministry of Infrastructure and Water Management, the Ministry of Agriculture, Nature and Food Quality, EMFAF and the MONS programme. Financing runs along several tracks, with varying programme durations. The MONS programme lasts 10 years (2021-2030). The Operational Programme EMFAF lasts from 2021-2027. In view of the various durations of financing and the timely availability of knowledge, good coordination of research is necessary, both between the MSFD and the MONS programmes and with other (inter)national research programmes.

Coordination also prevents overlap in research and ensures that certain knowledge questions at regional scale are answered, leading to efficient allocation of limited resources.

5 Financial consequences

This programme of measures mainly consists of existing measures (measures which were included in the previous programme of measures) which are continued, possibly in a slightly different form. These measures are generally generated from existing information European/international legislation for which national instruments and financing is already available.

For the descriptors D1 biodiversity, D6 seafloor integrity, D10 litter and D11 underwater noise, additional measures are included in this programme of measures. This chapter provides insight into how these measures are expected to be financed.

Financing additional measures

The additional measures under D1 biodiversity and D6 seafloor integrity emerge from the North Sea Agreement. The North Sea Agreement leads to several intensifications of (policy) measures and additional tasks for area-based protection, monitoring and research. Action plans with a concretisation of the measures for additional species protection will be drawn up from 2023, depending on what is required based on results from research and monitoring in the coming three years (particularly in the framework of the North Sea Agreement/MONS, Natura 2000, the OSPAR Quality Status Report (QSR) and updating of the initial assessment of the environmental status for the MSFD). For additional intensifications which are the result of agreements made in the North Sea Agreement, an appeal will be made on the 'Transition Fund' if existing or available funding fall short. For this, the cabinet has made 55 million euros available up to 2030 for monitoring, research and nature restoration. There is also 14 million euros for enforcing fisheries measures by the NVWA. For the restructuring and sustainability of the cutter fleet, 119 million euros is available until 2030. In the North Sea Consultation, it was agreed that in 2023 it will be investigated whether the goals of the North Sea Agreement will be achieved with the available funding. If further strengthening of the 'Transition Fund' will then prove necessary, parties will discuss this in the North Sea Consultation in an open and realistic conversation.

In addition to the 'Transition Fund', EMFAF resources (European Maritime Fisheries and Aquaculture Fund) are also available which the Netherlands and the European Commission have under shared management. For specific MSFD measures and research, 5 million euros are available.

The additional measures under D10 Litter and D11 underwater noise are covered from the budget of the Ministry of Infrastructure and Water Management. For litter, co-financing will be provided from EMFAF resources.

The MSFD knowledge questions that will be investigated in the planning period 2022-2027 will be financed from the budget of the Ministry of Infrastructure and Water Management and the Ministry of Agriculture, Nature and Food Quality, the MONS programme (Monitoring-Research-Nature Reinforcement-Species Protection) and EMFAF resources.

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Abbreviations

ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas)
BAC	Background Assessment Criteria
BAT	Best Available Techniques
BDC	Biological Diversity & Ecosystems (OSPAR committee)
BHD	Birds and Habitats Directive
BREF	BAT Reference documents (European reference documents)
CBD	Convention on Biological Diversity
CBGD	Clean Beaches Green Deal
CBS	Statistics Netherlands
CCS	Carbon Capture and Storage
CFP	Common Fisheries Policy
DIN	Dissolved Inorganic Nitrogen
DIP	Dissolved Inorganic Phosphorus
ECHA	European Chemicals Agency
ECN	Netherlands Energy Research Centre
EcoQO	Ecological Quality Objective
EEZ	Exclusive Economic Zone
EIHA	Human Activities (OSPAR committee)
EMFF	European Marine, Fisheries and Aquaculture Fund
EU	European Union
EZK	Ministry of Economic Affairs and Climate
FFL	Fishing for Litter
FMSY	Fish Mortality at MSY
FRP	Favourable Reference Population
FRR	Favourable Reference Range
GES	Good environmental status
CFP	Common Fisheries Policy
GW	Gigawatt
HASEC	Hazardous Substances & Eutrophication (OSPAR committee)
HD	Habitats Directive
ICES	International Council for the Exploration of the Sea
IDON	Interdepartmental Directors North Sea Consultative Body
IenW	Ministry of Infrastructure and Water Management
IMO	International Maritime Organization
IMP	Integrated Maritime Policy
IPO	Interprovincial Consultation
Jomopans	Joint Monitoring Programme for Ambient Noise North Sea
KEC	Framework for the Assessment of Ecological and Cumulative Effects
KIMO	Dutch Institute of Expertise for Oral Healthcare
KRA	Waste Framework Directive
MSFD	Marine Strategy Framework Directive
WFD	Water Framework Directive
LNV	Ministry of Agriculture, Nature and Food Quality
MARPOL	International Convention for the Prevention of Pollution from Ships
MEPC	Marine Environment Protection Committee
SEA	Strategic Environmental Assessment
MSCG	Marine Strategy Coordination group
MSY	Maximum Sustainable Yield
NCP	Dutch Continental Shelf
NEAES	North-East Atlantic Environment Strategy
ngo	Non-governmental organisation
NME	Nature and environmental education
NZA	North Sea Agreement
NSC	North Sea Consultation
OCW	Ministry of Education, Culture and Science
OFL	Physical Environment Consultative Council
OIC	Offshore Industry (OSPAR committee)
OSPAR (convention)	Convention for the Protection of the Marine Environment of the North-East Atlantic
PAH	Polycyclic Aromatic Hydrocarbons
PAM	Passive Acoustic Monitoring

PBDE	Polybrominated diphenyl ethers
PBL	Netherlands Environmental Assessment Agency
PCB	Polychlorinated biphenyls
PRF	Port reception facilities
REACH (convention)	Registration, Evaluation and Authorisation of Chemical substances
RIVM	National Institute for Public Health and the Environment
RSC	Radioactive Substances (OSPAR committee)
RWS	Rijkswaterstaat [Department of Waterways and Public Works]
rwzi	Sewage treatment plant
SEA	Strategic Environmental Assessment
SMART	Specific, Measurable, Acceptable, Realistic, Time-bound
SSB	Spawning Stock Biomass
SUP	Single-Use Plastics
TBT	Tributyltin
EPR	Extended producer responsibility
Vewin	Association of Dutch Water Companies
VIBEG (agreement)	Fishing in protected areas
VNG	Association of Dutch municipalities
BD	Birds Directive
VWS	Ministry of Public Health, Welfare and Sport
WEcR	Wageningen Economic Research
WOT	Statutory Research Objectives
Wozep	Offshore Wind Ecological Programme
ZOR	Litter Collection Regulation

Annex 1

Overview of international regulations and implementation measures in Dutch legislation

Measure	European/international legislation	National instruments
D1 Biodiversity		
Assessment of (large-scale) interventions and associated compensation	Directive governing environmental impact assessments for certain public and private projects (011/92/EEC)	Environmental Management Act
Limit fishing in the coastal zone	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC), Council Directive (EU) on the Common Fisheries Policy (CFP) (1380/2013)	Nature Conservation Act and Fisheries Act 1963
Zoning and phasing activities on the coast	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC)	Nature Conservation Act
Regulation of other indoor activities within the coastal zone	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC)	Nature Conservation Act
Implementation OSPAR List threatened species and habitats	OSPAR Commission, OSPAR List of Threatened and/or Declining Species and Habitats – correction 2014, Reference Number 2008-6 (2014)	Nature Conservation Act
Kier decree partial opening Haringvliet sluices		Decree concerning management Haringvliet sluices
Limit fishing (Frisian Front) and Bruine bank (follows from NZA, is designated BD area) and possible other areas which qualify under the BD.	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive (EU) on the Common Fisheries Policy (1380/2013)	Wet Natuurbescherming
Measures relating to birds, bats and marine mammals		Wind Energy at Sea Act, Nature Conservation Act, Fisheries Act 1963

Measure	European/international legislation	National instruments
D2 Non-indigenous species		
Conditions to issuing permits to prevent the spread of exotic species	Convention on Biological Diversity (CBD); Convention on the conservation of wild animals and plants and their natural habitats in Europe (Bern Convention), Regulation (EU) concerning 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), Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC)	Nature Conservation Act, Fisheries Act 1963, Regulation concerning the use of alien and locally absent species in aquaculture, Policy rules establishing policy rules concerning shellfish movements
Management Natura 2000 area (exotic species)	Convention on Biological Diversity (CBD), Convention on the conservation of European wildlife and natural habitats (Bern Convention), Regulation (EU) concerning 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), Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC)	Nature Conservation Act, Fisheries Act 1963
Regulation prevention and management invasive species	Regulation (EU) on the prevention and management of the introduction and spread of invasive alien species (1143/2014)	Nature Conservation Act
Tackle spread of species via ballast water	International convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention); OSPAR Convention	Law preventing pollution by ships
Implement protocols for exemptions after introduction of Ballast Water Management Convention	International convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention); OSPAR Convention	
Implement Biofouling Guidelines	Convention on Biological Diversity (CBD), IMO Biofouling guidelines	
D3 Commercial fish, shellfish		
Catch management commercial fisheries	Council Directive (EU) on the Common Fisheries Policy (CFP) (1380/2013)	
Minimise and phase out discards	Council Directive (EU) on the Common Fisheries Policy (CFP) (1380/2013)	
Promote alternative fishing gear		Economic instrument EMFF, Cutter Vision
Sustainability certificates fisheries	Council Directive (EU) on the Common Fisheries Policy (CFP) (1380/2013)	

Measure	European/international legislation	National instruments
D5 Eutrophication		
Implement Annex V MARPOL convention	IMO International Convention for the Prevention of Pollution from Ships (MARPOL)	Law preventing pollution by ships
Compulsory manure processing	Council Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrate Directive; 91/676/EEC), Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)	Manure Law
Treatment of urban waste water	Directive concerning urban waste-water treatment (91/271/EEC), Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)91/27	Water Decree, Environmental Management Act
Action Programme Nitrate Directive	Council Directive concerning the protection of waters against pollution caused by nitrates from agricultural sources (Nitrate Directive; 91/676/EEC)	Implementation regulation Manure Law
Delta Plan Agricultural Water Management		Voluntary, but in relation to the Nitrates Directive not voluntary
Improvement in treatment efficiency water treatment plants		Voluntary, but in relation to the Urban Wastewater Directive not voluntary
D6 Seabed protection		
Expansion of limitations on seabed-disturbing fishery fishing on Cleaver Bank, Dogger Bank and Frisian Front	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC)	Nature Conservation Act
Expand seabed protection Frisian Front and the Central Oyster Grounds and introduce seabed protection Borkumse Stenen	Council Directive establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive; 2008/56/EC); Council Directive (EU) on the Common Fisheries Policy (1380/2013)	Water Act
Limit seabed-disturbing fishing in areas to be determined equivalent to 13. 7% of the North SeaUnder HR or MSFD	Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC), Council Directive establishing a framework for Community action in the field of marine environmental policy (Marine Strategy Framework Directive; 2008/56/EC), Council Directive (EU) on the Common Fisheries Policy (1380/2013)	Water Act and Nature Conservation Act
Change in areas with a ban on seabed-disturbing fisheries North Sea coastal zone	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC); Council Directive (EU) on the Common Fisheries Policy (1380/2013)	
D7 Hydrographical conditions		
Assessment of hydrographical interventions and compensation of effects	EU Directive governing environmental impact assessments for certain public and private projects (011/92/EU)	Environmental Management Act

Measure	European/international legislation	National instruments
D8 Contaminants		
Implementation of the Directive concerning the quality of bathing water	Council Directive concerning the management of bathing water quality and repealing Directive 76/160/EEC (Directive concerning the quality of bathing water; 2006/7/EC)	Act/Decree management of bathing water quality
Reduce discharges by shipping (MARPOL Annex V)	IMO International Convention for the Prevention of Pollution from Ships (MARPOL)	Law preventing pollution by ships
Ban on TBT	International Convention on the Control of Harmful Anti-fouling Systems on Ships	Law preventing pollution by ships
Reduce pollution by reducing shipping incidents	IMO (shipping routes)	Change to shipping routes 1 Aug. 2013
Reduce discharges of contaminants by oil and gas installations	**Drilling:** 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 **Use and discharge of chemicals:** 3 OSPAR Decision 2000/2 on a Harmonised Mandatory Control System for the Use and Reduction of the Discharge of Offshore Chemicals(as amended by OSPAR 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 the Discharge by the Offshore Industry of Chemicals that Are, or Which Contain Substances Identified as Candidates for Substitution **Discharge of production water:** 8 OSPAR Recommendation 2001/1 for the Management of Produced Water from Offshore Installations. Amended by OSPAR Recommendation 2006/4 and Recommendation 2011/89 OSPAR Recommendation 2012/5 for a risk-based approach to the management of produced water discharges from offshore installations **Other wastewater from production processes:** PARCOM Recommendation of a 40 mg/l Emission Standard for Platforms, 1986	Mining Act, Mining Decree and Mining Regulation

Measure	European/international legislation	National instruments
Prevent and limit industrial emissions	Directive on industrial emissions (integrated prevention and control) (2010/75)	Activities decree environmental management, Water Act, Decree and Regulation environmental law
Reduce environmental risks resulting from serious 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)	Decree risks serious accidents 2015
Ban on discharge of ship waste inland shipping	Directive establishing a framework for Community action in the field of water policy (Water Framework Directive; 2000/60)	Ship Waste Decree Rhine and Inland shipping + Regulation
Action plan sustainable plant protection	Directive establishing a framework for Community action to achieve the 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, collaboration and coordination during disasters and incident approach at sea		Maritime Accident Control Act, Decree Incident Response Plan North Sea, Memorandum Maritime and aeronautic response on the North Sea 2010-2015, Cooperative Agreement Coastal Pollution Control Rijkswaterstaat departments, Cooperative Agreement Oil-covered Birds, Capacity Memorandum 2006-2010
International collaboration for disasters and incidents	Agreement concerning collaboration in combating pollution of the North Sea by oil and other harmful substances (Bonn Agreement), Bonn Agreement Counter Pollution Manual, International convention concerning action at sea in response to accidents that can cause contamination by oil	Response to maritime accidents Act, Bonn Agreement Action Plan 2013-2016
D9 Contaminants in fish		
Standardisation contaminants in in fish and other seafood for human consumption	see also Commission Regulation (EC) no. 1881/2006 and Commission Regulation (EC) no. 396/2005	Working directly
D10 Litter		
(Clean-up) campaigns		
Approach Clean Meuse Limburg		
Stakeholder initiatives on beaches		
Implementation new EU directive 2019/833 Port reception facilities	Directive on port reception facilities for ship-gnereated waste and cargo residues (2000/59/EC)	Law preventing pollution by ships
Ban on discharging waste by ships (MARPOL Annex V)	IMO International Convention for the Prevention of Pollution from Ships (MARPOL)	Law preventing pollution by ships

Measure	European/international legislation	National instruments
Marine environmental awareness course	International Convention on Standards of Training, Certification and Watchkeeping for seafarers (STCW Convention)	OCW education act
Programme Fishing for Litter		
Implementation (litter) waste policy		
Netherlands Circular 2050 (previously From Waste to Raw Material (VANG))		Policy programme
Sustainable packaging (previously packaging framework agreement)		Covenant
Broad approach to litter (previously national approach to litter)		
Plastic Pact (previously Chain Agreement Plastic Recycling)		Covenant
National Waste Management Plan (LAP) 3		Policy programme
Reduce the use of plastic bags	Directive (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	Environmental Management Act
Litter on the agenda of stakeholders and in education		Continued within the Policy programme VANG
Clean beaches: Clean Beaches Green Deal		
Rivers: River basin approach to litter		Regional joint ventures, partially via covenant. Policy programme Microplastics
Rivers: Rollout Litter Collection Regulation		Regulation Rijkswaterstaat economic instrument
Fisheries: Green Deal Fisheries for a clean sea		Covenant
Plastic products: Promote reduction of balloons	Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment	
Plastic products: Focus on EU ban on emissions from microplastics in cosmetics and detergents	EU plastic strategy 2018 and EU Circular Economy Action Plan 2020 (CEAP) (part of EU Green Deal)	Voluntary phasing out of microbeads by the Netherlands Cosmetics Association
Rivers: Putting on the agenda and embedding the approach to litter on banks among managers along rivers.		

Measure	European/international legislation	National instruments
Shipping: 1. Implementation of the duty to deliver persistent floating cargo residue from 2021. 2. Improve prewash procedure: submit IMO proposal to improve prewash procedure for this cargo residue.	Implementation IMO legislation	to be determined
Fisheries: If an alternative for dolly rope is found, we will aim to phase out conventional dolly rope by the year 2027. This will be part of the Green Deal Fisheries for a clean sea Possible action lines: 1. Phasing out by incentive: financial (tax) incentive use alternatives (link UPV and MIA/VAMIL) to make alternatives financially more attractive 2. Facilitate/ organise promotion activities of alternatives	to be determined	to be determined
D11 Underwater noise		
Permit regimes wind farms	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC)	Nature Conservation Act
Reduce impulsive noise via the Code of Conduct explosion clearing		Royal Netherlands Navy Code of Conduct using munition on the North Sea, 2005 (to be replaced in 2016 by new instruction Command Naval Forces)
Regulation sonar use		Instruction Command Naval Forces-Directorate Operations MWC 230 Responsible use of active sonar (2015)
Explore possibilities to amend regulation seismic survey	Council Directive on the conservation of wild birds (Birds Directive; 79/409/EEC), Council Directive on the conservation of natural habitats and of wild flora and fauna (Habitats Directive; 92/43/EEC)	Mining Act
Implement IMO guidelines for the reduction of underwater noise of commercial shipping	Guidelines for the Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life, IMO MEPC. 1/Circ. 833	
Limit 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)	
More actively implement IMO guidelines for the reduction of underwater noise of commercial shipping		to be determined

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This English translation is suitable for international consultation. However slight differences in the contents between the original Dutch text and this translation might occur, apart from grammatical imperfections. Therefore the only valid document is the Dutch version of the Mariene Strategie 2022-2027

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