



Ministry of Environment
and Food of Denmark

Danish Marine Strategy II Focus on a clean and healthy marine environment

2019

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Focus on a clean and healthy marine environment

The Danish Marine Strategy II is a six-year strategy to contribute to establishing a healthier and better marine environment for people, animals and plants - now and in the future.

The 2008 EU Marine Strategy Framework Directive has helped put the marine environment on the agenda, in Denmark and in the rest of Europe. However, the sea is under ever-greater pressure from economic growth and development.

The Marine Strategy Framework Directive is based on an ecosystem approach. This means that the total exploitation of the marine environment must be compatible with a good environmental status. In other words, protection and use of the sea must be in balance.

This booklet presents the first part of the Danish Marine Strategy II. The first part of the strategy defines what constitutes good environmental status and includes an assessment of the current status of Danish marine areas. It lists 68 specific targets for how the environmental status of the sea could be improved. The environmental targets are legally binding for public authorities.

After an introduction to the Marine Strategy, there are 11 sections on different topics, each of which describes the most important characteristics for the status of the sea. An overview of all the environmental targets can be found in an appendix. For more detail, see the full report at www.mfv.dk.

Danish Marine Strategy II

The first Danish marine strategy from 2012 has helped enhance the interplay between strategies and policies of relevance for the sea. The strategy was followed up by a monitoring programme in 2014 and a programme of measures in 2017.

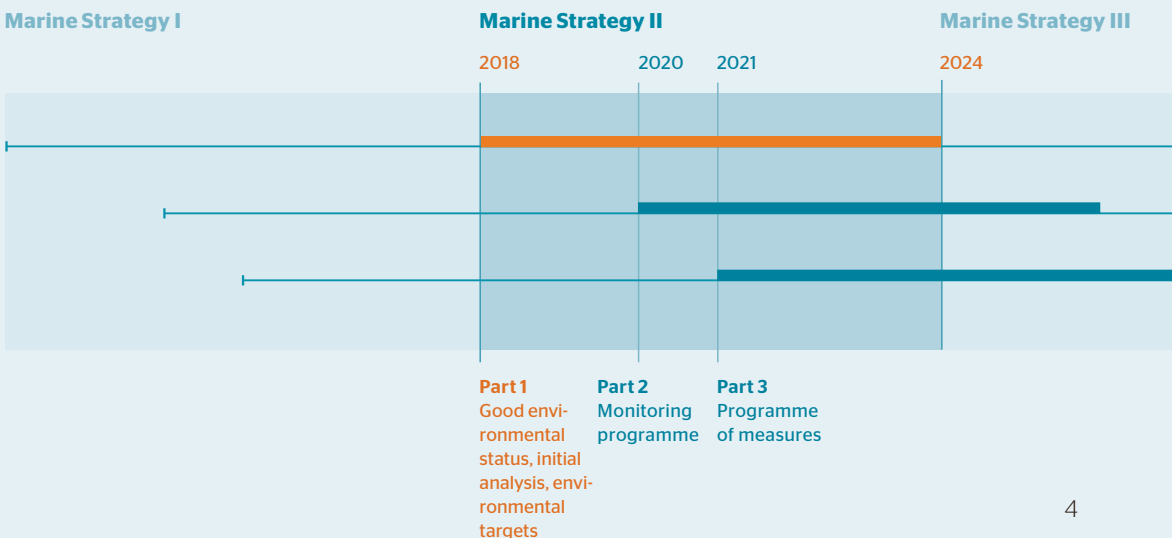
The Danish Marine Strategy II is also divided into three parts: an initial analysis, a monitoring programme and a programme of measures. The overall strategy covers the years 2018-2024. Each part of the Marine Strategy is revised every six years.

This first part provides an overview of the status of the sea and impacts on

it, and it sets targets aiming at a good environmental status. The second part is an updated monitoring programme that takes into account new knowledge and new monitoring methods. The third and final part, the programme of measures, follows up with measures and efforts to be implemented for the sea to achieve or maintain a good environmental status.

The Strategy is based on the Marine Strategy Framework Directive and the Danish Marine Strategy Act, which establish the framework for achieving or maintaining good environmental status in marine ecosystems, and which enable sustainable exploitation of

Timeline for the Danish Marine Strategy II



marine resources. The overall objective is to achieve good environmental status in the sea by 2020.

The Marine Strategy also has a clear link to the UN Sustainable Development Goals, which contain a number of sub-goals regarding pollution, marine litter, nutrients, ecosystems, fisheries and protected areas, all of which are included as an integral part of the Marine Strategy.

This booklet only deals with the first part of the Danish Marine Strategy II. The Strategy has been prepared on the basis of the 2017 EU criteria for good environmental status. →



11 topics form the point of departure of the strategy

The first part of the Danish Marine Strategy II defines good environmental status, provides an overview of the status in the sea and sets targets for the achievement of good environmental status. This is done for 11 topics, the so-called descriptors:

1. **Biodiversity**
2. **Non-indigenous species**
3. **Commercially exploited fish stocks**
4. **Marine food webs**
5. **Eutrophication**
6. **Sea floor integrity**
7. **Hydrographical changes**
8. **Contaminants**
9. **Contaminants in seafood for human consumption**
10. **Marine litter**
11. **Underwater noise**

Inclusion of the entire ecosystem

Improving the environmental status of the sea requires that work is organised on the basis of an ecosystem approach. This means that all elements of the ecosystems and all of the significant impacts from human activities should be included in the work.

The EU Marine Strategy Framework Directive therefore also aims at the entire marine ecosystem, with its many complex compositions of different types of habitats for both plants and animals. An important aspect of this is the dynamic interplay between plant life, animal life and the environment surrounding them.

An ecosystem is many different things. It can be anything from a single stone reef with the plants and animals living there, to a much larger marine area. The marine environment is both one large overall ecosystem, and it is the sum of many small ecosystems.

This holistic approach demands coordination with other countries in order to ensure good environmental status in the sea. Ecosystems cross borders, just like human activities and impacts. Work must therefore be coordinated with the countries with which Denmark shares the seas. With the unique geographical location of Denmark in the passage between the Baltic Sea and the North Sea, Danish marine areas are covered by two regional sea conventions, HELCOM and OSPAR.

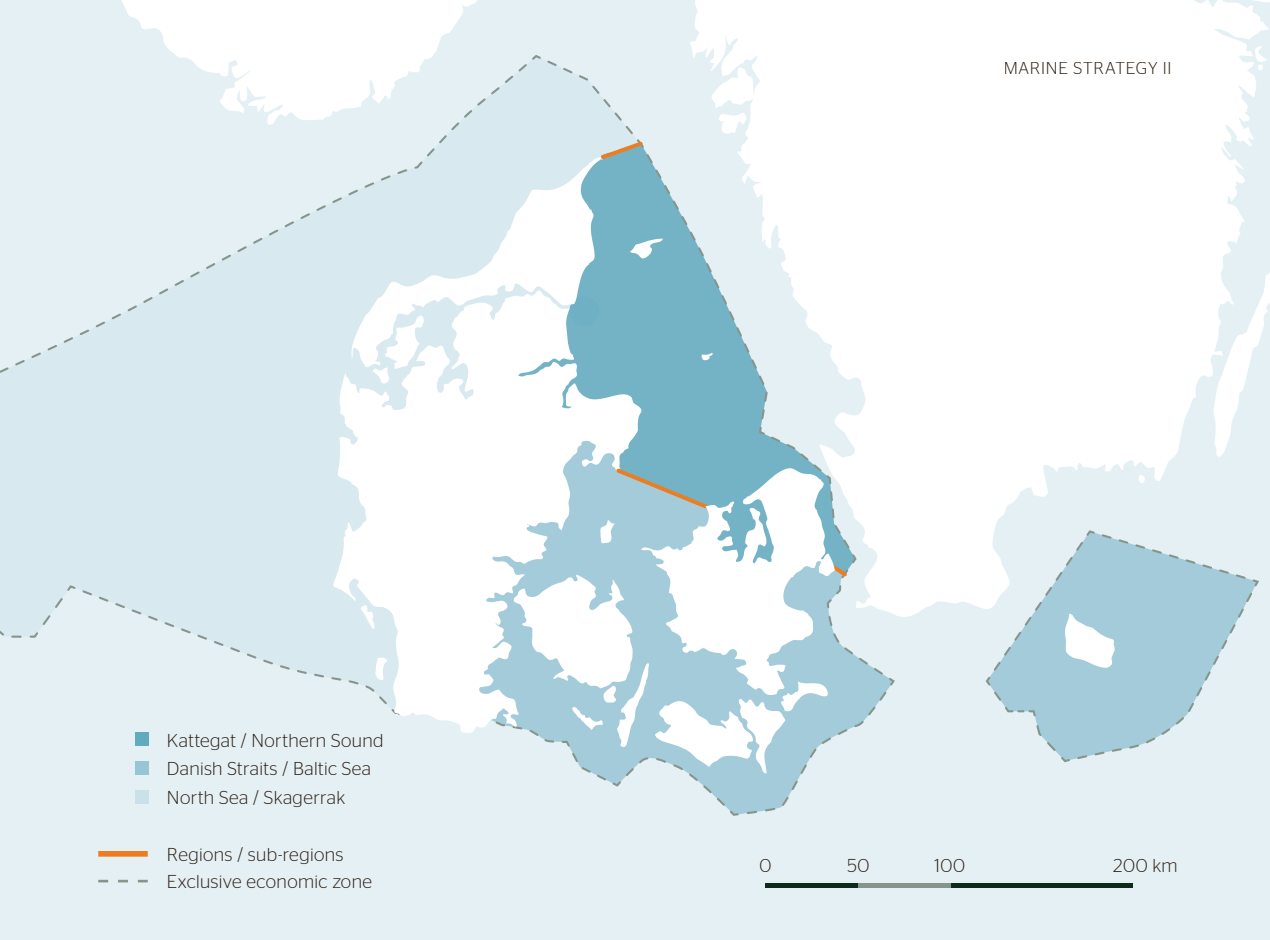
The Helsinki Convention (HELCOM) covers the Baltic Sea. The Oslo-Paris Convention (OSPAR) covers the north-east Atlantic Ocean.

Overall conclusions

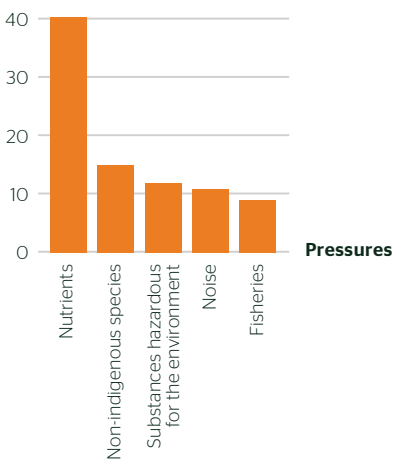
The first part of the Marine Strategy shows that several of the 11 topics/descriptors have not yet achieved good environmental status for the marine environment in Denmark. Generally, there is a need to increase focus on these to meet the targets. However, there are also positive signs and topics that are already assessed as having good status. For example the pollutants PFOS and benzo(a)pyrene, eutrophication in open marine areas far from the coast in the North Sea and the status for the harbour seal.

In general, however, it is unlikely that good environmental status can be achieved for all topics/descriptors in 2020, although this is the overall objective of the Marine Strategy Framework Directive.

Across the topics, a cumulative analysis shows that the potentially most important impacts are caused by three factors, namely nutrients, non-indigenous species and substances hazardous for the environment. In the North Sea and the Skagerrak, nutrients, non-indigenous species and fisheries are assessed as the most significant factors, whereas in the Kattegat they are nutrients, non-indigenous species and noise. The methods forming the basis for the cumulative analysis could, however, be further developed and improved.



Percentage of total accumulated impacts (100%)



Knowledge building

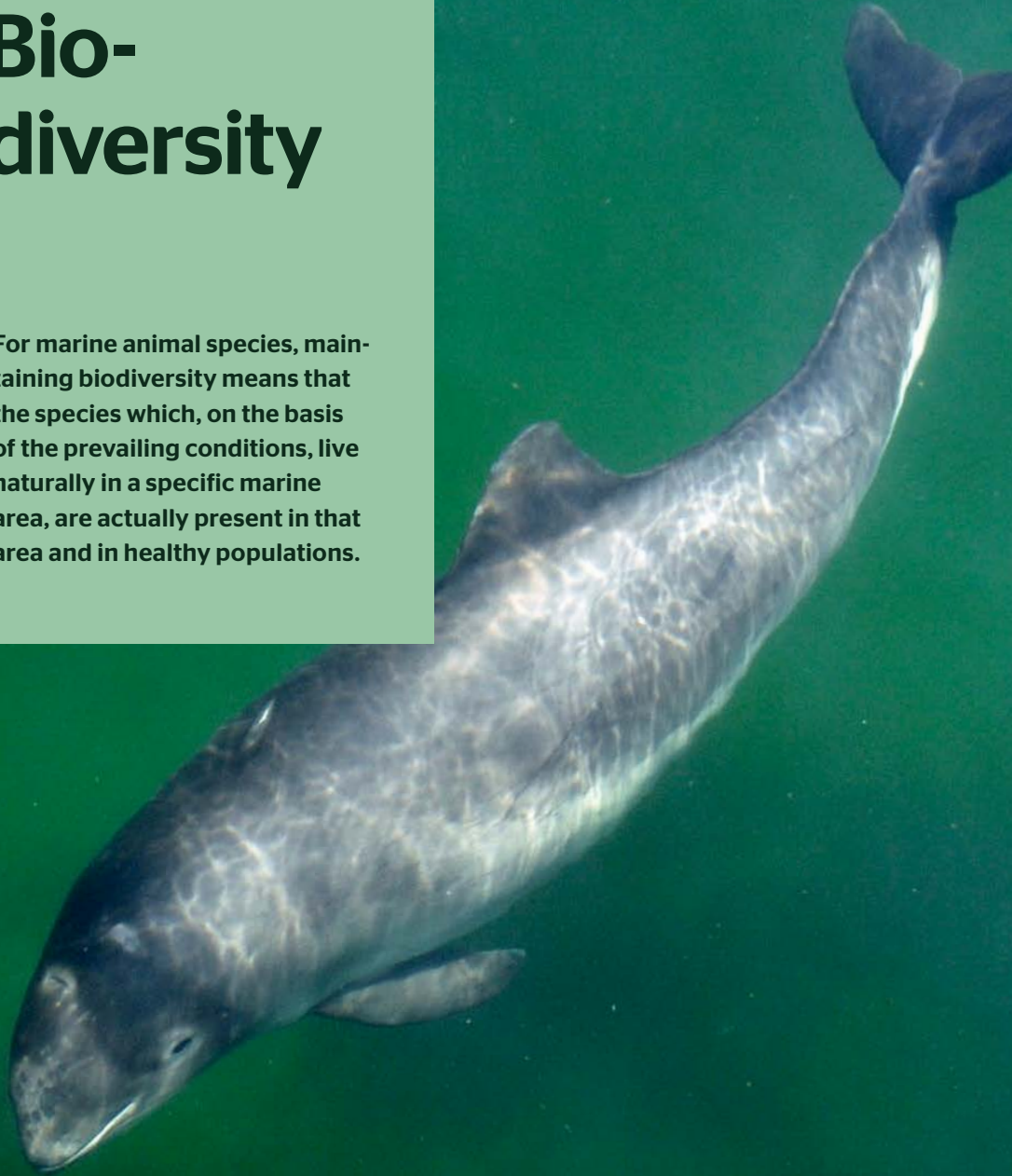
Generally, there is a need for more knowledge, better monitoring and new threshold values and methods to assess environmental status more accurately. There is a particular need for knowledge about impacts and effects for the topics non-indigenous species, sea floor, marine litter and underwater noise. Moreover, there are major gaps in the knowledge base for habitats, non-commercial fish species, by-catches of birds and mammals, as well as how to assess the status of the marine food webs.

Much of the development work to obtain new knowledge is coordinated at regional or EU level. Collaboration in OSPAR and HELCOM as well as in the informal EU cooperation on the Marine Strategy Framework Directive will therefore play an ever-larger role in the years to come.

Topic 1

Bio- diversity

For marine animal species, maintaining biodiversity means that the species which, on the basis of the prevailing conditions, live naturally in a specific marine area, are actually present in that area and in healthy populations.





Good environmental status is when biodiversity is maintained, and the abundance of species corresponds to the prevailing conditions, and when the status of the habitat type is not influenced negatively by anthropogenic impacts.

500 individuals

The Baltic Sea population of harbour porpoise is 500 individuals. The population in the North Sea has been estimated at 345,000.

Biodiversity is divided into four topics: birds, mammals, non-commercial fish species and pelagic habitats (open water).

The biodiversity targets in the Marine Strategy focus, among other things, on having low levels of bycatch and maintaining populations and their habitats.

Mammals

Danish marine areas contain populations of harbour seal, grey seal and harbour porpoise, as well as occurrences of white-beaked dolphin and northern minke whale.

Seals and harbour porpoise are at the top of the food chain in the Danish marine areas and therefore they are good indicators of hazardous substances, for example, that accumulate through the food chain. Seals live near coasts in colonies and are vulnerable to disturbances and epidemics, while harbour porpoise are sensitive to pressures such as eutrophication, hazardous substances, by-catch and noise.

Seals and harbour porpoise are covered by the targets in the Habitats Directive to achieve favourable conservation status, and a number of marine protected areas are designated for them. →

Environmental status for mammals

A good environmental status for marine mammals corresponds to favourable conservation status under the Habitats Directive. Based on assessments from 2013, good environmental status has been achieved for harbour seal. Grey seal numbers are growing, but good environmental status had not been achieved in 2013.

The population of harbour porpoise in the North Sea has achieved favourable conservation status, and the population in the Danish Straits is stable, whereas the population in the Baltic Sea is critically endangered. Knowledge about by-catch is limited for both seals and harbour porpoise. For harbour porpoise, it has been assessed that the rate of by-catch is less than 1% of the population.

Birds

Denmark is an important location for a large number of. More than three million birds winter in Danish marine areas every year.

Birds are found in many layers of the marine food chain, including the upper layers. Any changes in birds' food sources may be reflected in the occurrence and the status of a specific bird species or group of birds. Human activity can have a significant influence on the status of birds.

35%

of marine bird species in the North Sea are not breeding successfully.



Environmental status for birds

Good environmental status for birds corresponds to the assessment under the Birds Directive. Data from 2013 on breeding birds shows that populations of the majority of the species in the group of plant-eating birds and birds that forage for food on the sea floor or in the water column are stable or growing. For groups of species such as wading birds and birds that forage for food on the surface, fewer than 75% of species are stable or growing.

The majority of groups of species of overwintering birds are stable, growing or fluctuating, although not birds that forage for food on the sea floor. Several of the species have previously been seriously endangered, and growing or stable populations therefore do not mean that the birds have good status. There are no fixed threshold values for good environmental status regarding by-catch, and therefore it is not possible to assess when good environmental status will be achieved.



Non-commercial fish species

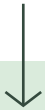
There are approximately 200 fish species in Danish marine areas. All the species have a key role in the food chain as either predators or prey. Populations and the distribution of the different species therefore have significance for the food webs in which they are included.

Non-commercial fish species include sharks, rays, ling and anglerfish. These species can be caught as unintentional by-catch, if they swim in the same places and are the same size as fished species. Pressure from fisheries challenges the biological adaptation of species.

Impacts on species' habitats, e.g. as a result of physical disturbance, eutrophication, etc. may also influence their status.

200-500 tonnes/year

Discards of flounder as a consequence of by-catch in the Danish Straits and the Sound.



Environmental status for non-commercial fish species

The status for non-commercial fish has been assessed on the basis of 14 selected species. In the North Sea, almost 25% of the populations examined in relation to fish mortality have good status. With regard to population density, a little under half of the populations examined have good status.

Only one of the 14 species on the list is found in the Baltic Sea; the thorny skate. The thorny skate is caught in trawl fishing, but is very rarely landed, and historical trends in catches are therefore unknown. Coastal fish (flounder and eelpout) do not have good environmental status. As yet, no threshold values have been set for non-commercial fish.

Pelagic habitats

Biological processes in open water, pelagic habitats, are controlled by the sun's radiation and the availability of nutrients that are converted into (plant) phytoplankton biomass. Zooplankton links phytoplankton with animals higher in the food chain and is therefore an important element in the ecosystem.

In Danish inlets and coastal areas, the open water is strongly influenced by water and substance additions from the shore. Because of generally high concentrations of nutrients, there is a large growth of phytoplankton, and there are regular periods of oxygen depletion. In parts of the open marine areas, fisheries have caused a decreased number of large fish. This leads to more small fish, increased predation on zooplankton and more phytoplankton blooms.



Environmental status for pelagic habitats

Overall, the phytoplankton biomass steadily decreased in the North Sea, Kattegat, the Danish Straits and in the Baltic Sea from 1978-2016, although most pronounced in the Baltic Sea. There is a slight increase after 2012 in both regions. There is too little data on zooplankton to assess developments.

Threshold values for pelagic habitats have not yet been set and there is not sufficient scientific basis to assess when good environmental status will be achieved.



Topic 2

Non-indigenous species

Species introduced via human activities to areas where they do not occur naturally, and to which they cannot spread naturally, are called non-indigenous species. These species include both plants and animals and they are found in all marine areas, although primarily in coastal waters.



Good environmental status is when the introduction of non-indigenous species via human activities is minimal and, as far as possible, reduced to zero and the geographical spread does not lead to adverse impacts on marine species and natural habitats.

100 new non-indigenous species have been recorded in the North Sea area since 2003. Since 1900, 140 non-indigenous species have been recorded in the Baltic Sea.

Shipping (ballast water and fouling) and aquaculture activities are the largest sources of introductions of non-indigenous species in the sea. It is believed that releases, fisheries and leisure craft etc. are also sources of introductions of non-indigenous species.

Introductions of non-indigenous species entail a risk that the species will establish and spread, and thus negatively change an ecosystem's natural balance and function. If this happens, they are called invasive species. Once damage has been caused to marine ecosystems and populations of indigenous species, commercial and leisure interests may also be affected.

When a non-indigenous species has become established in the marine environment, it is almost impossible to eradicate. Prevention and early intervention is therefore considered to be the most cost-effective methods to limit the introduction and spread of non-indigenous species and potentially invasive species.

The environmental targets in the Danish Marine Strategy for non-indigenous species focus on limiting the arrival of new non-indigenous species and reducing the adverse impacts of invasive species.



Environmental status for non-indigenous species

Regionally, constantly increasing numbers of new non-indigenous species are being recorded. In all Danish marine areas, various research projects have recorded a limited number of new species. The number of registrations is closely related to monitoring efforts (more monitoring means more species identified).

It is not likely that a drop in new introductions of non-indigenous species can be achieved before international interventions, such as the United Nations Ballast Water Management Convention, start to have an effect. Data is generally inadequate, but it has generally been assessed that good environmental status has not been achieved in the Baltic Sea or the North Sea, and this is unlikely in 2020 too.



Topic 3

Commercially exploited fish stocks

Fisheries are decisive for the size of commercially exploited fish stocks, the age and size of fish, the genetic diversity in a fish stock and the percentage of fish which have the opportunity to breed (spawning stock biomass).



Good environmental status is when populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

Sprat have good status in the Baltic Sea. The status for cod is not good.

If fishing pressure is too heavy, stocks might become too small to be able to maintain themselves in the long term. A sustainable fishing pressure is therefore important for maintaining a healthy fishing industry. Fish play a key role in the food chain, both as predators and prey. High fishing pressure can therefore influence the ecosystem that fish are part of.

The majority of the commercially exploited fish stocks in Danish marine areas are managed under the EU

Common Fisheries Policy. Overall, sustainable exploitation of the individual stocks is therefore managed through quotas and management plans at EU level in cooperation with other member states.

The environmental targets in the Marine Strategy for commercially exploited fish stocks are determined with reference to the Common Fisheries Policy, which stipulates that catches and reproduction of fish stocks must be sustainable.

→ Environmental status for commercially exploited fish stocks

Assessments of 22 selected populations of fish, crab and shellfish in the North Sea show good environmental status for 10 populations and not good status for eight populations, while the status cannot be determined for four populations. Fish mortality has been assessed as high in five of the 22 populations and undetermined in nine. The total weight of mature individuals is too low in two populations and undetermined in seven.

Assessments of six selected populations of fish, crab and shellfish in the

Baltic Sea show good environmental status for two populations and not good status for three populations, while the status cannot be determined for one population. Fish mortality has been assessed as too high in three of the six populations and undetermined in one. The spawning biomass is too low in two populations and undetermined in one.

Overall, the status has been assessed as not good. It is expected that good environmental status will be partly achieved in 2020.



Topic 4

Marine food webs

Marine food webs are the food relations between all organisms in the sea. From top predators such as the harbour porpoise, seals, some birds and large fish to smaller fish, zoo plankton and phytoplankton, which are the food source for the entire marine ecosystem.





Good environmental status is when all the known elements of the marine food webs occur at normal abundance and diversity, and at levels capable of ensuring stable abundance of species and maintenance of species' full reproductive capacity.

The number of zoo plankton species varies with no clear trend from 1979-2009.

Different organisms depend on each other's presence and abundance in order to survive. Thus, there is a complex interplay between the many species in the sea. It is important to maintain diversity at all levels of the food web and to provide the right balance in abundance between the levels.

Balance in the food web is essential for maintaining a healthy ecosystem, and this balance depends on the status of individual sub-elements. The marine food web is therefore vulnerable to changes in the individual sub-elements at different levels in the food web. This means that the food web can be influ-

enced by all pressure factors covered by the Marine Strategy Framework Directive. Impacts on a single sub-element in the food web can create imbalances in the entire food web and ecosystem.

The targets in the Marine Strategy for marine food webs are about ensuring the necessary knowledge to be able to set threshold values for good environmental status of the food web in the future. The interaction between the different species in the food web is complex and in constant change, and with the current knowledge base it is difficult to identify targets to ensure the achievement of good environmental status.

Environmental status for marine food webs

The general picture is a stable or slight increase in fish biomass since 2010. The picture is more blurred for birds. The biomass of phytoplankton fell steadily from 1978 to 2012, after which there was a slight increase. See also under biodiversity.

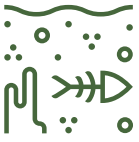
Despite assessment of individual sub-elements in the food web, it is

currently not possible to assess when the food web as a whole will be in good environmental status. However, it is expected that the balance in the marine food web will improve as environmental targets for pressure factors and status under the other topics/descriptors are achieved.

Topic 5

Eutrophication

Increased concentrations of nitrogen and phosphorus in the marine environment is termed eutrophication and often causes increased algal growth. More algae can lead to oxygen deficiency and impaired light conditions, thereby impairing conditions for benthic flora, fish and other animals. Furthermore, eutrophication can lead to toxic algal blooms.



Good environmental status is when anthropogenic eutrophication is minimised, especially the adverse effects of this, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency on the sea floor.

2 out of 119

coastal water areas in 2016 had good ecological status according to the Water Framework Directive on the basis of the indicators chlorophyll, eelgrass and benthic fauna.

Overall, eutrophication indicates that increased amounts of nutrients are influencing the overall marine environment.

Nutrients are primarily added to the marine environment from land-based sources (including via watercourses) and from the atmosphere, including via shipping. Marine currents cause an exchange of nutrients between different marine areas.

The eutrophication targets in the Marine Strategy include that Danish inputs of nitrogen and phosphorus to the Baltic Sea are to comply with the maximum allowable inputs stipulated in HELCOM (the so-called HELCOM ceilings). This will ensure that, in the long term, good environmental status for eutrophication can be achieved. Threshold values for nutrients have not yet been set for the North Sea.

Environmental status for eutrophication

There is good status in the open Danish marine areas in the North Sea and the Skagerrak far from land. Good status has not yet been achieved in the open marine areas closer to the shore.

There is poor status in the Danish marine areas in the Kattegat, the Danish Straits and the Baltic Sea. This applies even though, according to a report from 2015, Denmark has met the HELCOM reduction targets for nitrogen and phosphorus in all Danish marine areas, except for phosphorus inputs to the central Baltic Sea. The continued poor status is primarily due to accumulated large quantities of nutrients in the marine

areas, and because nutrients are continuously added from other marine areas in the Baltic Sea.

119 coastal water areas (within one nautical mile) have been designated in the Danish river basin management plans. In 2016, only two coastal water areas had achieved their targets according to the Water Framework Directive.

Ecosystems can take decades to respond to a reduction in inputs of nutrients. Good environmental status for the overall assessment of eutrophication is not expected to be achieved in 2020.

Topic 6

Sea floor integrity

The sea floor consists of several different substrate types deposited on the Danish sea floor during glacial periods, for example stones, sand and mud. Sea floor substrate combined with depths, salinity and the amount of the nutrients in the water column form varied habitat types for many different species on and near the sea floor.



About 85%

of the sea floor in the North Sea is disturbed.

Human activities can affect the sea floor directly through physical losses or disturbance. At the same time, other pressures such as nutrient discharges and invasive species can lead to an indirect impact on the sea floor by reducing light penetration or by displacing indigenous species.

Loss of sea floor can be caused by constructions and installations such as harbours, beach parks, oil and gas installations, offshore wind turbines etc. as well as dredging and minerals extraction. Physical disturbance can be caused by fishing with bottom contacting gear, mussel dredging and dumping.

If activities 'disturb' the sea floor, the damage can be restored if the activity



Good environmental status is when sea floor integrity is at a level which preserves the structure and functions of ecosystems, and when sea floor biodiversity is maintained and the extent of the loss and adverse impacts per habitat type does not exceed the future thresholds laid down by the EU.

is discontinued, while 'loss' is defined as a permanent impact.

The sea floor is a habitat and growing area for a number of species such as fish and crabs on stone reefs, or rag worm on soft seabed. The sea floor is also a foraging site, for example for birds and marine mammals. Sea floor integrity is therefore important for the overall marine ecosystem.

The Marine Strategy targets for sea floor integrity cover protection of the Sound and additional protected areas, as well as knowledge gathering and contributions to setting threshold values for loss and disturbance.



Environmental status for sea floor integrity

The sea floor in Denmark is heavily exploited, with disturbance rates of about 85% (about 63,500 km²) in the North Sea and Kattegat, and 67% (about 19,040 km²) in the Baltic Sea and the Danish Straits. Fisheries are the main cause of disturbance. Nine of 15 habitats in the North Sea and Kattegat are more than 80% disturbed, and eight out of 14 habitats in the Baltic Sea, including the Danish Straits, are disturbed.

The total loss of seabed is about 1%, respectively, for the North Sea and the Baltic Sea. Extraction of raw materials causes the largest loss of area. In terms of area, the loss is greatest for coastal sandy habitats. The highest percentage loss is for coastal gravelly habitats - around 5% in the North Sea, including Kattegat, and about 52% in the Baltic Sea, including the Danish Straits. No other habitat types have a loss of more than 10%. Eight habitat types have a loss of 1% or less.

No threshold values for good environmental status have been set, but despite the large uncertainty, the analysis above indicates that there is not good status for the sea floor in relation to disturbance and similarly in relation to loss for certain habitat types. There is not sufficient knowledge to assess when good environmental status will be achieved.

Topic 7

Hydro- graphical changes

Hydrographical conditions in the sea include physical properties such as temperature, salinity, sea currents and wave impacts. These natural conditions are vital for marine ecosystems.





Good environmental status is when permanent changes in hydrographical conditions do not adversely affect marine ecosystems.

Offshore wind farms are a dominant cause of assessed hydrographical changes.

Hydrographical conditions are primarily determined by the wind, tidal waters, atmospheric pressure and not least climate, but may also be affected by many different types of human activities that influence currents, including installations such as offshore wind farms, offshore oil and gas installations, bridges, harbours, etc. as well as dredging channels and other impacts on the sea floor.

Changes in hydrographical conditions can affect marine ecosystems and potentially lead to permanent changes in an ecosystem.

The environmental targets in the Marine Strategy for hydrographical changes state that specific projects should only have local impacts and that they should be designed taking into account environmental factors.

Environmental status for hydrographical changes

The assessment is based on actual measurements, use of hydrodynamic models based on experience. This approach entails a large degree of uncertainty.

In the North Sea and Kattegat, hydrographical changes occur in approximately 3,400 km² of the water column and on approximately 4,700 km² of the sea floor. In the Baltic Sea and the Danish Straits, hydrographical changes linked to the water column

have been assessed at about 200 km², while hydrographical changes to the sea floor have been estimated at around 100 km². The adverse impacts of hydrographical changes on sea floor habitats have been assessed as insignificant (0.02% and 0.06% of the total area, respectively).

Threshold values have not yet been set and there is not a sufficient knowledge to assess when good environmental status will be achieved.

A photograph of an industrial factory complex at sunset. The sun is low on the horizon, creating a bright orange and yellow glow. Several tall smokestacks are visible, with thick plumes of white smoke rising into the sky. The factory buildings are silhouetted against the bright sky. In the foreground, a body of water reflects the golden light of the sun, and a bridge spans across it. The overall scene conveys a sense of industrial activity and environmental impact.

Topic 8

Contaminants

Chemical contaminants can cause adverse effects in living organisms and thus cause various types of damage to the marine ecosystem.



Good environmental status for concentrations and species health is when concentrations of contaminants do not exceed set threshold values.

Concentrations and species health

Chemical contaminants come from multiple sources, of which several of the most well-known are already regulated. In addition to being toxic to living organisms, many chemical contaminants are also difficult to degrade and bioaccumulate in the food chain. Previously discharged and utilised substances still cause damage in the marine environment today.

Pollution of the marine environment with chemicals can cause adverse effects in marine organisms and the ecosystem. Furthermore, bioaccumulation in the food chain may cause a special risk for marine predators at the top of the food chain, for example seals, seabirds and humans. →

Mercury is emitted from coal power plants and waste incineration, among other sources.



Environmental status for concentrations and species health

Not good chemical status has been assessed for mercury, brominated flame-retardants (PBDE), PFOS and benzo(a)pyrene in coastal and territorial waters in accordance with the Water Framework Directive. Possibly bad status for these contaminants can be found outside territorial waters as well.

Levels of PBDE in fish were above the threshold value at all stations in the period 2012-2016. For mercury concentrations in mussels, in the North Sea in the period 2014-2016 set threshold values were exceeded in 20%, 36%, and 44% of samples, respectively.

Concentrations of PFOS in fish and benzo(a)pyrene in mussels comply with the threshold values outside territorial waters. Good environmental status has been assessed for these substances.

Since the 2003 ban on TBT in antifouling products, falling levels of endocrine disruptors in marine gastropods have been observed. There are raised levels of TBT in several locations, particularly in shipping lanes and in harbours. Levels of defectively developed young eelpout have increased, and this indicates an environmental impact.

Overall, good environmental status is not expected by 2020. This applies in particular to levels of PBDE and mercury as well as to the adverse effects on species health. This is either because the contaminants are not degraded, or they are very slow to degrade. Although many chemical contaminants are banned, there will be small additions from waste management.



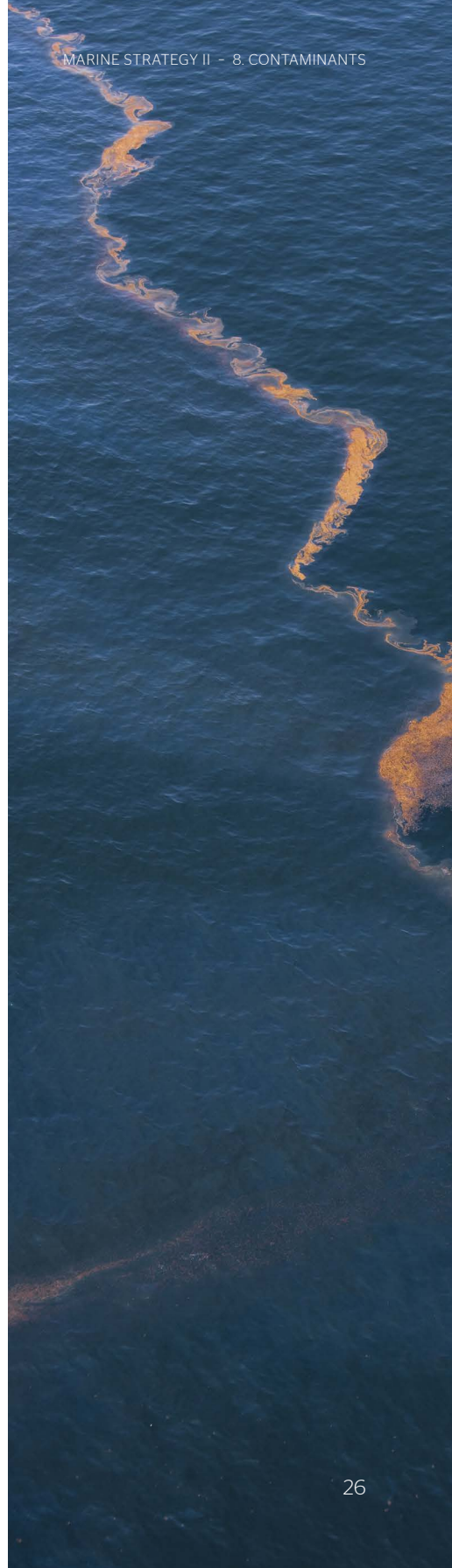
Good environmental status for acute pollution events is when the adverse effects of significant acute pollution events on species health and the status of habitats is minimised and as far as possible eliminated.


Acute pollution events

Oil spills can cause a serious threat to the marine environment and can have adverse effects on marine animals. Even small amounts of oil on the sea surface may harm seabirds, because the oil damages their plumage, reducing buoyancy and heat insulation.

Historically, discharges of oil and chemicals in connection with accidents in Danish offshore oil and gas installations have been very limited. The largest discharges from Danish installations are from oil discharged with produced water in accordance with discharge permits. Oil can also be discharged from ships as engine room water or by dumping waste oils.

The environmental targets in the Marine Strategy for contaminants are to ensure that the limit values that have been set are met. For acute pollution events, the goal is to ensure prevention and good emergency response in the event of accidents.





The number of illegal oil spills from ships in the Baltic Sea area has fallen considerably since 1989.



Environmental status for acute pollution events

It is not possible to identify any trends with respect to oil and chemicals spills from marine oil and gas installations in the North Sea, including Kattegat. Good environmental status can therefore not be assessed for this area.

A fall in both the number and the volume of registered oil spills can be observed in the Baltic region, and several of the assessed sub-areas comply with the threshold values set. Therefore, it is expected that good environmental status will be partly achieved in 2020 in the Baltic region.

Topic 9

Contaminants in seafood for human consumption

Marine organisms absorb and ingest many of the contaminants in the marine environment. Some of the substances accumulate in the food chain. The substances can come from human activities at sea and from natural sources. For example, volcanic ash contains mercury that can spread with the wind over very large distances.



Good environmental status is when there are no significant transgressions of the relevant maximum residue levels in food legislation for fish and shellfish for human consumption.

Woodburning stoves are a source of Danish emissions of dioxin.

A high content of harmful chemical substances can be a problem in the fish and fish products people eat. Therefore, EU food legislation stipulates residue values for concentrations of contaminants in seafood for human consumption.

The targets in the Marine Strategy for contaminants in seafood for human consumption include that discharges of contaminants must not lead to breaches of the relevant residue values and that the trend in dioxin emissions to the air does not increase.



Environmental status for contaminants in seafood for human consumption

There is good status regarding concentrations of the heavy metals lead, cadmium, mercury, as well as benzo(a)pyrene in seafood for human consumption.

Concentrations of dioxins and PCB above the maximum residue values have been found in mackerel, cod liver and salmon. These substances can lead to greater risk of cancer and affect human reproductive health and the immune system. Because of the findings, there is a ban on selling specific fish of a certain size caught in the Baltic Sea. The most signifi-

cant sources of dioxin in food are dioxin accumulated in the environment from historical emissions and deposition from the atmosphere from sources outside of Danish borders.

There are increased levels of contaminants in some places in coastal and port areas because of historical industrial activity.

Despite extensive efforts to reduce discharges of dioxin and PCB, it is unlikely that levels will drop to below the threshold values up to 2020 for all fish species.

Topic 10

Marine litter

Marine litter is waste left at sea or on beaches, or waste that is led to the sea via watercourses, wastewater, from the land or from the air. Around 70-90% of the marine litter is plastic. Global consumption of plastic is increasing, and plastic litter can remain in the marine environment for hundreds of years.





Good environmental status is when the properties and quantities of marine litter do not cause harm to the coastal and marine environment.

Plastic in the marine environment can constitute a risk for wildlife, as marine mammals and seabirds can ingest and accumulate plastic in their stomachs and they risk being entangled in pieces of plastic or drowning. Marine litter is divided into macrolitter and micro-litter, if the particle size is less than 5 mm. Zooplankton, mussels and a number of other marine animals ingest microplastics, and microplastics can then spread throughout the food chain.

Marine litter also has socio-economic consequences in increased costs for municipal beach cleaning as well as issues for the fishing industry with broken gear and impaired catches. Furthermore, litter is a nuisance for recreational activities and tourism on and by the sea. At the same time, fishing, tourism and recreational activities are the dominant sources of marine litter.

The targets in the Marine Strategy for marine litter include that the volume of marine waste is to be reduced significantly, and that the loss of fishing gear must be prevented.

95%

of northern fulmars examined in 2012-2016 had plastic in their stomachs.



Environmental status for marine litter

Because of sea currents, marine litter is a particular problem along the west coast of Jutland. The highest level of litter on beaches in 2015 was registered at Skagen with 2,146-9,137 pieces of waste per 100 m. Plastic was the dominant material.

Litter on the sea floor is monitored through bottom trawl surveys. Plastic is the most frequently caught material and is present at almost all monitoring stations.

Litter ingested by seabirds is monitored by collecting stranded dead northern fulmars. In 2012-2016, 95% of the northern fulmars had plastic in their stomachs. In Danish studies of microplastics in fish stomachs, micro-particles were found in 20-30% of the fish stomachs.

Without set threshold values, there is no scientific basis for assessing quantitatively when good environmental status will be achieved, but basically litter has no place in nature.



Topic 11

Under- water noise

Sound occurs naturally in the marine environment, as a consequence of waves, wind and animal activity. There is also man-made noise, for example from construction works at sea, minerals exploration, sea floor surveys, military exercises and shipping.



Good environmental status is when underwater noise is at levels that do not adversely affect species.

Loud impulse noise can cause permanent hearing damage to harbour porpoise.

Underwater noise can affect marine animals in many ways. Loud, short-term impulse noise can cause physical injury and influence animals' hearing. For marine mammals such as seals and harbour porpoise, hearing is important for foraging and communication.

Low-frequency and more constant noise, such as noise from ships, may potentially affect animal behaviour, their ability to communicate with each other, and whether they will stay in specific areas. Even though there is

some knowledge about the impact of anthropogenic noise on individuals and species, there is not adequate knowledge about the consequences at population level.

The environmental targets in the Marine Strategy for underwater noise include that the harmful effects of impulsive noise exposure for animals should be avoided. For low-frequency noise, the target is to build knowledge and set threshold values.

→ Environmental status for underwater noise

In the Danish marine areas, noisy activities were registered in the North Sea and in the northern part of Kattegat in 2015. Noise levels (from those activities) may have a harmful effect. The majority of the Danish marine areas were affected by impulse noise for less than 10 days in 2015.

The spread of low-frequency sound from ships has been modelled for the Baltic region. There is a clear overlap between the major shipping routes and areas where the level of low-frequency sound is highest.

Several of the major shipping routes overlap with habitats for Danish populations of harbour porpoise and cod spawning areas. It is uncertain whether this noise has serious adverse impacts on the populations.

There are, as yet, no threshold values for levels of underwater noise compatible with good environmental status. Until these values are set, it is not possible to assess when good environmental status will be achieved.

Appendix

Environmental targets in the Danish Marine Strategy II

Targets for achieving good environmental status have been set for each topic. There is a total of 68 environmental targets in the Danish Marine Strategy II, of which 29 are operational environmental targets (marked with *). The latter are either specific actions to support achievement of the other targets, or they clarify further work to set more precise targets in the future.

Both types of environmental targets are legally binding for the authorities. This means, for example, that authorities may not grant authorisation to activities or discharges that are incompatible with achieving the targets.



Topic 1 Biodiversity

- 1.1** Incidental by-catch of birds is at a level that does not threaten the species in the long term.
-
- 1.2** Populations and habitats for birds are conserved and protected in accordance with objectives under the Birds Directive.
-
- 1.3** The Ministry of Environment and Food contributes to regional work regarding establishment of threshold values and determination of good environmental status, and works to ensure that the status for biological diversity is in accordance hereto.
-
- 1.4** * More knowledge about by-catch of seabirds is collected pursuant to the relevant monitoring programmes.
-
- 1.5** * Need for protection initiatives for HELCOM and OSPAR Red List species is assessed. If there are any Red List species that are endangered or not sufficiently protected, the Ministry of Environment and Food will assess specifically the need for further initiatives in collaboration with relevant ministries.
-
- 1.6** Incidental by-catch of harbour porpoise is reduced as much as possible, and as a minimum to a level below 1.7% of the total population.
-
- 1.7** Incidental by-catch of seals is at an adequately low level that does not threaten populations in the long term.
-
- 1.8** Harbour porpoise, harbour seal and grey seal achieve favourable conservation status in accordance with the timeline laid down in the Habitats Directive.
-
- 1.9** * The Ministry of Environment and Food contributes to setting population-specific threshold values for by-catches of harbour porpoise in a regional context with a view to subsequently setting environmental targets for vulnerable populations of harbour porpoise.
-
- 1.10** * More knowledge about by-catches of marine mammals is collected pursuant to the relevant monitoring programmes.
-
- 1.11** * The Ministry of Environment and Food carries out an analysis of by-catches of shark and ray in Danish marine areas, and the possibility of a DNA-based approach to determining species is investigated.
-
- 1.12** * The Ministry of Environment and Food establishes a national indicator to evaluate the status of Danish fish that are not exploited commercially, and the opportunities to further develop regional indicators are investigated.
-

Topic 1

Biodiversity (continued)

- 1.13** The abundance of plankton follows the long-term average.
-
- 1.14** * The Ministry of Environment and Food is tracking developments and improving the knowledge base about plankton through monitoring.
-



Topic 2

Non-indigenous species

- 2.1** The number of new non-indigenous species introduced through ballast water, ship fouling and other relevant human activities is decreasing.
-
- 2.2** The distribution of certain invasive species is, as far as possible, at a level so that significant adverse effects are stable or decreasing.
-
- 2.3** The Ministry of Environment and Food contributes to regional work regarding establishment of threshold values and determination of good environmental status, and works to ensure that the number of new non-indigenous species and impacts from invasive species are in accordance hereto.
-



Topic 3

Commercially exploited fish stocks

- 3.1** The number of commercially exploited fished stocks regulated pursuant to the MSY principles in the Common Fisheries Policy is increasing.
-
- 3.2** Within the framework of the Common Fisheries Policy, fish mortality (F) is at levels that can ensure a maximum sustainable yield (Fmsy).
-
- 3.3** Within the framework of the Common Fisheries Policy, spawning biomass (B) exceeds the level that can ensure a maximum sustainable yield (MSY Btrigger).
-



Topic 4 Marine food webs

- 4.1** The Ministry of Environment and Food contributes to regional work regarding establishment of threshold values and determination of good environmental status, and works to ensure that the anthropogenic impacts on the food web are in accordance hereto.
-
- 4.2** * The Ministry of Environment and Food contributes to regional knowledge and methodology development on marine food webs.
-
- 4.3** * The Ministry of Environment and Food is tracking the development in the food web through monitoring the individual sub-elements of the web.
-



Topic 5 Eutrophication

- 5.1** The Ministry of Environment and Food contributes to regional work regarding establishment of threshold values and determination of good environmental status for the North Sea, including the Skagerrak, and works to ensure that anthropogenic eutrophication and its effects are in accordance hereto.
-
- 5.2** Danish inputs of nitrogen and phosphorus (TN, TP) comply with the maximum acceptable inputs stipulated under HELCOM.
-
- 5.3** Coastal waters: Target loads and needs for measures for fjords, estuaries and coastal waters determined in accordance with the Water Framework Directive are complied with. Targets and needs are described in the Danish river basin management plans.
-



Topic 6 Sea floor integrity

- 6.1** The Ministry of Environment and Food contributes to work regionally and in the EU regarding establishment of threshold values and determination of good environmental status, and works to ensure that losses, physical disturbance and adverse effects on the sea floor are in accordance hereto.
-
- 6.2** * The knowledge base about the Danish sea floor, as well as the abundance and the location of the benthic habitats and their status, is improved pursuant to the monitoring programme (NOVANA).
-
- 6.3** * Through regional work and the work in the EU, better understanding of the impacts on the sea-floor in relation to losses, disturbances and adverse effects is achieved.
-

Topic 6

Sea floor integrity (continued)

- 6.4** * In connection with licensing activities at sea requiring an environmental impact assessment (EIA), the approval authority encourages assessment and reporting to the Danish Environmental Protection Agency (monitoring programme) of the extent of physical losses and physical disturbances of benthic broad habitat types.
-
- 6.5** The marine habitat types under the Habitats Directive achieve favourable conservation status in accordance with the timeline laid down in the Habitats Directive.
-
- 6.6** The northern Sound is designated as a marine protected area pursuant to the Marine Strategy Framework Directive, and new licences to extract mineral resources are stopped. This will not result in any changes in relation to the existing fisheries regulation.
-
- 6.7** The most important habitats contain the typical species and communities for Danish marine areas.
-
- 6.8** * When threshold values for losses, disturbances and adverse effects are established through cooperation at regional and Union level, the Ministry of Environment and Food will initiate a project to form the basis for establishing environment targets in accordance with the thresholds and good environmental status.
-
- 6.9** * Need for protection initiatives for HELCOM and OSPAR Red List habitats is assessed. If there are any natural habitats on the Red Lists that are endangered or not sufficiently protected, the Ministry of Environment and Food will assess specifically the need for further initiatives in collaboration with relevant ministries.
-
- 6.10** * The need for additional marine protected areas or other initiatives in the Baltic Sea and the North Sea is assessed, and a similar assessment is subsequently carried out for the Danish Straits.
-



Topic 7

Hydrographical changes

- 7.1** Anthropogenic activities that are particularly associated with physical loss of the sea floor, and which cause permanent hydrographical changes
- only have local impacts on the sea floor and in the water column, and
 - are designed to take account of the environment and what is technically possible and financially reasonable to prevent harmful effects on the seabed and in the water column.
-
- 7.2** In connection with licensing activities at sea requiring an environmental impact assessment (EIA), the approval authority is encouraging reporting to the Danish Environmental Protection Agency (monitoring programme) of hydrographical changes and the adverse effects of these.
-



Topic 8 Contaminants

- 8.1** Discharges of contaminants in the water, sediment and living organisms do not lead to exceeding of the environmental quality standards applied in current legislation.
-
- 8.2** Emissions, discharges and losses of PBDE and mercury are ceased or phased out.
-
- 8.3** The Ministry of Environment and Food contributes to work regionally and in the EU regarding establishment of threshold values and determination of good environmental status, and works to ensure that the quantities of contaminants are in accordance hereto.
-
- 8.4** There is a gradual decrease in the levels of imposex/intersex in marine gastropods.
-
- 8.5** * By 2021, a process has been carried out to trace the source of the most polluting substances which prevent meeting the environmental targets laid down for surface water bodies in the Water Framework Directive. If necessary, the relevant licences and permits will be revised as far as possible.
-
- 8.6** * The Ministry of Environment and Food is working to ensure that more indicators for contaminants are established.
-
- 8.7** * The Ministry of Environment and Food ensures increased coordination between policy areas/directives when new national environmental quality requirements are set for selected substances in matrices, where there is monitoring data.
-
- 8.8** * The Ministry of Environment and Food is working to develop additional regional joint tests for biological impacts.
-
- 8.9** The spatial extent and duration of acute pollution events is gradually reduced as much as possible through prevention, monitoring and risk-based scaling of contingency and response facilities.
-
- 8.10** Adverse effects on marine mammals and birds from acute pollution events are prevented and minimised as much as possible. For example, this may be secured by means of floating booms as well as through contingency plans for marine mammals and birds injured in oil spills.
-
- 8.11** * Up to the next monitoring programme (2020), the Danish Environmental Protection Agency will examine how the adverse effects of the most significant pollution events can be monitored and registered in the specific cases.
-



Topic 9

Contaminants in seafood for human consumption

- 9.1** Emissions of contaminants generally do not lead to exceeding of the maximum residue levels applicable in the food legislation for seafood.
-
- 9.2** The trend in total Danish dioxin emissions into the air is not increasing.
-
- 9.3** * The Danish Environmental Protection Agency is monitoring developments in relation to emissions of POPs (including dioxins) from wood-burning stoves to assess the need for further initiatives.
-
- 9.4** * The Danish Environmental Protection Agency is gradually improving emission estimations of POPs into the air.
-
- 9.5** * The Danish Veterinary and Food Administration is inspecting concentrations of contaminants, particularly dioxins and PCBs in order to monitor developments in organisms at risk of containing high concentrations.
-



Topic 10

Marine litter

- 10.1** The amount of marine litter is reduced significantly in order to achieve the UN goal that marine litter is prevented and significantly reduced by 2025.
-
- 10.2** The Ministry of Environment and Food contributes to work regionally and in the EU regarding establishment of threshold values and determination of good environmental status, and works to ensure that the quantities of marine litter are in accordance hereto.
-
- 10.3** Losses of fishing gear in Danish waters are prevented in order to achieve the UN goal that marine litter is prevented and significantly reduced by 2025.
-
- 10.4** * The Ministry of Environment and Food implements the National Plastics Action Plan and the associated Political Agreement on collaboration of 30 January 2019, with a view to improving recycling of plastic and reducing plastic litter and pollution from plastic litter.
-
- 10.5** * The Ministry of Environment and Food is working to develop indicators and measurement methods for microplastics in seabed sediments and the water column.
-

-
- 10.6** * The Danish Fisheries Agency draws up an estimate of the amount of lost fishing gear in Danish marine areas up to 2020.
-
- 10.7** * The Ministry of Environment and Food prepares a catalogue of potential and targeted measures to prevent marine litter.
-



Topic 11

Underwater noise

- 11.1** As far as possible, marine animals under the Habitats Directive are not exposed to impulse sound which leads to permanent hearing loss (PTS). The limit value for PTS is currently assessed as 200 and 190 dB re:1 uPa_{2s} SEL for seals and harbour porpoise, respectively. The best knowledge currently available is on these species. However, it is likely that these limits will be revised as new knowledge on the area becomes available. The values are the sound-exposure level accumulated over two hours.
-
- 11.2** Anthropogenic activities causing impulse sound are planned such that direct adverse effects on vulnerable populations of marine animals from the spatial distribution, temporal extent, and levels of anthropogenic impulsive sound are avoided as far as possible and such that these effects are assessed not to have long-term adverse effects on population levels.
-
- 11.3** Activities by the authorities under the Ministry of Defence that cause impulse noise in the marine environment are, as far as possible, being assessed and adapted to reduce possible adverse effects on marine animals under the Habitats Directive, provided this does not conflict with national security or defence objectives. Defence Command Denmark applies current NATO standards when carrying out environmental assessments.
-
- 11.4** When conducting preliminary seismic studies, adequate remedial action is taken in accordance with the Danish Energy Agency's guidelines on standard terms and conditions for preliminary studies at sea.
-
- 11.5** The Ministry of Environment and Food contributes to work regionally and in the EU regarding establishment of threshold values and determination of good environmental status, and is working to ensure that the level of underwater noise is in accordance hereto.
-
- 11.6** * In connection with licensing offshore activities requiring an environmental impact assessment (EIA), the approval authority is encouraging reporting to the Danish Environmental Protection Agency (monitoring programme) of registrations of impulse noise.
-
- 11.7** * Through increased monitoring, the Ministry of Environment and Food is improving knowledge about the extent and levels of low-frequency noise in the Baltic Sea and the North Sea.
-

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