



II. The Targets

1 Landscape and Culture

For the specific purposes of cooperation on landscape and cultural heritage, the Wadden Sea Area and an area beyond has been identified for inclusion of the main cultural entities. As shown in Map 3, parts of the identified cultural entities are located outside the Wadden Sea Cooperation Area. Activities on landscape and cultural heritage should be carried out by, or in close cooperation with, all relevant administrative levels and with support of the people living and working in the region.

In Germany such a cooperation would fall mainly under the responsibility of the Counties (Landkreise). Although the importance of preserving the cultural heritage of the Wadden Sea is acknowledged, the development of human use in a sustainable way remains further possible, because this is the basis of life of many people on the islands and in the coastal area.

The landscape of the Wadden Sea Coast, with some 22,000 km² the world's largest transgression coastal wetland site, consists of three parts. The Wadden Sea proper basically comprises the Wadden Sea Conservation Area (ca. 11,000 km²), consisting of water, tidal flats, salt marshes and dunes, as in Niedersachsen, where most of the islands are included in the Nature Conservation Area. Although the Wadden Sea is a natural area, it contains some very important cultural heritage features, past and present. Examples include the landscape of islands, Halligen and marsh areas, the Friesian language and regional traditions. Then there are the scores of ship-wrecks dating from Mediaeval and Early Modern Times in the western Wadden Sea and in the northern Wadden Sea there are many inundated archaeological traces of agriculture and salt mining.

The further parts are the islands which belong to the Cooperation Area and, mostly outside of the Cooperation Area, endiked former salt-marshes or polders which are landwards of the sea dikes. The endiked area forms a cultural landscape created at the interface of land and sea. Being an amphibious landscape, it constitutes a unique example of a transgressive coastal region with an occupational history of nearly three millennia. As such it is the result of the interaction of physical developments (a Holocene landscape under a relatively strong sea level rise) and intentional as well as unintentional human actions.

The 50 or so (Friesian) islands together can be roughly divided into two categories. The larger category is formed by the generally sandy islands or islands with cores formed by glacial moraines. These make up a chain of barrier islands from Den Helder at the south-western end of the Wadden Sea region up to Esbjerg at its north-eastern end. The smaller category of islands, lying inside the barrier islands and off the North Friesian coast, are the so-called Halligen marsh islands that are partial remnants of a former salt-marsh destroyed by the sea. Apart from separating the Wadden Sea from the North Sea, the islands with their age-old agrarian-maritime societies form the most dynamic eco-cultural frontier zone of the Wadden Sea.

The marshes have been settled uninterruptedly since 600 BC. Thousands of dwelling mounds, and miles of ditches (partly of a natural, partly of an artificial origin) give archaeological and visual evidence of an occupational history reaching back nearly 3000 years from today. Since about 1000 AD, intentional water and landscape management by means of dike systems has resulted in the embankment of large salt marsh areas. Dike and water management under transgressive maritime conditions originated here, in an area characterized by sluggish natural drainage. The techniques were subsequently exported to western central parts of Holland, and from there to the Elbe- and Wesermarshes, to Poland, Russia, France and England.

Sea level rise, together with the subsidence of the inland moorlands as a result of their cultivation from Carolingian times, put the inhabitants in constant jeopardy. Apart from the danger of floods, they had to adapt to an increased inflow of fresh water to the marshes by

using drainage, which as a consequence caused the subsidence of inland bogs. Moreover, they faced a constant threat of diseases (endemic malaria etc.) because of the increasing volumes of fresh water. The insular character of the region (it was relatively isolated from the hinterland) combined with the commercial success of farming in a fertile but hazardous environment to create a tradition of independence and self-sufficiency. During the Middle Ages, this coastal society found its political and social expression in the so-called Friesian freedom, evolving already in pre-modern times into a rather autonomous and individualistic society. One of the direct consequences was the high density of villages (parishes) with their still existing medieval churches as well as noble houses (*stinzen, states, borgen*), most of which have since been demolished.

THE TARGETS

- Identity - to preserve, restore and develop the elements that contribute to the character, or identity, of the landscape, which forms the basis for life of the people living in the region
- Variety - to maintain the full variety of cultural landscapes, typical for the Wadden Sea landscape
- History - to conserve the cultural-historic heritage
- Scenery - to pay special attention to the environmental perception of the landscape and the cultural-historic contributions in the context of management and planning

STATUS AND ASSESSMENT

The cultural landscape of the Wadden Sea is a rich, complex and irreplaceable resource. It has great potential both with regard to its intrinsic value and its role in economic development. From an economic perspective, the landscape of the Wadden Sea is gradually changing from a production area into a consumption area, as are many other cultural landscapes today. There is a growing need for distinctive and unique landscapes, for places with stories and histories that offer visitors new perceptions and experiences and that offer local inhabitants and entrepreneurs new opportunities to generate income.

Not only is the economic landscape changing; the social situation of its inhabitants has changed significantly in the last few decades. This is reflected in the way people now look at their surroundings and the issues they raise concerning the environment they want to live and stay in. An environment which local people can identify with becomes increasingly important, especially in regions with a decreasing population – such as this area.

The challenge is to safeguard cultural and landscape assets and use those strengths regionally, because only a living landscape will create living communities and vice versa. The heritage is however vulnerable to change resulting from agricultural policies, urban development, use of the landscape for energy infrastructure and change in demography.

Enlargement of land parcels, urbanization and industrialization, e.g. harbour development and construction of power plants and the associated construction of infra-structural installations, enhance this transformation. This development interferes with characteristic elements such as the openness, serenity and identity of the landscape, the topography of the landscape, the biodiversity and the cultural-historic remnants. The construction of wind turbines has increased significantly during recent years because the production of electricity from wind energy is particularly productive in the area. However, wind turbine installations also impinge upon the landscape values.

HOW TO PROCEED

The LancewadPlan project was carried out during the period 2004–2007. It was based upon the extensive inventory of the landscape and cultural heritage in the wider Wadden Sea from the Lancewad project (1999–2001), launched on the basis of the Wadden Sea

Plan. The LancewadPlan project has resulted in a draft Integrated Landscape and Cultural Heritage Management and Development Plan for the Wadden Sea Region "A Living Historic Landscape" for consideration by the Parties.

The proposed strategy "A Living Historic Landscape" is a long term vision of how this heritage will be maintained as a shared heritage. The stakeholders, both governmental and non-governmental, have an essential role and function to fulfil in conserving this heritage. It is intended to help create and extend new opportunities to stimulate local ownership and local responsibility for the maintenance and sustainable use of the cultural landscape. It is an integrated strategy which takes as its starting point the fact that the unique landscape and cultural heritage are combined and multifaceted. This strength and potential must be safeguarded and further developed through an integrated approach.

The aims of "The Wadden Sea Region: A Living Historic Landscape" are primarily

- To establish an overall framework for the management and sustainable development of the cultural landscapes and heritage in order to give the heritage a role in coastal development
- To establish and further extend a network within which the competent stakeholders act and co-operate in a trans-boundary context
- To implement sector strategies to support the opportunities that heritage presents for regional development
- To further raise awareness of the unique landscape and cultural heritage.

It is recommended to identify and evaluate the landscape and cultural heritage in an international context and on the basis hereof determine the specific features around which a cooperation should be further developed.

The development of this approach is at different stages in the three countries. Policies on landscape and culture have already been agreed upon in The Netherlands and Denmark, whereas in Germany the discussion is just beginning.

TRILATERAL POLICY AND MANAGEMENT

1.1 Set up a working group of the three Wadden Sea countries including the responsible authorities and stakeholders with the aim of

- Enhancing the involvement and responsibility of relevant authorities and stakeholders for the management of the landscape and cultural heritage by, or in close cooperation with all relevant administrative levels and with support of the people living and working in the region.
- Intensifying the integration and collaboration between the natural environment and landscape management.
- Promoting the further development of appropriate planning instruments.

The group will take into account the results of the Lancewad Plan project as a starting point.

2 Water and Sediment

The Wadden Sea is an open system. With the rising tide, marine water and sediment from the North Sea enter the Wadden Sea. Fresh water and sediments are discharged by a number of large rivers. The quality of water and sediment in the Wadden Sea is mainly determined by the external sources through which polluting substances enter the Wadden Sea. Atmospheric deposition is an additional source of pollution.

Pollutants are generally divided into three types, namely 'natural micro-pollutants', 'man-made micro-pollutants' and 'macro-pollutants'. The first class contains substances like heavy metals, which are not only produced by humans, but which also occur naturally in the environment, be it in low concentrations.

The second class, the man-made substances, also called xenobiotics, contains PCBs, pesticides and endocrine substances.

The third class, macro-pollutants, contains substances which are of natural origin and can be found in relatively high concentrations in the (marine) environment. The most important ones are nutrients, in particular phosphorus and nitrogen compounds.

Micropollutants can have toxic effects on biota, for example, through interference with the reproductive system or the immune system. These effects can be aggravated through bio-accumulation and synergism. Nutrients in excess concentrations and quantities may lead to increased primary production which, in turn, can cause negative effects like oxygen depletion as a result of decaying algal material, shifts in species composition, increased blooms of toxic algae and remobilization of micro-pollutants.

A strategy for dealing with pollution of water from chemicals is set out in Article 16 of the Water Framework Directive 2000/60/EC (WFD). As a first step of this strategy, a list of priority substances was adopted, identifying 33 substances of priority concern at Community level. The Directive 2008/105/EC of the European Parliament and of the Council on environmental quality standards in water policy (developed under Article 16 of and amending Directive 2000/60/EC) has the objective to ensure a high level of protection against risks to or via the aquatic environment arising from these 33 priority substances by setting European environmental quality standards. In addition, the WFD requires Member States to identify specific pollutants in the river basins and to include them in the monitoring programmes (both of priority substances and other pollutants for the purpose of determining the chemical and ecological status according to Article 8 and Annex V of the WFD).

THE TARGETS

- Background concentrations of natural micropollutants.
- Concentration of man-made substance as resulting from zero-discharges.
- A Wadden Sea ecosystem which can be regarded as eutrophication non-problem area.
- Improvement of habitat quality for conservation of species.

The Targets are valid for the tidal area, the offshore area and the estuaries, and are consistent with the definitions of "good chemical status" according to the WFD. Under the WFD, Environmental Quality Standards (EQS) have been developed for priority substances in water (Directive 2008/105/EC). Comparable standards for sediment and biota will not be available at the Community level but must be developed by the member states.

The Targets also support the World Nature Heritage criteria VIII-X.

In the assessment of the Wadden Sea Targets, the OSPAR Background Assessment Criteria (BAC) and the OSPAR Ecological Quality Objectives (EcoQOs) are applied.

STATUS AND ASSESSMENT

The pollution of the Wadden Sea originates mainly from external sources. It concerns

- The rivers. The major rivers Elbe, Weser, Ems and the IJssel, a branch of the Rhine. In addition, a substantial part of the Rhine water enters the Wadden Sea via the North Sea through a coastal flow along the Dutch coast. Rivers are by far the largest carrier of polluting substances from the land to the Wadden Sea.
- The North Sea. Due to the net North Sea current, a substantial part of North Sea water and suspended particles – and consequently polluting substances – enter the Wadden Sea.
- The atmosphere. The Wadden Sea lies at the rim of northwestern Europe. A significant part of its pollution is caused by atmospheric deposition which originates from the highly industrialized northwestern and central European countries and exhaust emissions from ships.

Below is an assessment of the pollution status of the Wadden Sea.

Eutrophication

Though input of nutrients, especially of phosphate, has decreased, the entire Wadden Sea still has to be considered a eutrophication problem area, meaning that the target of a Wadden Sea which can be regarded as "eutrophication non-problem area" has not yet been met. Regional differences observed indicate a more intense eutrophication in the southern as compared to the northern Wadden Sea.

Hazardous substances

The riverine input of metals (Cd, Cu, Hg, Pb, Zn) in the period 1996 – 2007 remained at the same level as in 1995, or continued to decrease at a moderate rate. For some metals, the Target of background concentrations in sediment and biota (blue mussels and bird eggs) has not yet been reached in all sub-areas. For a number of xenobiotic compounds discharges to and concentrations in the Wadden Sea have decreased; however, the target has not yet been reached. Some of these substances still pose a risk to the ecosystem. Many newly developed xenobiotics, including hormone disruptors, occur widely in the Wadden Sea ecosystem and may have deleterious effects on the ecosystem.

Oil and seabirds

The major sources of oil pollution at sea in the Wadden Sea region are illegal discharges of oil residues, which are a constant threat to sea- and water-birds. Although the oil rates among beached birds have decreased since the 1980s they are still high. The oil rate of the guillemot is still about three times higher than the OSPAR-EcoQO of 10% set for this species. The Wadden Sea coast is hit repeatedly by oil spills. In the period since the last QSR was published, one oil spill from a cargo ship polluted the coast of Niedersachsen and two oil spills from unknown sources polluted the Schleswig-Holstein west coast.

Marine litter

Litter in the marine environment is a constant threat to wildlife, a hindrance to human activities, incurs high economic costs, is unsightly and reduces the recreational value of our coasts. It is a worldwide problem that doesn't stop on the borders of the Wadden Sea. Information on the levels and trends in litter pollution for the Wadden Sea region from OSPAR-Beach Litter Monitoring and other studies that have been carried out in the Wadden Sea and adjacent waters show that plastic items make up the major part of litter polluting the marine environment. Thousands of litter items per kilometre are recorded regularly during the OSPAR beach surveys. Up to 40% of the litter recorded on beaches in the region comprises various forms of packaging. Lost or discarded nets from the fisheries industry make up 28% of the litter. The results of the OSPAR beach surveys indicate that litter pollution is presently on the increase in the southern North Sea area and a recent analysis of beached birds data indicates that entanglements with litter are also on the increase.

HOW TO PROCEED

The trilateral policy and management on pollution issues is closely related to developments within the Oslo and Paris Convention (OSPAR), the International Maritime Organization (IMO) and the European Union (WFD and MSFD). It is within these frameworks that international agreements on pollution issues, relevant for the whole catchment area of the Wadden Sea Area, are made.

Water is the principal matrix for assessing compliance with the WFD Environmental Quality Standards (EQS). The Directive on environmental quality standards in the field of water policy (Directive 2008/105/EC) underlines that sediment and biota are an important matrix for monitoring and obliges member states to set up EQS for sediment and biota where necessary and appropriate to complement the EQS set at Community level. Member states have to ensure that concentrations of priority substances and other pollutants do not increase in sediment and biota.

For the Wadden Sea, the appropriate matrix for the assessment of hazardous substances will remain sediment and biota because concentrations in water are comparatively low and show high variability (in time and space). Assessment procedures and guidelines for sediment and biota will be developed in the framework of the TMAP.

Shipping safety policies are addressed in the Chapter "Integrated management".

TRILATERAL POLICY AND MANAGEMENT

- 2.1 Trilateral policies for the reduction of inputs of nutrients and hazardous substances from all sources are congruent with those within the relevant EC Directives (WFD, MSFD) and the OSPAR framework. Special emphasis must be given to substances that cause unintended/unacceptable biological responses.
- 2.2 The current nutrient reduction policies within the framework of OSPAR, and the EC Urban Wastewater and Nitrogen Directives are supported by the EC Water Framework Directive and the new EU Agriculture Policy. In all three countries, these policies are being implemented together with national measures and programs in order to reach the Target. Special emphasis will be given to the trilaterally harmonised implementation of the relevant EC Directives, in particular with regard to monitoring and assessment at an integrated ecosystem level.
- 2.3 Policies for the reduction of hazardous substances, especially from riverine inputs as the quantitatively most important source, will be continued, in particular for newly developed xenobiotics. Special emphasis will be given to the trilaterally harmonised implementation of the relevant EC Directives on this issue.
- 2.4 The three countries will, in the framework of OSPAR and the EU, support the development and implementation of programmes and measures to reduce the input of marine litter and oil from its many sources, as well as removing litter and oil from the coastal and marine environments, also aiming at reducing negative effects on animal populations and ecosystem functions.

Pollution from ships

- 2.5 With the aim of eliminating operational pollution and minimizing accidental pollution, the obligatory installation of AIS (**Automatic Identification System**) on ships since 2005 is an additional, informative, valuable and comprehensive tool for surveillance of ship traffic.
- 2.6 Harbours bordering the Wadden Sea have adequate facilities to handle all types of residues and wastes generated by ships to meet the requirements of the MARPOL Convention.
- 2.7 To prevent spills of oil and other hazardous substances, residual materials and litter to the aquatic environment and wildlife, activities aiming at improving enforcement (surveillance and prosecution) of agreed regulations and policies to combat illegal discharges will be continued.

- 2.8 The three countries will support IMO initiatives with the goal to reduce ship emissions as much as and as quickly as possible both on sea and in the harbours.

Dredging and dumping of dredged material

- 2.9 The three countries will develop and apply national criteria with regard to dredging operations and disposal of dredged material. They will cooperate within the framework of existing international agreements and organizations by exchanging information about their main experiences with the implementation of these criteria.
- 2.10 Dredged material from the Wadden Sea Area and Wadden Sea harbours will, in principle, be re-located within the system unless the contamination exceeds national criteria levels. Dredged material may be used for coastal defence measures and infrastructure works if appropriate.

Discharges from oil and gas exploration and exploitation activities

- 2.11 The exploration and exploitation of the energy resources in the North Sea, as well as in the Wadden Sea Area, has to comply, at least, with the international agreements in the appropriate fora. This results *inter alia* in a prohibition on discharging oil-based muds and cuttings. Dumping or discharge of water based muds and/or cuttings is only allowed in line with relevant OSPAR agreements.
- 2.12 The leaching of toxic substances from protective coatings of pipelines and other installations will be avoided by the use of appropriate materials.
- 2.13 In the Nature Conservation Area, offshore activities that have an adverse impact on the Wadden Sea environment will be limited and zero-discharges will be applied. In the Wadden Sea Area outside the Nature Conservation Area, discharges of water-based muds and cuttings will be reduced as far as possible, by applying Best Available Techniques and by prohibiting the discharge of production water from production platforms.

3 Salt Marshes

THE HABITAT

The habitat type salt marsh includes all mainland, island and hallig salt marshes, including the pioneer zone. The brackish marshes in the estuaries are also considered part of this habitat type.

All salt marshes are part of Natura 2000 areas and covered by the habitat types "1310 Salicornia and other annuals colonising mud and sand", "1320 Spartina swards", "1330 Atlantic salt meadows" and mainly within the saltmarshes "1150 coastal lagoons", for which national conservation objectives have been elaborated.

In addition, in The Netherlands, salt marshes (both area and quality) are considered as part of the quality element "angiosperms" within the Water Framework Directive (WFD), which is one element to assess the ecological status of water bodies. In Germany this is recently under discussion.

Salt marshes form the upper parts of the intertidal zone and the supralitoral, the interface between land and sea, and are strongly controlled by geomorphological, physical and biological processes, such as sedimentation in interaction with the vegetation, tidal regime and wind-wave pattern. They constitute a habitat for a wide range of organisms. On a European scale, of some 1000 plant species that are bound to coastal habitats, nearly 200 are restricted to salt marshes. The highest species diversity in salt marshes is found among the invertebrate fauna; about 1500 arthropod species inhabit salt marshes, of which a considerable number are restricted to this habitat. Salt marshes provide valuable and irreplaceable resting, breeding and feeding grounds for many bird species which are typical for the Wadden Sea. In addition, the natural salt marshes may be of importance as nursery and feeding ground for fish and for coastal flood defence and protection.

NATURALLY DEVELOPING SALT MARSHES have a drainage system of irregular, winding gullies, a zonation of subtypes reaching from a pioneer zone up to higher saltmarshes and in most cases transition to dunes, and - in the course of time - formations of salt marsh cliffs between older parts on the one side and pioneer zones on the bordering tidal flats on the other. Natural salt marshes can be found on the islands on the landside of dune areas and, in some places, along the mainland coast.

FORELAND SALT MARSHES are salt marshes which have developed or which development has accelerated through active human interference, like shelter by means of brush wood groynes on mudflats with an artificial drainage from the beginning of their development. They are mainly situated in places where natural developments would not have led to salt marsh formation.

SUMMER POLDERS are embanked parts of the salt marshes with dikes that are high enough to prevent flooding during the growing season. The frequency of inundation varies between only once per 2 or 3 years to several times per year, depending on the height of the dikes.

In many cases summer polders do not have a typical salt marsh vegetation.

THE TARGETS

- To maintain the full range of variety of salt marshes typical for the Wadden Sea landscape.
- An increased area of salt marshes with natural dynamics.
- An increased natural morphology and dynamics, including natural drainage of mainland salt marshes, under the condition that the present surface area is not reduced.

- A salt marsh vegetation diversity reflecting the geomorphological conditions of the habitat with variation in vegetation structure.
- Favourable conditions for all typical species.
- Salt marsh Targets are consistent with the relevant national conservation objectives for salt-marsh habitat types. The salt marsh Targets are consistent with the World Heritage criteria VIII, IX and X.

STATUS AND ASSESSMENT

Large areas of natural and man-made salt marshes have been embanked in the past. This has not only caused a considerable loss of this typical Wadden Sea habitat, but also reduced the volume of the tidal area considerably. These losses have been compensated for, at least partly, on the islands where new natural salt marshes developed in the shelter of sand dikes and on the mainland through the stimulation of sedimentation. Most of the island salt marshes have developed in a natural way. Most mainland salt marshes are man made and have developed by being protected by brushwood groynes. As a result of their artificial drainage patterns, their morphology differs to natural saltmarshes. Exceptions are the area between the Varde river estuary and the peninsula of Skallingen in the far north, salt marshes at the western end of Eiderstedt and in some coastal parts of Dithmarschen in front of brushwood groynes.

The main interference with the natural development of salt marshes and summer polders is caused by coastal flood defence and protection. Salt marshes and summer dikes are important elements for coastal flood defence and protection. Salt marshes constitute an alternative to protecting the dike foot with hard constructions if the security of the dike is guaranteed.

Agricultural activities, mainly intensive grazing and mowing and the then necessary drainage, but also the application of fertilizer and pesticides, affect the natural vegetation structure and, consequently, the faunal composition.

Although different management tools (including hands-off management) are applied in different parts of the Wadden Sea, the approach to salt marsh management can be regarded as a common one to achieve the Targets. Since the mid 1980s, the Wadden Sea salt marshes in most areas have increased. Local losses occurred and were mainly due to poor sedimentation conditions or to erosion of the intertidal flat area adjacent to the marsh.

In general, livestock grazing, mowing and artificial drainage have decreased in the entire Wadden Sea since the 1980s and the salt marshes now support a variety of more naturally distributed vegetation types. Ageing of salt marshes (a development of vegetation which is dominated by some single species after cessation of farming but continuation of artificial drainage) is considered to be a problem in some areas and will require more attention in salt marsh management in future. This is valid mainly for salt marshes with artificial drainage, high sedimentation rates and lacking rejuvenation processes.

The role of saltmarsh gullies for juvenile fish is still largely unknown.

In Denmark the current conservation status according to the Habitats Directive is unfavourable (bad) for Habitat Type 1330.

In Germany the conservation status of Types 1310 and 1320 is favourable and of Type 1330 unfavourable (inadequate).

In The Netherlands the conservation status of Habitat Type 1310 is favourable, for Type 1330 unfavourable (inadequate) and for Type 1320 unfavourable (bad).

HOW TO PROCEED

Much has been achieved over the last decades to implement the Targets for salt marshes. In order to further implement the Targets and to comply with the Natura 2000 requirements, it is necessary to further increase the area of salt marshes with natural dynamics, to increase natural morphology and dynamics, and to improve natural vegetation structure

of artificial salt marshes through further cessation of intensive grazing where possible, reduction of artificial drainage in salt marshes without any agricultural use, and de-embankment of summer polders where this is appropriate and compatible with the needs of coastal flood defence and protection.

Outbankment of summer polders, excluding the summer dikes of the Halligen, because these protect the inhabitants, is an effective way to enlarge the salt marsh region.

The present forelands can be protected against extensive erosion because the size of the man-made salt marshes along the mainland is still less than the total size before the embankments started. Brushwood groynes in exposed positions in front of artificial salt marshes prevent erosion and also mitigate effects of stronger sea level rise.

It is important to increase natural dynamics in conjunction with dune areas and tidal flats, to allow adaptation to sea level rise and to achieve favourable conservation status where not interfering with the protection of the islands.

The width of the salt marsh is important in order to maintain or enhance zonal diversity and to slow down ageing. Sedimentation rate on the salt marshes should be sufficient to keep pace with sea level rise.

With respect to saltmarsh management it is recommended to allow dynamic processes as far as possible. If saltmarsh works are necessary, sedimentation fields with brushwood groynes should be applied if feasible. In addition, the artificial drainage in sedimentation fields should be kept to a minimum.

The assessment of the Target of a more natural vegetation structure, as well as the relevant N2000 conservation objectives, require further data analysis based on harmonised criteria. Such a Wadden-Sea-wide harmonised assessment of salt marsh development will be carried out using a common vegetation typology.

Regional salt marsh management plans have proven to be important for harmonising the interests of nature protection and coastal defence for parts of the Wadden Sea. In order to further implement the Targets, as well as achieving a good ecological status, such plans should be developed for all parts of the Wadden Sea.

The function of saltmarsh gullies for spawning and juvenile fish should be better elucidated.

TRILATERAL POLICY AND MANAGEMENT

- 3.1 The general trilateral policy regarding salt marshes aims at adequately protecting the full range of variety of salt marshes in order to allow natural processes to take place within this habitat, with special emphasis on flora and fauna and by this maintain or restore a favourable conservation status.
- 3.2 Regional salt marsh management plans should be established for all Wadden Sea salt marshes, insofar this has not yet been done. These plans will contain, amongst others, Best Environmental Practice in salt marsh protection and development, taking account of experiences with local concepts and measures, as well as coastal flood defence and protection requirements, particularly focusing on possible impacts of sea level rise.

Salt Marsh Area

- 3.3 The trilateral policy takes as a starting point that the present area of salt marshes will not be reduced and that, where possible, the area of salt marshes with natural dynamics will be extended.
- 3.4 The long-term goal is to maintain or restore a favourable conservation status for all salt marshes by limiting human interference, except for the edges which may need protection against erosion. In working towards this long-term goal, the interest of coastal flood defence and protection, cultural history and private rights should be taken into account.
- 3.5 An increase of the salt marsh area with natural dynamics will be aimed for through the restoration of salt marshes, for example by opening summer dikes or by removing

sand dikes, provided that it is in line with the Targets for the region, socio-economic conditions and coastal flood defence and protection requirements. The Halligen are protected by summer dikes for the security of the inhabitants. There is no intention to open these dikes.

Natural Dynamics and Natural Diversity

- 3.6 The natural drainage of salt marshes will be increased by—reducing artificial drainage works where possible and practicable. Artificial structures, allowing predators to reach areas which they could not use under more natural conditions, may not be constructed, respectively removal considered where possible.
- 3.7 It is the aim to reduce and/or diversify grazing in order to increase the natural dynamics or the diversity of vegetation and associated animal species in salt marshes, reflecting the geomorphological conditions of the habitat with the exception of those areas where grazing is necessary for coastal flood defence and protection measures. Economic dependences of farmers will be taken into account.
- 3.8 Disturbance and damage caused by recreation and tourism will be further reduced by information systems and/or temporal and spatial zoning e.g. network of trails and routes. (Identical with 4.31 and 5.6)
- 3.9 The application of natural and artificial fertilizers and pesticides and other toxic substances on the salt marshes will be stopped.

Coastal Flood Defence and Protection

- 3.10 The interests of nature protection and sea defence measures will be further harmonised, through e.g. regional salt marsh/foreland management plans, giving priority to the safety of the inhabitants.
- 3.11 As a principle, it is prohibited to embank salt marshes and the loss of biotopes through sea defence measures will be minimised. Reinforcement of existing dikes will be carried out on the location of existing dikes and, preferably, on the land side. (Identical with 4.3)
- 3.12 The application of Best Environmental Practices for coastal flood defence and protection will be enhanced.
- 3.13 In general, clay for sea defence will be extracted behind the dikes. In special cases, i.e. where there is urgent and sudden need and if no other deposits behind the dikes are available, or if the extraction of suitable material is ecologically balanced, the extraction of clay may be allowed in front of the dike. In this case, the extraction shall be carried out in such a way that the environmental impact is kept to a minimum and permanent or long lasting effects are avoided and, if this is not possible, compensated. Additional regional regulations may complete this policy.

Infrastructural works

- 3.14 New infrastructural works which have a permanent or long-lasting impact should not be established in salt marshes.
- 3.15 Infrastructural works which are necessary for the supply of the islands and the Halligen with, amongst others, gas, water and electricity, or other utilities, shall be carried out in a way that the environmental impact on the Wadden Sea is kept to a minimum and permanent, or long lasting, impacts are avoided. (Identical with 4.20)
- 3.16 New licenses for the construction of pipelines in the salt marshes for the transport of gas and oil shall not be issued unless in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest including those of a social or economic nature.

- 3.17 To concentrate cable crossings through the Wadden Sea within a minimum of cable corridors and a minimum of cables, using the best available techniques, e.g. cables with highest capacity available, and avoiding salt marshes crossing as far as possible, and to communicate regularly on this item in order to use synergies. (Identical with 4.19; 5.10; 7.3)
- 3.18 The construction of wind turbines in the Nature Conservation Area is prohibited. (Identical with 4.17; 7.4; 8.4; 9.11)
- 3.19 The construction of wind turbines, in the Wadden Sea Area outside the Nature Conservation Area, is only allowed, if important ecological and landscape values are not negatively affected. (Identical with 4.18; 7.5; 8.5; 9.12)

4 Tidal Area

THE HABITAT

The tidal area covers all tidal flats and subtidal areas. The border of the North Sea side is determined by an imaginary line between the tips of the islands. The borders to the estuaries are determined by the average 10‰ isohaline at high water in the winter situation

Most of the tidal area is designated as a Natura 2000 area (see Map 4). National Conservation Objectives have been defined for Habitat Types 1110 (sandbanks which are slightly covered by sea water all the time), 1130 (estuaries), 1140 (mudflats and sandflats not covered by seawater at low tide), 1150 (coastal lagoons) 1160 (large shallow inlets and bays) and 1170 (reefs).

The entire tidal area has been assigned to 4 types of coastal water bodies and in the estuaries one type of transitional waters under the Water Framework Directive.

The tidal area, with its ever-changing pattern of tidal flats, gullies and open water, is the most characteristic habitat of the Wadden Sea. At low tide, the tidal flats cover about two thirds of the tidal area. The tidal flats of the Wadden Sea form the largest unbroken stretch of mudflats worldwide.

As a result of the daily tides and the open connection with the North Sea, the tidal area is very dynamic. It is exposed to natural impacts such as ice winters, strong gales and extreme changes in temperature.

A characteristic feature of the Wadden Sea tidal area is its high biological productivity, which is the main reason that the Wadden Sea is an important nursery area for North Sea fish and for the high numbers of breeding and migrating birds which feed in the area. Distinctive biological features of the tidal area are, amongst others, mussel beds, and *Zostera* fields. At low tide, the tidal flats are important feeding, roosting and/or moulting areas for birds and seals.

THE TARGETS

- A natural dynamic situation in the tidal area.
- An increased area of geomorphologically and biologically undisturbed tidal flats and subtidal areas.
- A natural size, distribution and development of natural mussel beds, *Sabellaria* reefs and *Zostera* fields.
- Targets for the harbour seal, the grey seal and the harbour porpoise, see Chapter Mammals.
- Targets for migrating and breeding birds, see Chapter Birds.
- Targets for fish, see Chapter Fish.

Tidal area Targets are consistent with the quality objectives of the WFD and relevant national conservation objectives for tidal area habitat types. The targets are also consistent with the World Nature Heritage criteria VIII – X. There are differences in the designation of relevant Habitat Types between Wadden Sea countries, as well as size and number of water bodies (see further "Status and Assessment").

STATUS AND ASSESSMENT

Geomorphology

The tidal area between the mainland and the islands is characterized by a high degree of natural dynamics. The positions and structures of tidal channels and shoals and emerging sand banks are changing continuously. The total area of the intertidal flats is almost the

same as in the mid 1980s. Since then no further embankments of tidal areas have been carried out. However, there seems to be a general depletion of fine-grained material close to the mainland coast due to hydromorphological changes as a combined result of land reclamations in the past and sea level rise.

The tidal area is a sediment importing system and has, therefore, been able to compensate for the subsidence of the sea bottom. Accelerated sea level rise, expected as a result of climate change, will most probably increase the sediment importing demands. Current sea level rise is about 20 cm/100 years. The system may be able to compensate for sea level increases of up to approximately 50cm/100 years (a level that will considerably vary among different tidal basins), but higher levels will possibly result in a loss of tidal flats and a transition to a coastal lagoon system. As most recent prognoses for sea level rise vary from 50 to 130 cm/100 years, the long term functionality of the area may be affected.

During the past decades, sand extraction has steadily declined. Still, a certain amount of sand is used for purposes of coastal protection, e.g. beach nourishment, dike and (on the Halligen) dwelling mound reinforcement.

The exploitation of natural gas in and adjacent to the Wadden Sea, effects in a subsidence of the sea floor. Investigations show that this subsidence of tidal flats has been fully compensated by natural sedimentation until now.

Biology

Mussel beds, seagrass meadows and Sabellaria reefs

In the past, numbers and size of mature mussel beds have seriously declined all over the Wadden Sea, although there are regional differences. The lack of spatfall since 1999, fishing for seed mussels in some areas, as well as some winters with heavy storms, have played a role. In the past 10 years, a slow recovery of intertidal mussel beds has occurred in some areas, though in others the decline is ongoing, despite a reduction of seed mussel fishery. The situation of stable subtidal mussel beds is largely unknown.

In the past, *Sabellaria* reefs and seagrass meadows in the Wadden Sea have also seriously declined, the latter varying between regions with most declines in south-western parts. It is unclear what the main causes for the decline in *Sabellaria* reefs and seagrass meadows have been. A slow recovery of seagrass stands has been observed, for which the improved water quality is deemed responsible. *Sabellaria* forming reefs are actually very rare, though single individuals are found.

Generally, there is insufficient knowledge of the situation of the sublittoral part of the tidal area.

Temperature

Average temperatures in the Wadden Sea have increased as a result of global warming. Climate change may stress the present structure and functioning of the food web and may result in a cascade of yet unknown effects. For example, the response of organisms and of the ecosystem as a whole may not only depend on absolute shifts in temperature, but on the phasing of the new temperature regime (tidally, daily and seasonally) with other key variables as well.

Alien species

Although the present knowledge about the extent, patterns and mechanisms of aquatic bioinvasions is still in its infancy, it is clear that aliens are a significant force for change in aquatic communities globally. At the North Sea coast, many of the introduced species, mainly algae and invertebrates, arrived via shipping or via aquaculture. They most often became established within estuaries and on hard substrates, with more than 80 known species, of which about 52 also occur within the Wadden Sea. Of the 52 known introduced species, six have already had, or are about to have, effects on the composition of the existing biota in the Wadden Sea. These species differ in their effects, some of which may be of a dynamic character. Global warming may benefit some species, resulting in further

changes in dominance. Some introductions have become extremely numerous locally. In particular, pacific oysters are found today in all parts of the Wadden Sea, mainly on oyster beds and natural mussel beds, leading to the most obvious change in the community structure of mussel beds. It is as yet unknown what the community effects will be. There is, however, no evidence that introduced species have caused the extinction of natives in the Wadden Sea.

Human Activities

There are several human activities taking place in the tidal flat area. Those which cause adverse effects are regulated in time and space or, as appropriate, are prohibited by national laws. Where appropriate, activities are subject to licensing following an assessment of their impact on the Wadden Sea in accordance with the stipulations of the Habitats Directive.

In addition, there are some activities such as leisure activities, civil air traffic, fishery, military activities, hunting and laying of cables that may potentially cause disturbance to the Nature Conservation Area. For many of these activities the natural dynamic processes which change the Wadden Sea over time have to be taken into account.

The most prominent **touristic activities** in the tidal area are boating and mudflat-walking. Flat walking takes place mainly near the recreational beaches and on guided tours on defined routes.

Though the construction of new **wind turbines** is not allowed within the Nature Conservation Area, it can be expected that cables from planned and anticipated wind farms in the North Sea will have to cross the Wadden Sea in most cases. It is also unavoidable that additional cables and pipelines for supplying the islands will be constructed through the Wadden Sea Area and, subsequently, also maintained. The construction of such infrastructure installations is subject to assessment and permission under the Habitats Directive. It is the aim to minimise the construction and maintenance effects as far as possible.

Fishery may affect the natural environment of the Wadden Sea. Most important fisheries within the Nature Conservation Area are for blue mussel and shrimp.

Shrimp fishery is allowed in the Dutch and German Wadden Sea with the exception of defined zero-use zones and is limited in Denmark to the area between the islands and in the offshore area. The planned WSP project in 1997 could not be conducted due to a lack of funding. Thus, there are still open questions on the influence of shrimp fishery on bottom fauna and potential to further reduce the bycatch, which is mainly fish.

Mechanical **cockle fishery** has been phased out in most parts of the Nature Conservation Area. Limited non-mechanical commercial cockle fishing (by hand digging) is allowed and regulated in The Netherlands. In other parts of the Area, non-mechanical cockle fishing is limited to private use only in accessible areas of the tidal flats.

The policy of the three countries, including the needs of the Habitat Directive for **blue mussel fishery** and aquaculture since the Wadden Sea Plan of 1997, aimed for a sustainable and ecologically sound mussel fishery. In general, major parts of the intertidal are closed for blue mussel fishery, the area of mussel culture lots has been stable or is reduced and seed mussel fishery is regulated.

In Denmark, the mussel fishery takes place only at natural mussel beds (five licenses) and has for the time being been suspended (2009) due to stock decrease. According to the actual legislation, dispensation may be acquired to fish in three well-defined areas. In Hamburg, mussel fisheries is forbidden by the National Park Act. In Schleswig-Holstein, Niedersachsen and The Netherlands mussel management programmes have been implemented and are being or will be updated.

Hunting is prohibited in the Nature Conservation Area, with the exception of a few areas. Further exemptions for hunting for wildlife management and pest control are possible in the whole area.

The extent of **military activities** has been significantly reduced over the last years. There are a few exercise areas such as the shooting range "Vliehors" on the island of Vlieland or the tidal area in front of the Meldorfer Bucht in Dithmarschen. All activities are limited

in time to take account of the breeding and moulting times for birds and seals. In the Danish Wadden Sea, military activities take place on the northern part of the island of Rømø. Here, air-to-ground training sessions are regularly performed, but they are strictly limited in time.

EC Directives

Differences in implementation

The main differences in the national designation of the Habitats Directive for the tidal area are:

- NL has designated the tidal area as Habitat Types 1110 (sublittoral banks) and 1140 (eulittoral banks) only. NL has explicitly included the protection of sublittoral mussel beds in Habitat Type 1110;
- In Germany and Denmark, additionally Types 1130, 1160 and 1170 have been designated. Germany has designated sublittoral mussel beds as Habitat Type 1170. Following the recent clarification on the common definition of 1170 at EU-level, the designation of eulittoral mussel banks as reefs in Germany will be revised at the next revision of the standard data forms.

With regard to the Water Framework Directive, size and number of water bodies in the tidal area differ between NL (6 water bodies), D (18 water bodies) and DK (4 water bodies). There are no transitional water bodies in DK. In principle, the WFD and WSP address the same area – the tidal area. There is an overlap with the offshore area and estuaries as defined in the WSP.

Conservation status

In Denmark, the conservation status of HD Types 1110, 1130, 1140, 1160 and 1170 has been classified as unfavourable (bad). The status of Type 1150 is unknown.

In Germany, the conservation status of Habitat Types 1110, 1160 and 1170 is unknown, for Type 1140 it is favourable.

In The Netherlands, HD Types 1110 and 1140 are assessed as unfavourable (inadequate).

HOW TO PROCEED

In the framework of the trilateral cooperation, a large number of measures to counteract the negative effects of human presence in the area and the exploitation of natural and mineral resources has been agreed upon.

In the light of impacts of climate change, additional or amended policies are desirable for the management of the tidal area, in particular taking account of substantial changes in the ecosystem and, consequently, dealing with HD Conservation Objectives. Such policies must be carefully tuned with those concerning the dynamic situation in the offshore area, beaches and dunes, salt marshes and estuaries.

Furthermore, a better management of characteristic tidal area communities, especially natural mussel beds, *Zostera* fields and *Sabellaria* reefs, is necessary for an effective implementation of the relevant Targets.

In light of the ecological importance of the sublittoral part of the tidal area, a more harmonised trilateral management is necessary.

Major challenges for the future tidal area policies are to collect relevant knowledge of the subtidal natural values, to develop harmonised assessment methodologies, and to specify and harmonise relevant Conservation Objectives in order to have a common approach between the Wadden Sea States.

The WFD transitional waters cover partly the tidal area and partly the estuaries. This overlap has to be clarified in the Wadden Sea also in connection with the Habitat Directive areas in the estuaries.

In the development of the WFD assessment tools, various approaches and methods are under discussion to define a water body type-specific reference condition and good ecological status.

It is the overall aim to harmonise these different approaches at the trilateral level to produce comparable results.

For invasive alien species, new trilateral policies will be developed (see Chapter Integrated Management).

The development of fisheries into the direction of more sustainable activities in the Wadden Sea has started and will be continued. Existing national management plans and policies for mussel fisheries are regarded as a step into this direction.

In The Netherlands, policy for mussel seed collectors will be further developed in conjunction with the transition of the mussel fishery and the Nature Recovery Programme Wadden Sea between 2009-2020.

National policies regarding the import of seed mussels are different.

Trilateral principles for sustainable shrimp fisheries should be developed in cooperation with the fisheries sector.

The management of seals in the tidal area is covered by the Trilateral Seal Management Plan. This plan is amended and updated at regular intervals.

TRILATERAL POLICY AND MANAGEMENT

Natural Dynamics and Coastal Flood Defence and Protection

- 4.1 Trilateral policies will, as a principle, be based on an integrated approach to coastal defence and nature protection on the mainland coast, the islands and the offshore zone taking into account the water management of the inland.
- 4.2 Future trilateral policies will aim at increasing the resilience of the Wadden Sea to impacts of climate change, in particular by promoting the development of natural dynamics.
- 4.3 Embankments of tidal areas will, as a principle, be prohibited and the loss of biotopes through sea defence measures minimised. Reinforcement of existing dikes will be carried out on the location of existing dikes and, preferably, on the land side. (Identical with 3.11)
- 4.4 Permission for small-scale modifications of jetties, piers and other infrastructural works along the Wadden Sea coast shall only be given after a careful review of all interests.
- 4.5 Permission for new permanent structures, which may influence the natural dynamics in the tidal area of the Nature Conservation Area, will not be granted unless for imperative reasons of overriding public interest and if no alternative can be found. Permission for new permanent structures, which are likely to have significant effects on the natural dynamics in the tidal area outside the Nature Conservation Area, will only be granted after having been made subject to an assessment in accordance with the EC Directive on Environmental Impact Assessment.

Shipping, Harbours and Industrial Facilities

- 4.6 The extension, or major modification, of existing harbour and industrial facilities and new construction shall be carried out in such a way that the environmental impact is kept to a minimum and permanent, or long lasting, effects are avoided and, if this is not possible, compensated.
- 4.7 Shipping routes and harbours are to be managed for their intended purposes, including the necessary maintenance of shipping routes; in doing so, negative impacts should be avoided, as far as possible. Navigation dredging operations should aim at allowing natural processes to run their course, as far as possible.

- 4.8 New shipping routes to the harbours and the Wadden Sea islands will, in principle, not be dredged unless the present routes threaten to disappear or for shipping safety reasons.
- 4.9 In shipping links across the water shed and other not designated routes that exist by virtue of natural dynamics in principle, no dredging operations will be carried out.
- 4.10 Speed limits within the tidal area have been imposed where such is deemed necessary.

Mineral Extraction and Infrastructure

- 4.11 In the Nature Conservation Area, new exploitation installations for oil and gas will not be permitted.
For the area of the World Heritage property, Germany and The Netherlands have confirmed their commitment not to explore and extract oil and gas at locations within the revised boundaries of the nominated property in line with law in force.
- 4.12 In the parts of the Nature Conservation Area not being designated as World Heritage Property exploration activities are permitted in accordance with national legislation if it is reasonably plausible that deposits can be exploited from outside the Nature Conservation Area. Net loss of nature value must be prevented. Therefore, exploration activities will be regulated in space and time. Associated studies, mitigation and compensation measures should be carried out where appropriate.
- 4.13 In light of the expected acceleration in sea level rise and the consequent increased sand demand of the system, trilateral policies generally take as a starting point that sand is not removed from the Nature Conservation Area.
- 4.14 The extraction of sand in the Nature Conservation Area will be limited to the dredging and maintenance of shipping lanes. This sand can be used for, inter alia, sea defence purposes. In specific cases, sand may also be extracted for sea defence purposes.
The extraction of sand in the Wadden Sea Area outside the Nature Conservation Area should make maximum use of sand generated by the maintenance of shipping lanes. It should be carried out in such a way that the environmental impact is kept to a minimum and permanent, or long lasting, effects are avoided and, if this is not possible, compensated.
- 4.15 Small scale extractions of mud and sea water for medical purposes and of sand remain licensable following national legislation.
- 4.16 The construction of pipelines shall be such that the environmental impact on the Wadden Sea ecosystem is kept to a minimum and permanent, or long lasting, negative impacts are avoided, and if this is not possible, compensated. In the Nature Conservation Area, new licenses for the construction of pipelines in the tidal area for the transport of gas and oil shall not be issued unless in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature.
- 4.17 The construction of wind turbines in the Nature Conservation Area is prohibited. (Identical with 3.18; 7.4; 8.4; 9.11)
- 4.18 The construction of wind turbines, in the Wadden Sea Area outside the Nature Conservation Area, is only allowed, if important ecological and landscape values are not negatively affected. (Identical with 3.19; 7.5; 8.5; 9.12)
- 4.19 To concentrate cable crossings through the Wadden Sea within a minimum of cable corridors and a minimum of cables using the best available techniques, e.g. cables with highest capacity available, and to communicate regularly on this item in order to use synergies. (Identical with 3.17; 5.10; 7.3)

- 4.20 Infrastructural works which are necessary for the supply of the islands and the Halligen with, amongst others, gas, water and electricity, or other utilities, shall be carried out in a way that the environmental impact on the Wadden Sea is kept to a minimum and permanent, or long lasting, impacts are avoided. (Identical with 3.15)

Dredged Material

- 4.21 The impact of re-location or dumping of dredged materials will be minimised. Criteria are, amongst others, appropriate dumping sites and/or dumping periods. This has been implemented on national level through joint concepts for dredged materials for marine and coastal waters. (Identical with 6.4)

Mussel, Cockle and Shrimp Fishery

- 4.22 Cockle fishery is not allowed in the Wadden Sea Area, with the exception of mechanical fisheries in some small areas along the Esbjerg shipping lane and in the Ho Bay, and in Niedersachsen outside of the conservation area (but will not be carried out at present), as well as non-mechanical cockle fishing in The Netherlands. (Identical with 9.5)
- 4.23 The effects of mussel fishery are limited by the permanent closure of considerable areas and the reservation of sufficient amounts of mussels for birds. In addition, the management of fishery on mussels should not be in conflict with protecting and enhancing the growth of natural mussel beds and *Zostera* fields. (Identical with 9.6)
- 4.24 Mussel fishery will, in principle, be limited to designated parts of the subtidal area. Based on national management plans, fishery on the tidal flats and parts of the sublittoral may be granted. The fishery sector will, in close cooperation with competent authorities, improve existing practices in such a way that impacts of mussel fishery in general and seed mussel fishery in particular, will be minimised. (Identical with 9.7)
- 4.25 The current area of mussel culture lots will not be enlarged.
- 4.26 The existing permit for oyster culture in Schleswig-Holstein will remain in force. New permits will not be granted.
- 4.27 In order to reduce bycatch and to reduce impact on the sea floor, trilateral policy principles for a sustainable shrimp fishery will be developed in close cooperation with the fisheries sector. (Identical with 11.3)

Tourism and Recreation

- 4.28 The recreational values of the Wadden Sea will be maintained for the benefit of man and nature. To this end in the Nature Conservation Area,
- in the ecologically most sensitive areas, zones have been or will be established where no recreational activities, including excursion ships and recreational boating, is allowed;
 - the use of jet skis, water skis and similar motorized equipment has been, or will be, prohibited, or limited, to small designated areas;
 - new marinas will be avoided and the extension of the existing marina capacity will only be allowed within the approved levels;
 - water sports, like wind surfing have to be balanced with the needs of nature protection and bathing tourism;
 - Kitesurfing can distort nature values, in particular roosting sites for birds. The aim is a harmonised approach to kitesurfing consisting of zoning where the activity is allowed under conditions. (Identical with 9.21 and 10.5)
- 4.29 Speed limits for ships have been imposed, taking into account safety, environmental recreational and fishery factors. (Identical with 9.22 and 10.6)

- 4.30 The negative effects of hovercraft and hydrofoil craft and other high-speed craft are minimised by the following strategies:
- In The Netherlands and Germany, hovercraft and hydrofoil craft are forbidden in the tidal area of the Nature Conservation Area; new, other high speed craft are forbidden (in Germany) outside the designated shipping routes in the area (in The Netherlands);
 - In Denmark, applications for new, high-speed craft can only be granted on the basis of an Environmental Impact Assessment and if it is not in conflict with the nature protection targets for the area.
- 4.31 Disturbance and damage caused by recreation and tourism will be further reduced through information systems, and/or temporal and spatial zoning, e.g. network of trails and routes. (Identical with 3.8 and 5.6)
- 4.32 Experience of nature and landscape should be made possible by appropriate measures. It is the aim to guide recreational activities and tourism by information systems, as well as temporal and/or spatial zonation, routing systems and field guidance in such a way that people can enjoy unspoiled nature, and disturbances and damages are minimised.

5 Beaches and Dunes

THE HABITAT

Beaches and dunes include beaches, sandbars, beach plains, and different types of dunes including humid dune slacks. Most beaches and dunes are situated on the North Sea side of the barrier islands. Mainland beaches and dunes can be found on the Skallingen and Eiderstedt peninsulas and near Cuxhaven.

Almost all dune areas have been designated as Natura 2000 areas under the Birds and Habitats Directives and National Conservation Objectives have been adopted for Habitat Types 2110 (embryonic dunes), 2120 (white dunes), 2130 (grey dunes), 2140 (decalcified fixed dunes with *Empetrum nigrum*), 2150 (Atlantic decalcified fixed dunes), 2160 (dunes with *Hippophae rhamnoides*), 2170 (dunes with *Salix repens*), 2180 (wooded dunes of the Atlantic, Continental and Boreal region) and 2190 (humid dune slacks). For beaches, HD types 1150 (coastal lagoons), 1220 (perennial vegetation of stony banks), 1310 (*Salicornia* and other annuals colonising mud and sand) and 1330 (Atlantic salt meadows) are relevant.

Beaches and coastal dunes together constitute one morphogenetic habitat system. Beaches and dunes play an important role in the Wadden Sea – they build up the barrier islands and provide habitats for many and often highly specialised species. At the same time, they are important for coastal defence and as recreation area.

Sandy beaches are the most dynamic physical system of the seashore. Coastal dunes develop where sand is mobilised at dry beaches and blown landwards, trapped by shells or plants and giving rise to a succession of dunes, from embryonic to white, grey and brown.

Dunes are hot spots of biodiversity. Especially wet dune slacks are of outstanding importance because they are inhabited by a number of endangered species.

Wadden Sea island dunes have a far more natural character than those of the mainland dunes along the Northwest European coast. The Wadden dunes are to a large extent embedded in the natural landscapes of the North Sea and the Wadden Sea.

THE TARGETS

- Increased natural dynamics of beaches, primary dunes, beach planes and primary dune valleys in connection with the offshore zone.
- An increased presence of a complete natural vegetation succession.
- Targets for Birds, see chapter Birds.

Few differences exist in the designation of HD dune types. Some types are not present in all three countries or only in very small areas with smooth transitions to other types. The national conservation objectives are largely consistent with the Targets. The Targets for beaches and dunes are consistent with the World Heritage criteria VIII, IX and X.

STATUS AND ASSESSMENT

The dune Targets of increased natural dynamics and of an increased presence of a complete natural vegetation succession have not yet been reached. This is mainly due to:

- Stabilization of dunes resulting in decreasing dune dynamics (mainly due to coastal defence measures);
- Decrease of ground water level and impacts on dune slacks (due to water extraction);
- Eutrophication of dunes by atmospheric deposition, leading *inter alia* to increased moss coverage

- Fragmentation of dune habitats;
- Invasive alien species;
- Mass development of rabbits on some islands.

Many of the Atlantic coastal dunes are unnaturally stable. About two-thirds of the coastal dunes consist of mid- and late successional dune types. Important other types, in particular embryonic dunes and species-rich dune slacks and also grey dunes in typical appearance, are absent or show a further decline. Wet dune valleys become more and more dry.

The main reason is that dunes and beaches have an important coastal flood defence and protection function and consequently the dynamics of the coastal zone have been restricted, especially near inhabited areas, areas of drinking water extraction, buildings and other artificial structures.

The effect on the flora and fauna is that species typical of open sand dune grassland or heath are replaced by scrubs and secondary woodland. The avoidance of penetration of salt water in areas of drinking-water extraction increases unnatural ageing of dunes. If younger dune stages are not sufficiently present, biodiversity in dunes and salt marshes, not only of higher plants but also of mosses, lichens and insects, may be lower or declines. Nowadays some of the most characteristic species, also some of the birds typical for open dunes, have vanished from the Wadden Sea islands.

In areas where coastal defence measures have been reduced, natural dynamics have increased.

Especially wet dune slacks are of outstanding importance because they are inhabited by a number of endangered species which have become rare during the last decades because of habitat loss, stabilization of dunes and lowering of groundwater table through drinking water extraction.

Over the last century all Northwest-European dune ecosystems have experienced changes due to increased nutrient deposition, planting of conifers, grazing pressure, or invasion of non-native species such as *Rosa rugosa*.

Long-term nitrogen deposition has a strong potential to reduce plant species richness. Fast-growing species like grasses outcompete slow-growing species, usually small herbs and lichens. Generally N-sensitive vegetation has declined in semi-natural ecosystems in Europe. Examples are heath, grasslands and fens.

There is a considerable extent and diversity of sandy beaches in the Wadden Sea Area. The biota is distinctly different in composition from that of the offshore belt and the tidal area. Beaches contribute considerably to overall faunal diversity with unique forms of life. In contrast to tidal flats, organisms have little effects on their habitat. Physical factors select the forms of life, most of which are rather small. Two of the most threatened breeding bird species in the Wadden Sea Area, the Kentish plover and the little tern, breed mainly on beaches.

In Denmark the conservation status of all dune Habitat Types is unfavourable, with the exception of 2110 and 2160 (unknown), which is mainly due to eutrophication, but there is also overgrowth, unnatural water levels/regimes, as well as lack of or reduced dynamics. In Germany, the conservation status of all dune Habitat Types is favourable with the exception of 2120 and 2190 (unfavourable, inadequate) and 2150 (unfavourable, bad). In The Netherlands, Types 1310, 2110, 2120, 2150, 2160 and 2170 have a favourable conservation status, Types 1330, 2140, 2180 and 2190 are unfavourable (inadequate) and 2130 is unfavourable (bad).

HOW TO PROCEED

In order to implement the Targets on increased natural dynamics and natural vegetation succession, a more active policy is necessary, promoting coastal flood defence and protection techniques that allow for higher natural dynamics. In addition, active stimulation measures must be taken to enhance the dynamic situation on beaches and in dunes. Coastal management must be carefully tuned to natural values and natural processes, taking into account the priority of safety of the islands and their inhabitants.

New insights suggest that coastal defence and nature management can benefit from each other. Where safety is provided by means of nourishments, natural processes might transfer sand from the beach inland, and consequently will result in growing dunes and rising surfaces, not only in the foredunes but also inland. Therefore, nature can serve safety. Policies for sea defences and for nature management could aim for the same goals. Sand nourishments for coastal flood defence and protection contribute positively in that they stabilize dunes under stronger sea level rise. The nourished material will, after renewed erosion during storm surges, finally accumulate in the tidal area, thereby stabilising the system under sea level rise.

All dune habitats are part of the Natura 2000 network of the EC Habitats Directive. However, the conservation status in at least parts of the dune areas has been assessed as "non-favourable".

The implementation of the European Nature Conservation Directives in the Wadden Sea requires a tuning between The Netherlands, Germany and Denmark.

Additional protection of beach breeding species may be achieved through relatively simple zoning measures limited in space and time. *inter alia* closing of areas or visitor management. Similar protection measures can be applied to seals. These policies will be continued.

TRILATERAL POLICY AND MANAGEMENT

- 5.1 Dunes are protected and natural processes are allowed to take place within this habitat, with special emphasis on geomorphology, flora and fauna. To this end, HD Conservation Objectives and Best Environmental Practices will be more harmonised and commonly applied in dune protection and development.
- 5.2 The interests of nature protection and sea defence measures will be further harmonised, and the loss of biotopes by sea defence measures minimised, while taking into account that the safety of the inhabitants is essential.
- 5.3 For beaches and dunes, the trilateral policy takes into account the demands of recreation and tourism, coastal flood defence and protection and natural values, like high geomorphological dynamics and important breeding areas. Where possible, the natural situation should be increased by 'hands-off management'.
- 5.4 Coastal management should aim at a natural dynamic development recognizing the necessity to protect the security of the inhabitants on the islands and safeguarding the stability and the infrastructure of the islands.
- 5.5 In case coastal flood defence and protection is carried out, Best Environmental Practice will be applied.
- 5.6 Disturbance and damage caused by recreation and tourism are already managed and will be further minimised through information systems and/or temporal and spatial zoning. (Identical with 3.8 and 4.31)
- 5.7 Driving cars in breeding areas on beaches and in dunes is prohibited. (Identical with 9.10)
- 5.8 It is important to restore the natural dynamics. This could be done by e.g.
 - allowing sand drift,
 - restoring natural dune vegetation.
 Coastal flood-defence and protection, existing buildings and infrastructure, as well as traditional use, are not affected.
- 5.9 Ground water extraction on the islands will be limited to the extent possible and will be managed in such a way that negative impacts on wet dune valleys are avoided.
- 5.10 To concentrate cable crossings through the Wadden Sea within a minimum of cable corridors and a minimum of cables, using the best available techniques, e.g. cables with highest capacity available, and to communicate regularly on this item in order to use synergies. (Identical with 3.17; 4.19; 7.3)
- 5.11 To aim for natural nutrient levels in dunes.

6 Estuaries

THE HABITAT

The estuaries in the Trilateral Cooperation Area are delimited on the landward side by the mean brackish water limit of the rivers, and on the seaward side by the average 10‰ isohaline at winter high water. On the landward side of the rivers, the areas outside of the main dikes or, where the main dike is absent, the spring-high-tide-water line, including the corresponding inland areas to the designated Ramsar and/or EC-Bird Directive areas, are part of the estuaries.

Estuaries include the river mouths with a natural water exchange with the Wadden Sea. Such brackish areas belong to the transition zone between rivers and tidal waters. There are five such estuaries in the Wadden Sea Area with 'open access' to the Wadden Sea, namely the Varde Å in the Danish Wadden Sea Area, the Eider, the Elbe and the Weser in the German Wadden Sea Area, and the Ems in the German and Dutch Wadden Sea Area.

Most of the estuarine area is designated as Natura 2000 area (see Maps 2 and 4) with respect to the Habitat Directive as well as to the Bird Directive. With exception of the Ems estuary, national Conservation Objectives have been defined for the estuarine Habitat Types, of which 1130 (estuaries) is dominating.

The entire estuarine area in The Netherlands and Germany has been assigned as transitional water bodies under the Water Framework Directive. Management plans for the rivers Elbe and Weser are in progress.

The estuaries are of high relevance for the Wadden Sea ecosystem in terms of input of nutrients and toxic substances, sediment dynamics, nursery and feeding area for Wadden Sea species on the one hand. However, the estuaries themselves are also viewed as a specific habitat, characterized by strong variability and dynamics of key factors such as salinity, tidal range, turbidity and others. From an ecological point of view they are important, e.g. for migrating species (in particular birds and fish), but additionally they are inhabited by various brackish-water and estuary-endemic species and are thus of special importance for nature protection reasons. The brackish salt marsh vegetation produces more biomass than any other salt marsh, attracting large numbers of ducks and geese.

THE TARGETS

- Protection of valuable parts of the estuaries.
- Maintaining and where possible restoring natural habitats and tidal dynamics typical of estuaries.
- Maintaining and, as far as possible, restoring the river banks in their natural state.
- Maintaining and where possible restoring the function as migration route and breeding area for fish and birds.

The Targets are consistent with the quality objectives of the WFD and relevant national conservation objectives for tidal area habitat types. The Targets are also consistent with the World Nature Heritage criteria VIII-X.

STATUS AND ASSESSMENT

Especially the smaller river outflows in the Wadden Sea Area have sluices or surge barriers that prevent natural mixing of fresh and salt water and the establishment of transition zones.

Of the five estuaries with open access to the Wadden Sea, the rivers Elbe, Weser and Ems constitute the seaward access routes to the major German sea ports and are among

the most industrialized regions of the Wadden Sea Area. The industrial development of these rivers in the last centuries has resulted in significant alterations in morphology, hydrography (including tidal amplitude), flora and fauna, amongst others as a result of deepening and embankment and fixation of river banks, including the resulting loss of brackish marshes.

By virtue of the designation of the vast majority of the foreland and water areas of the estuaries as Natura 2000 sites, the first target can be viewed as largely achieved. However, the attempts to achieve a favourable conservation status for river banks and maintenance of good water quality failed, although loads of nutrients and several contaminants have been reduced considerably during the last 20 years.

The ecological importance of the upper Ems estuary and especially of its tidal brackish water reach has drastically deteriorated over the last 20 years. The water quality (in particular the increase of suspended solids and oxygen depletion) and the aquatic fauna have been severely depleted mainly as a result of deepening of the upper estuary for shipyard purposes. There is a strong need for improvement. A storm surge barrier (also in use as a temporary tidal weir with respect to new build ships) has been constructed.

During the last 20 years the Weser ecosystem has undergone fewer changes than that of the Ems. However, further deepening has occurred and the alteration of the tidal amplitude is highest.

In the tidal freshwater reach of the Elbe estuary bad water quality (especially oxygen deficiency), high dredging volumes and further deepening have further degraded the ecological system.

The Varde Å estuary has morphologically remained in its natural state, but has for decades been subject to intensive agricultural exploitation. However, a joint agricultural and environmental project for the extensive meadows around the estuary of Varde Å was initiated during the years 1998-2002, and extensification is now taking place in almost 2,400 hectares of marshland.

The houting belongs to the most endangered fish populations of the Wadden Sea/North Sea and is one of two prioritized species under the EC Habitats Directive. Previously it was common in the Wadden Sea Area and adjacent river systems. Today it is found in the Danish part of the Wadden Sea Area and in upstream river systems in self-sustaining populations. The actual conservation status is unfavourable in Denmark. In Schleswig-Holstein, single individuals are found but there is no reproducing population.

Apart from the large estuaries, there are few natural transitions between fresh and salt water left. Some progress on modifying sluice regimes, building fish passages and restoration of brackish marshes increased the opportunities to develop habitats and species depending on natural transition zones.

Climate change will also alter the ecological situation in the estuaries due to changes in the freshwater flow regime, accelerated sea level rise, rising temperature and others. Due to climate change, adaptation measures will become necessary with respect to e.g. coastal defence. This may lead to additional impacts on the estuarine ecosystem.

In all three countries, the Conservation status according to the Habitats Directive is unfavourable (bad) for Habitat Type 1130.

HOW TO PROCEED

Because it is necessary to maintain and restore ecological functions of estuaries and to manage shipping routes and harbours for their intended purposes, assessments of the environmental impacts of new activities, compensation and mitigation, and restoration projects are central elements in policy and management.

Management plans according to the WFD (aiming in HMWB designated waterbodies at a good ecological potential) and the HD (aiming at a favourable conservation status) are currently under development, including the planning of restoration measures. These plans should be developed in a harmonised way and should also include the freshwater tidal reaches of the estuaries.

Possibilities for reducing artificially increased tidal amplitude and tidal pumping in estuaries should be considered, as has been started in the Elbe estuary

In the Varde Å estuary, extensification of agricultural use is in progress and will be continued.

Further progress on modifying sluice regimes, building fish passages and restoration of brackish marshes and reconstitution of spawning areas for migrating fish species is necessary.

Long-term strategies for adaptation to climate change should be developed for the estuaries.

TRILATERAL POLICY AND MANAGEMENT

The policies for important elements of the estuaries, *i.e.* the water, sediment and tidal flats, the salt and brackish marshes, the rural area, birds and fish, have been formulated in Target Chapters 2, 3, 8, 9 and 11 respectively. The relevant parts of these policies also apply to valuable parts of estuaries. It concerns here, in particular, dumping of dredged material, agriculture, hunting, fisheries, recreation and energy.

- 6.1 The extension, or major modification, of existing harbour and industrial facilities and new construction shall be carried out in such a way that the environmental impact is kept to a minimum and permanent, or long lasting, effects are avoided and, if this is not possible, compensated.
- 6.2 Large scale extractions and disposal of cooling water from power plants should be limited to a degree that is compatible with ecosystem requirements, applying best available technology to avoid incompatible heating of estuarine waters, shortage of oxygen and negative impacts on estuarine habitats and species, especially fish.
- 6.3 The deepening of shipping lanes in the estuaries will be carried out in conjunction with an overall assessment, according to relevant EC Directives, of how to compensate and mitigate the measures.
- 6.4 The impact of re-location and dumping of dredged materials will be minimised. Criteria are, amongst others, appropriate dumping sites and/or dumping periods. This has been implemented on national level through joint concepts for dredged materials for marine and coastal waters. (Identical with 4.21)
- 6.5 River banks will remain in and be restored to their natural state, as far as possible.
- 6.6 Good water quality will be maintained or restored as far as possible.
- 6.7 The transition zone between fresh and salt water should be as natural as possible.
- 6.8 Estuaries will be managed in such a way that vulnerability to climate change will be reduced.

7 Offshore Area

THE HABITAT

The offshore area ranges from seaward of the tidal area to the seaward border of the Nature Conservation Area. The border between the offshore area and the beaches on the islands is determined by the average low-tide-water mark.

Most of the offshore area is designated as N2000 area (see Maps 2 and 4). National Conservation Objectives have been defined for Habitat Types 1110 (sandbanks which are slightly covered by sea water all the time), 1140 (mudflats and sandflats not covered by seawater at low tide), 1160 (large shallow inlets and bays) and 1170 (reefs).

The offshore area has been assigned to 4 types of coastal water bodies under the Water Framework Directive. The Marine Strategy Framework Directive covers the main part of the offshore area.

The offshore area is dominated by water depths of more than 10 m. There is a close connection between the tidal area and the offshore area. This connection is clear with respect to water, geomorphology and biology. The tide causes a daily exchange of water between the Wadden Sea and the North Sea, the extent of which is modified by wind conditions. The offshore area forms one coherent geomorphological system with the tidal area. This is demonstrated by the net transport of sediment from the North Sea into the Wadden Sea.

The biology of the Wadden Sea and the North Sea is intimately linked. Phytoplankton is transported from the offshore zone to the Wadden Sea proper and, after dying off, is remineralised. The import of organic matter from the offshore zone is one of the main causes of the food richness of the Wadden Sea. Both cockles and blue mussels may restock the Wadden Sea from populations in deep water refuges in the North Sea after severe winters have decimated the population of the exposed tidal flats. Motile animals like fish, shrimps and crabs largely leave the Wadden Sea in autumn to survive the winter in the relatively warm waters of the North Sea, after which they return to the Wadden Sea. Without the high productivity in the Wadden Sea, the overall stock of these species would be greatly reduced. Birds and marine mammals demonstrate both a daily and a seasonal shift in their use of the Wadden Sea and the offshore area.

THE TARGETS

- An increased natural morphology, including the outer deltas between the islands.
- The Targets for birds, marine mammals and fish are relevant for the offshore area.
- Targets on water quality, see chapter "Water and Sediment".

The offshore area Targets are consistent with the quality objectives of the WFD and relevant national Natura 2000 Conservation Objectives for offshore area habitat and species types. The targets are also consistent with World Nature Heritage criteria VIII – X.

STATUS AND ASSESSMENT

The natural morphology of the offshore zone is closely related to the natural dynamics in the tidal area and the beaches and dunes: there is a net transport of sand from the seaward shores of the islands up to the so-called wave base into the Wadden Sea and this transport is determined by the overall water circulation. The wave base delineates the water depth, from below which no sediment can be stirred up by waves. In consequence, no (significant amount of) sediment is moved towards the Wadden Sea from below this

line. According to CPSL (2001), the wave base is situated in the offshore area between the 10 and 15 m isobath.

Sea level rise and bottom subsidence cause a deepening of the tidal basin resulting in an increased net sand import from the offshore zone. The extraction of sand is increasingly regulated on the basis of the importance of the offshore area and for the overall Wadden Sea sand balance.

Apart from coastal defence activities on the Wadden Sea islands (e.g., cross-shore dam at Texel) no evidence has become available of any negative development in natural dynamics of the geomorphology of the offshore area.

Birds using the North Sea off the Wadden Sea have not been subject to regular monitoring. However, knowledge of the birdlife was derived through different initiatives and in national campaigns in the 1980s and 1990s and has grown enormously in recent years. Seabird species occurring in the offshore area in specific months of the year are divers, eider, scoters, gulls and terns. The sandwich terns breeding on the Wadden sea islands feed above subtidal sand banks in the off shore area.

Notwithstanding progress in protection, including the designation of the Wadden Sea PSSA in 2002, there are several activities in the offshore zone of the Wadden Sea, including shipping adjacent to the area, which can pose a threat to the area ecology. The offshore zone is important for birds in periods of food shortage. Safeguarding the food situation of (diving) birds is closely connected to the shellfish fishery in the area. Repeated inventories have demonstrated the occurrence of important stocks of the bivalve *Spisula subtruncata* along the Dutch coast, and of *S. solida* along the coast of Schleswig-Holstein. These bivalves are a major food source for diving ducks such as the common scoter and eider. For the eider in particular, these *Spisula* stocks are important for the survival when other bivalve stocks in the Wadden Sea are depleted, e.g. by severe winter conditions. *Spisula*-populations can show big natural fluctuations, e.g. *Spisula solida* off the coast of Schleswig-Holstein nearly died off during the severe winter of 1995/96 and has not recovered since.

Intensive shipping traffic by cargo and fishery vessels may result in disturbance of seabirds and especially the seaduck species eider and common scoter, which depend on the offshore area both as a major roosting and foraging area during winter and again during the sensitive moulting period in late summer.

The increased building of wind farms in the North Sea may affect both seabirds and marine mammals in the North Sea. Wind farms are not allowed in the Nature Conservation Area, but some have already been established close to this area and others are planned, and can, therefore, influence parts of the wildlife populations that use both the offshore area and the tidal area.

The environmental effects of the construction of wind farms in Danish offshore areas have been studied thoroughly during the last decade. The study includes one of the largest wind farms in the world, the Horns Rev 1 Wind Farm, constructed in 2002 (sited 14–20 km west of Blåvands Huk with 80 turbines; 20 km²). Additionally, an extension of the wind farm was completed by 2009 with another 91 turbines; 35 km²).

The main results of the ecological effects of the first phase are:

In relation to fish, data have documented some effects of the cable route on fish behaviour, indicating avoidance of the cable as well as attraction, depending on species. Further investigations were made to see if fish began to colonize the turbine foundations as artificial reefs. The early results were not clear, but the colonization of the foundations will probably progress over the coming years, and may lead to higher diversity and biomass of fish species in the wind farm area.

Hazards presented to birds by the construction include barriers to movement, habitat loss and collision risks. Observations confirmed that most of the more numerous species showed avoidance responses to the wind farm, although responses were highly species specific. Birds tended to avoid the vicinity of the turbines and there was considerable movement along the periphery of the wind farm. Post-construction studies showed almost complete

absence of divers and scoters within the farm. Other species showed no significant change. Although such bird displacement represents effective habitat loss, it is important to assess the loss in terms of the proportion of potential habitat affected relative to the areas which remain available outside the wind farms. However, the cumulative impacts of many other such wind farms may constitute a more significant effect in the future.

To seals, the wind farm area is part of a much larger foraging area. No general change in behaviour at sea or at their nearby roosting sites could be linked to the construction or operation of the wind farm. Only a slight decrease in porpoise abundance was found during the construction and no effect during operation of the wind farm was observed. However, clear effects of pile driving the foundations were observed.

Harbour seals spend part of their time in the offshore zone. Harbour porpoises appear in considerable numbers in the adjacent coastal part of the North Sea, especially in winter, partly in spring. The Schleswig-Holstein offshore area off Sylt is an important rearing area for harbour porpoises. Meanwhile there are indications that the offshore area in other parts of the Wadden Sea could also become important for these small whales.

There is little experience within the trilateral cooperation with the management of the offshore area. The whole of the Danish offshore part of the Wadden Sea Area is part of the national park. In the Danish offshore area, shellfish fishery on species other than mussel, cockle and shrimp, is not allowed. Parts of the German national parks are situated in the offshore area. The commercial extraction of sand is, in principle, not allowed. Cockle fishery is not carried out.

In Denmark, the conservation status of Habitat Type 1110, 1160 and 1170 is unfavourable (bad).

In Germany, the conservation status of Habitat Types 1110, 1160 and 1170 is unknown.

In The Netherlands, the conservation status of the offshore Habitat types 1110 and 1140 is unfavourable (inadequate).

HOW TO PROCEED

For the area of the World Heritage property, the state parties of Germany and The Netherlands have confirmed their commitment not to explore and extract oil and gas at locations within the revised boundaries of the nominated property, in line with the law in force.

The offshore area in The Netherlands has been designated as a Natura 2000 area, to a limit of 3 sea miles for the Bird Directive and to the 5 meter depth line for the Habitats Directive. The management plan for this part of the offshore area must be ready by early 2012 at the latest. The Netherlands intends to enhance the designation as N2000 area to the 20 meter depth line and notified this extension to the EC in December 2008.

There is a need to evaluate differences in national policies for the offshore area, including differences in the implementation of relevant EC Directives, with the aim of identifying harmonisation needs and possibilities.

Because of the interactions between hydrological and geomorphological processes in the offshore zone, the dunes and beaches, the tidal area and the salt marshes, policies aiming at increasing the natural dynamic situation in these habitats need to be further developed and intensified. Coastal flood defence and protection needs should not be affected, in particular in the light of increasing sea level rise.

Policies for safeguarding the food situation for birds must be continued for the whole offshore area

The management of seals in the offshore area is covered by the Trilateral Seal Management Plan (see Chapter 10). This plan is amended and updated at regular intervals.

In view of the high numbers of harbour porpoises in the offshore area, policies aiming at safeguarding these values, especially in rearing areas, will be further developed.

TRILATERAL POLICY AND MANAGEMENT

- 7.1 Trilateral policies will be based on an integrated approach to coastal flood defence and protection and nature protection on the mainland coast, the islands and the offshore zone.
- 7.2 In view of accelerating sea level rise, increased attention will be given to the role of the offshore zone in the total Wadden Sea sand balance. In this respect sand will only be extracted from outside the Wadden Sea Area. Exemptions for local coastal flood defence and protection measures may be granted, provided it is the Best Environmental Practice for coastal protection (e.g. taking the sand from below the wave base).
- 7.3 To concentrate cable crossings through the Wadden Sea within a minimum of cable corridors and a minimum of cables, using the best available techniques, e.g. cables with highest capacity available, and to communicate regularly on this item in order to use synergies. (Identical with 3.17; 4.19; 5.10)
- 7.4 The construction of wind turbines in the Nature Conservation Area is prohibited. (Identical with 3.18; 4.17; 8.4; 9.11)
- 7.5 The construction of wind turbines, in the Wadden Sea Area outside the Nature Conservation Area is only allowed if important ecological and landscape values are not negatively affected. (Identical with 3.19; 4.18; 8.5; 9.12)

8 Rural Area

THE HABITAT

The rural area includes meadows and arable land on the islands, Halligen and on the mainland where there is a strong ecological relationship with the Wadden Sea.

Human use, mainly agriculture, has priority in major parts of the rural area. The areas for wildlife and biodiversity have for centuries been determined by agricultural utilization. To migratory birds, in particular some wader, duck and goose species, rural areas behind the dikes on the islands and on the mainland are very important during their stay in the Wadden Sea Area. Meadows, pasture land and arable land are utilized as roosting sites by golden plover, lapwing, ruff and curlew, and other species, mainly in spring and autumn. The herbivores widgeon, barnacle goose and, to a lesser extent, brent goose, also use meadows and arable land as feeding areas during autumn and spring.

Furthermore, some rural areas on the islands and on the mainland are important alternative high-tide roosting sites when there are extraordinarily high water levels in the Wadden Sea.

The rural area is in most cases not a habitat type according to the EC Habitats Directive, but it may contain designated habitat types, e.g. 3150 (natural eutrophic lakes with magnopotamion or hydracharition- type vegetation), 6510 (lowland hay meadows) and habitat types of the wet grassland and the species rich meadow grassland. The low-lying marshes and wetlands are of utmost importance to a number of breeding bird species which are characteristic of the Wadden Sea Area and which are under protection of the EC Birds Directive. Several areas within the Wadden Sea Area, as well as areas adjacent to the Wadden Sea Area, have been designated as Special Protection Areas (SPA) according to the Birds Directive and Special Areas of Conservation (SAC) according to the Habitats Directive. These areas include a number of protected habitat types and species

THE TARGETS

- Favourable conditions for flora and fauna, especially migrating and breeding birds.
- Good ecological connectivity between the tidal area, salt marshes and rural areas.

STATUS AND ASSESSMENT

Breeding birds

Six species that rely on rural areas behind the seawall (oystercatcher, Northern lapwing, ruff, common snipe, black-tailed godwit, and common redshank) showed significant declines in 1991-2006. Drivers for the negative trends are not known in detail in all species. Some of the nests fail due to predation (mainly mainland), whereas many other suffer from intensified agricultural practise (all areas). Numbers of spoonbill have increased, so have the numbers of them that have been observed feeding in ditches in the rural area.

Migratory birds

Numbers of roosting birds during high tide are mainly linked to developments in the intertidal area, or factors in breeding grounds outside the Wadden Sea Area, mentioned in the chapter Birds. The species that rely on rural areas for feeding are golden plover, brent goose, widgeon, curlew, lapwing and barnacle goose. Among these, barnacle geese have shown a significant increase since 1987 (as part of a general population increase). Brent goose shows an adverse trend (now stable, but decline in the 1990s and probably also in the near future due to lack of good breeding years in Siberia). The other species show

stable trends. The exception is the golden plover, which has shown a decline since 1987. This is one of the main species relying on rural areas behind the seawall.

The herbivores wigeon, barnacle goose and, to a lesser extent, brent goose, use partly meadows and arable land as feeding areas during the period September/October to March/April. A shift in habitat use from natural feeding areas such as seagrass beds and salt marshes to agricultural land (e.g. intensively used grassland areas) has occurred and resulted in damage to agricultural land and, as a consequence, conflicts with farmers.

At night, marshes, grasslands and fields behind the dikes are utilized by wigeons. However, the use of agricultural land by geese and ducks, and in consequence also the conflicts, are concentrated in specific localized areas. This is not only dependent on the management of the concerned area, but also on the management of habitats and geese elsewhere. The developments in agricultural use (e.g. cultivation of winter grain, set-aside or transformation of meadows to farmland) also have consequences for the use by geese and ducks.

Human activities

A major change in the human use of the rural area has been a further intensification of agriculture. This mainly concerns turning pastures into arable land, e.g. for growing maize. This development is enhanced by energy policies that enhance farmers to grow crops that can be used for generating energy from biomass. This change has a major (negative) impact on the biodiversity of the rural area.

In all three Wadden Sea states biodiversity has decreased as a result of the abandonment of the EU set-aside policies in 2008, in order to increase production of crops. Furthermore, earlier mowing of grassland in spring has a negative impact on breeding success of meadow birds.

In the past decades numerous wind farms have been constructed in the vicinity of the Wadden Sea Area, especially in Niedersachsen and Schleswig-Holstein, which may have an impact on roosting and migrating birds.

Locally, agri-environmental schemes have been designed to improve breeding and feeding opportunities for farmland birds, but mainly species that have no direct connection with the Wadden Sea.

National policies

There is a marked difference between the Wadden Sea countries regarding implementation of the EC Bird Directive. In Denmark and partly Schleswig-Holstein rural areas on the mainland, with an ecological link to the Wadden Sea, are included in the Wadden Sea Area. In Niedersachsen SPAs have been designated all along the mainland coast, not being part of the Wadden Sea Area. In The Netherlands there are only few SPAs on the mainland, directly adjacent to the Wadden Sea Area.

HOW TO PROCEED

The most important element in future policy and management is to work towards sustainable agricultural use of the rural area. However, it is evident that this can only be done in close cooperation, and on a voluntary basis, with the agricultural sector.

Regional and local authorities have an important responsibility to stimulate sustainable use in cooperation with the people who live in the area.

Also, measures in the tidal area and salt marshes will help to provide favourable conditions for the concerned bird species.

There are strong interactions between the tidal area, salt marshes and the rural areas, and this connection can be strengthened by the establishment of a sustainable development strategy which integrates policies for both the tidal area, salt marshes and the adjacent areas.

The proper management of geese is an issue of increasing relevance in Wadden Sea Region due to increasing numbers of geese. On the one hand geese "belong", to the area, they are a natural asset and are a typical and to a large extent protected element of the Wadden Sea Region biodiversity. Due to the high proportion of the populations being dependent on the Wadden Sea there is also an international responsibility of the Wadden Sea countries for these species. In addition, geese also constitute an important touristic attraction.

On the other hand, some geese species cause increasing damage to farmlands, while current management schemes for geese are highly variable between countries and liable to further improvement.

It is acknowledged that a coordinated and consistent management of geese grazing in the rural area is needed.

There is a need to make consistent national policies regarding the designation of parts of the rural area as SPA.

TRILATERAL POLICY AND MANAGEMENT

Trilateral measures regarding the management of human activities which are relevant for the rural area, and which have also relevance for the special Targets on birds, such as hunting, are dealt with comprehensively in Chapter 9 on birds.

- 8.1 Sustainable agriculture for improving nature conservation, with particular emphasis on improving conditions for breeding meadow birds, limiting the use of artificial fertilizers and pesticides and a good water management, maintaining typical landscape elements and protection of cultural heritage will be supported, amongst others, financially.
- 8.2 Nature areas reclaimed for agricultural purposes should be restored, where possible, through voluntary cooperation with, and active participation of, the owners.
- 8.3 The management of geese in the rural area will be based upon a strategic trilateral goose management plan.
- 8.4 The construction of wind turbines in the Nature Conservation Area is prohibited. (Identical with 3.18; 4.17; 7.4; 9.11)
- 8.5 The construction of wind turbines, in the Wadden Sea Area outside the Nature Conservation Area, is only allowed, if important ecological and landscape values are not negatively affected. (Identical with 3.19; 4.18; 7.5; 9.12)

9 Birds

THE SPECIES

The Wadden Sea is an important area for breeding and migrating birds.

Of 5 species more than 25% of the NW-European population breeds in the Wadden Sea. A total of 14 breeding species is listed as Annex 1 species of the EC Bird Directive. Several species are included in national Red Lists in the Wadden Sea countries.

At least 52 populations of 41 different species occur in high numbers as migrant, moulting or wintering bird in the Wadden Sea. For 44 populations in 34 species, the Wadden Sea is an indispensable roosting area. All these species belong to the so-called East-Atlantic flyway, a system of migration routes between Greenland and Western Siberia in the Arctic and wetlands in Western and Southern Africa. The most important migratory and wintering birds are geese, ducks and waders.

Birds use different habitat types of the Wadden Sea Area. Therefore, all habitats which are used by one species or population are linked to and depend on each other. For example, feeding areas and appropriate roosting sites on the tidal flats or salt marshes should be available in sufficiently close distance to the breeding site of a species. During various periods, all these habitats are important habitat types for the different species and are essential for the natural development of these species in the Wadden Sea Area. Therefore, the bird Targets are more or less relevant for all habitat types in the Wadden Sea Area.

All countries have designated most of their parts of the Wadden Sea Area as SPA and/or SAC and have adopted conservation objectives for the designated species.

THE TARGETS

- Stable or increasing numbers and distribution taking into account that abundance of species is in line with prevailing physiographic, geographic and climatic conditions.
- Breeding success and survival determined by natural processes.
- Breeding, feeding, moulting and roosting sites supporting a natural population.
- Undisturbed connectivity between breeding, feeding, moulting and roosting sites
- Fluctuations in food stocks determined by natural processes.
- Habitat, food stocks and connectivity between habitats supporting a favourable conservation status.

The Bird Targets are consistent with the national Natura 2000 conservation objectives. The Targets are also consistent with World Nature Heritage criterion "X".

STATUS AND ASSESSMENT

The conservation status of birds in the Wadden Sea Area is primarily determined by weather conditions, the availability of habitats and their quality, the availability of adequate breeding or roosting areas, food availability, disturbance from various human activities, and by pollution. For migratory and some breeding birds these factors are relevant for the whole of their flyways.

Migratory Birds Developments

Trends for 34 waterbirds are now available for a 20-year period for the entire Wadden Sea and show that 8 species show a strong or moderate increase, 12 species are stable and 14 species show decreasing trends. Among the increasing species are the great cormorant, Eurasian spoonbill and barnacle goose. Some of the stable species are brent goose, Eurasian wigeon, red knot and Eurasian curlew. Among the decreasing species are common

shelduck, mallard, Eurasian oystercatcher and Kentish plover. The trend for common eider covers only the last 15 years and this is also decreasing.

The reason for changes in numbers for most species is not known and for future assessments more detailed information and data are necessary together with ecological studies.

Breeding Birds Developments

Analyses of trends of Wadden Sea breeding birds in 1991–2006 show that 13 of the 29 monitored species for which a trend calculation was possible are actually in decline. Recent counts suggest that (further) declines are also due in common eider, arctic tern and little tern. Especially in waders, declines are most pronounced: 12 of 13 declining species represent this group and they include both typical Wadden Sea breeding species like oystercatcher, avocet and common redshank and more farmland-dependent species like Northern lapwing and black-tailed godwit. Dunlin, ruff and common snipe have nearly gone extinct and mainly depend on management of their remaining breeding sites in Denmark. Backgrounds of the observed trends are only partly known. At least in some species it has been demonstrated that breeding success has been low for many years, Depleted food stocks have had a negative impact on especially shellfish-eating species (common eider, oystercatcher and herring gull). For Kentish plover and great ringed plover, disturbance and habitat changes are important limitations that prevent a recovery from the long-term declines observed in both species. For breeding meadow species it is evident that intensification of farming practice (drainage, fertilizing, early mowing in grasslands etc.) has had clear negative effects on both breeding success and population developments. In addition an increased predation, often by invasive species, creates problems. The impact of other factors, such as changes in salt marsh management and climate change in the Wadden Sea ecosystem are largely unknown yet.

Breeding Success

In 2009 a new TMAP Parameter was introduced in order to explain downward trends in several breeding bird species. The new parameter 'breeding success' performs as an early-warning system to detect changes in the ecosystem or assess human impact, since it is more directly linked with shifting conditions in the environment. Moreover, evaluation of the target 'natural breeding success', as addressed in the Wadden Sea Plan, was not possible with monitoring of only population size and distribution.

Contaminants in bird eggs

In 2008, the ecological quality objectives (EcoQOs) proposed by ICES and OSPAR for contaminants in seabird eggs have already been reached for some substances at some sites in the Wadden Sea. The stagnation of the levels of various substances and some recent increases point to local problems with environmental pollutants. At the hot spots of contamination, the present concentrations of Σ PCB and Σ DDT, especially in the eggs of common tern, are still very high in comparison with the target levels.

Roosting Areas

Waterbirds in the Wadden Sea gather at roosting places during high tide. Many of the important roosting sites can be found at areas with a low level of human activity and are located at close range of intertidal mudflats occur. Human disturbance is nevertheless among the most important factor with influence on bird numbers at high tide roosts, and it can put an extra stress on the species energetic balance and their tight migration schedule.

High tide roosts are relatively well protected, with more than 80% of these roosts being located within Special Protection Areas. Despite this, disturbances can occur in all parts of the Wadden Sea. A main impact is by outdoor recreation, with peaks during July and August but also, increasingly, in spring and autumn. Potential conflicts are minimized and resolved by spatial and temporal zoning of recreational activities as well as convincing

visitor information systems. Different protection schemes for roosting birds are in place along the Wadden Sea.

Moulting Areas

Large numbers of moulting common shelduck, common eider and common scoter occur, and several sites within the Wadden Sea Area hold numbers of international importance. During the moult the species are flightless, and therefore very sensitive to disturbance, thus they choose areas with a minimum of human activity, especially by small boats. The three species differs in moult periods, moulting locations and moulting behaviour. Because shelduck and eider concentrate very much during moulting, moulting areas are well known. As result of concomitant research on planned offshore windparks more information is available about the common scoter. Common scoters are highly dispersed at a huge area during their moult. Therefore a protection scheme is difficult to find. The northern Wadden Sea seems to be a very important moulting are for that species. Due to the concentration of almost all moulting Shelducks in just one area there is a permanent risk for this species which requires special attention.

More information is needed about the planning of offshore wind parks and the associated traffic, as well as shrimp fisheries and sand extraction, which can potentially affect the distribution and activity of common scoters at sea during the moulting season.

Generally further assessment of the demand of undisturbed moulting sites in and outside the Wadden Sea is needed.

Food Availability

Large populations of herbivorous aquatic bird species, among which the barnacle goose, the dark-bellied brent goose, and the Eurasian wigeon, and semi-herbivorous aquatic bird species, such as the mallard and teal, occur in the Wadden Sea. Of these the barnacle goose shows a steady strong increase, the dark-bellied brent goose and the Eurasian wigeon are stable and the common teal together with mallard are decreasing. For none of the decreasing species food seems to be the cause.

Fertilized grasslands landwards the dikes will always be of higher food quality and could thus become more attractive for geese than the natural saltmarshes. Goose numbers (especially Barnacle goose) have increased further and with them the conflicts between different stakeholders.

Common eider, oystercatcher and herring gull depend on shellfish and both, breeding and roosting populations are decreasing. The common eider and the Eurasian oystercatcher use blue mussel as their main food source. Large scale studies in the Dutch Wadden Sea showed a possible connection between the exploitation of blue mussels and cockles and the size of bird populations. Simultaneous declines in blue mussels and local bird populations of some species have been described. While the mussel fishery was hardly regulated in the 1980s and 1990s, since then management measures for mussel fisheries including regulations for food reservation for birds have been introduced in all Wadden Sea countries.

Some bird species are now arriving earlier and staying longer during autumn, than in the past. These major changes in phenology are most likely influenced by milder climate during the last 20 years, and from a management perspective this opens new challenges, meaning that the Wadden Sea shall in the future be able to host birds that no longer use their original autumn and wintering grounds as well as those individuals that normally use to stay in the Wadden Sea during autumn and winter.

There are four military exercise sites in the Wadden Sea Area: in the Dutch Wadden Sea the exercise grounds the "Vliehors" and the "Mokbaai" are located partly within and partly outside the Nature Conservation Area. The "Vliehors" is used on work days for firing guns and rockets and bomb dropping. Explosive bombs are only used outside the breeding season. Practices with bombs, rockets and gunning from fighter planes occur on average 180 days per year. In the "Mokbaai" annually about 50 exercises involving zodiaks, landing crafts and helicopters of the naval forces are executed, confined to work days. In Germany

a ballistic testing site for new weapons is located in the Meldorfer Bucht. The area has been used since the early 1980s. However, over the last ten years the range has been used on average on 0.5 days per year only. Tests are undertaken from platforms on the seawall outside the Nature Conservation Area, however the target area stretches into the Nature Conservation Area. In the Danish Wadden Sea military activities takes place at the northern part of the island of Rømø. Here air-to-ground training sessions are regularly performed, and these actions are quite distinctive, but strongly limited in time.

All military activities are limited in time to take account of especially breeding and moulting times for birds and seals. An impact assessment study in the Meldorfer Bucht conducted in 2001 showed that the overall impact on birds (and seals and macrobenthos) was very small. In combination with the very low frequency of testing activities here, it can hence be stated that the testing site has no negative effects on the biological values and the integrity of the Meldorfer Bucht area. On Rømø the closure of the area for the public has delivered important breeding sites with no or very little disturbance from other human activities compared to other saltmarsh and dune areas in the Wadden Sea. An agreement between the Ministry of Defence and the Ministry of the Environment includes a management plan (2002 – 2017) for the 2.200 ha of important saltmarsh and beach areas within the shooting range.

EC Bird Directive

Only 15 bird species (13% of the total number of species) have been listed commonly as designating species in all countries. Hence, there is quite a variation among countries what species they have used. Differences were also found in implementation of the Bird Directive:

- use of numerical threshold values (number of birds) in Denmark;
- use of ecological carrying capacity of the habitat for a certain population size in The Netherlands;
- use of habitat quality as assessment parameter in Niedersachsen and Schleswig-Holstein and The Netherlands;
- no site-based conservation targets in Hamburg and Denmark.

HOW TO PROCEED

An important element in future policy and management is to work towards acceptable solutions to reduce the conflict between food requirements for birds and the interests of fisheries and agriculture. It is important to avoid food shortage due to disturbance of other human uses (such as recreational activities, aerial traffic, wind turbines and hunting), as well as, human activities which favor certain species of birds by increasing their food supply, e.g. fishery discards, eutrophication and agricultural practices in island polders and areas behind the dikes. However, it is evident, that this can only be done in close cooperation with the fishery and agricultural sectors.

Policies for transition towards sustainable shellfish fisheries are described under tidal area.

Policies for goose management are presented under Rural Area.

Measures to protect breeding, roosting and feeding habitats can be achieved by establishing a sufficient number of bird reserves of proper size and through the management of human activities. Breeding populations of Kentish Plover and Little Tern, which are highly dependent on sandy beaches and primary dunes, are particularly threatened. The situation of these species will be further improved. The same is valid for migrating and moulting birds. Undisturbed moulting and roosting sites which lie close to their feeding areas are necessary for birds to avoid energy loss.

It is important to avoid the construction of wind turbines in the rural area where this may cause a significant impact on birds.

The impact of civil air traffic has been limited by, amongst others, minimum flight

altitudes (Germany, and The Netherlands) and by additional voluntary agreements with pilots and airport administrations (Schleswig-Holstein and Niedersachsen). No additional measures have been taken in Denmark. Because severe disturbances are still reported, there is a need to continue to further reduce impacts by civil air traffic in close cooperation with the relevant islands.

Flyway-Cooperation Agreements have already been established with The Wash and Guinea Bissau.

The Trilateral Cooperation will further strengthen the cooperation on management and research activities with state parties of the African Eurasian flyways, which also play a significant role in conserving migratory species along these flyways.

Conservation objectives according to the Birds Directive will be made consistent to the extent possible and assessment methodologies harmonised.

TRILATERAL POLICY AND MANAGEMENT

Bird conservation and management at the general trilateral policy level is subordinated in the Nature Conservation Area to the Guiding Principle, *i.e.* a natural and, as far as possible, dynamic Wadden Sea ecosystem, even if natural dynamics may lead to less favourable conditions for some bird species or populations locally. That means that in the Nature Conservation Area the Guiding Principle is more important than special conservation measures for certain species. However, severe declines of protected bird species will not be accepted if the reasons are found regionally in the Wadden Sea.

The general management measures for specific habitats, listed under the headlines of the habitat categories, can be relevant for bird populations in general.

Site Protection

- 9.1 The conditions for breeding birds will be further improved by appropriate management.
- 9.2 It is the aim to further improve the conditions for migratory birds during roosting and feeding, as well as, for seabirds in the offshore area during moulting, through integrated management.
- 9.3 Avoid barriers between feeding, roosting and/or moulting areas, *e.g.* by wind turbines or wind parks.
- 9.4 Prevent introduction and immigration of mammalian predators to the Wadden Sea islands. Artificial structures allowing predators to reach areas which they could not use under more natural conditions, may not be constructed, or, where possible, removal should be considered.

Food Availability

- 9.5 Cockle fishery is not allowed in the Wadden Sea Area, with the exception of mechanical fisheries in some small areas along the Esbjerg shipping lane and in the Ho Bay, and in Niedersachsen outside of the conservation area (but will not be carried out at present), as well as non-mechanical cockle fishing in The Netherlands. (Identical with 4.22)
- 9.6 The effects of mussel fishery are limited by the permanent closure of considerable areas and the optional reservation of sufficient amounts of mussels for birds. In addition, the management of fishery on mussels should not be in conflict with, protecting and enhancing the growth of natural mussel beds and *Zostera* fields. (Identical with 4.23)
- 9.7 Mussel fishery will, in principle, be limited to designated parts of the subtidal area. Based on national management plans, fishery on the tidal flats may be granted. The fishery sector will, in close cooperation with competent authorities, improve existing practices in such a way that impacts of mussel fishery, in general and seed mussel fishery, in particular will be minimised. (Identical with 4.24)

Acoustic and Visual Disturbance

Recreational and farming activities

- 9.8 Disturbance in significant breeding, moulting and roosting areas will be further reduced and access to these areas will be made more predictable for birds, through clear temporal and spatial zoning (for example using only certain footpaths on salt marshes, beaches and dunes and information system for visitors). Regulations should be established in close cooperation with the involved stakeholders.
- 9.9 It is the aim to further reduce the disturbance in significant breeding areas caused by grazing through the reduction of the grazing pressure and through postponing the beginning of the grazing period, except where a certain intensity of grazing is necessary for coastal flood defence and protection measures.
- 9.10 Driving cars in breeding areas on beaches and in dunes is prohibited. (Identical with 5.7)

Wind energy

- 9.11 The construction of wind turbines in the Nature Conservation Area is prohibited. (Identical with 3.18; 4.17; 7.4; 8.4)
- 9.12 The construction of wind turbines in the Wadden Sea Area outside the Nature Conservation Area is only allowed if important ecological and landscape values are not negatively affected. (Identical with 3.19; 4.18; 7.5; 8.5)

Hunting

- 9.13 Hunting of migratory species is prohibited, or will be progressively phased out in the Nature Conservation Area or in an ecologically and quantitatively corresponding area in the Wadden Sea Area.
- 9.14 Hunting of non-migratory species is prohibited, or will only be allowed in the Nature Conservation Area if migratory species are not harmed.

Civil air traffic

- 9.15 The impact of civil air traffic in the Wadden Sea Area will be further limited.
- 9.16 New civil airports will not be constructed in the Wadden Sea Area.
- 9.17 The expansion of existing civil airports in the Wadden Sea Area is restricted to cases where this is essential in order to increase the safety of air traffic.
- 9.18 Minimum flight altitudes for civil air traffic have been or will be established in the Wadden Sea Area. Exemptions can be granted for safety reasons and for scientific purposes and will be confined to designated flight corridors situated in less vulnerable parts of the Wadden Sea Area.
- 9.19 Advertisement flights are, in principle, prohibited in the Wadden Sea Area.
- 9.20 Helicopter flight routes and altitudes are established in such a way that the disturbance to wildlife in the Wadden Sea Area is minimised.
- 9.21 The recreational values of the Wadden Sea will be maintained for the benefit of man and nature. To this end in the Nature Conservation Area,
- in the ecologically most sensitive areas, zones have been or will be established where no recreational activities, including excursion ships and recreational boating, is allowed;
 - the use of jet skis, water skis and similar motorized equipment has been, or will be, prohibited, or limited, to small designated areas;
 - new marinas will be avoided and the extension of the existing marina capacity will only be allowed within the approved levels;
 - water sports like wind surfing have to be balanced with the needs of nature protection and bathing tourism;

- kitesurfing can distort nature values, in particular roosting sites for birds. The aim is a harmonised approach to kitesurfing, consisting of zoning where the activity is allowed under conditions. (identical with 4.28 and 10.5)
- 9.22 Speed limits for ships have been imposed, taking into account safety, environmental, recreational and fishery factors. (Identical with 4.29 and 10.6)

Military activities

- 9.23 Disturbance caused by military activities has been, or will be, reduced and the possibilities for further concentrating and/or phasing out military activities will be regularly examined.
- 9.24 The negative effects of low altitude flight routes of military aircraft have been, or will be, reduced by reducing the number of flights and the maximum speed.
- 9.25 Action to minimize disturbance caused by military air traffic in the Wadden Sea Area will be taken on a coordinated basis.
- 9.26 High priority will be given to the assignment of redundant shooting ranges as nature protection areas.

10 Marine Mammals

THE SPECIES

The harbour (or common) seal, the grey seal and the harbour porpoise may be regarded as indigenous Wadden Sea species. Water is the main or exclusive element of these marine mammal species. The year round, the seals use other habitats than water, to haul out ashore. This includes sand banks in the tidal area and beaches or even any coastal shore. Grey seals tend to prefer areas that are available for longer periods, and could also haul out on higher grounds such as dunes. This holds especially when rearing pups, as grey seal pups do not usually swim for the first weeks of their lives. All these habitats are essential for the maintenance of the seals' vital biological functions, such as whelping, nursing, breeding, moulting, resting and feeding.

Marine mammals, as top predators and often long-lived species, have an important indicative function for the quality of the Wadden Sea ecosystem. These species, and other top predators (*i.e.* several bird species) that overlap in habitat demand, need special attention. Because of their longevity and dependence both directly and indirectly on large areas, they can be vulnerable to disturbance and pollution. On top of this they are often considered in competition with man for food resources.

The harbour seal (species type 1365), the grey seal (1364) and the harbour porpoise (1351) are an Annex II species under the Habitats Directive, and special areas have been designated for their conservation. Furthermore harbour seal and grey seal are listed in Annex V, where the conservation objective is that taking in the wild and exploitation may be subject to management measures. National Conservation Objectives have been defined for all three species. In addition, the harbour seal is protected through the Trilateral Seal Agreement under the Bonn Convention on the Conservation of Migratory Species of Wild Animals (UNEP/CMS) from 1990. The harbour porpoise is protected according to the Agreement on the Conservation of Small Cetaceans of the Baltic and the North Seas (ASCOBANS; UNEP/CMS, 1990).

THE TARGETS

- Viable stocks and a natural reproduction capacity of the harbour seal, including juvenile survival.
- Viable stocks and a natural reproduction capacity of the grey seal, including juvenile survival.
- Viable stocks and a natural reproduction capacity of the harbour porpoise
- Conservation of habitat quality for conservation of species.

The Targets are consistent with the national Conservation Objectives under the Habitats Directive. The Targets are also consistent with World Natural Heritage criterion "X".

STATUS AND ASSESSMENT

Harbour Seal

In the years after the virus epidemics in 1988 and 2002, the population of the harbour seal has shown a rapid recovery. During coordinated flights in the entire Wadden Sea Area in 2009, 21,500 seals were counted, the highest number ever counted in the international Wadden Sea during the moult.

Grey Seal

Grey seals have relative recently recolonised the Wadden Sea. Currently the species is regularly seen in all countries, including in the Danish Wadden Sea area which seems to be the last area colonised. Since 2004, there have been coordinated counts of grey seals in NL and D. Breeding, occurring in December-January, is observed in several locations throughout the Wadden Sea. By far the largest colony is observed in the western Dutch Wadden Sea between the island of Vlieland and Terschelling. Two other breeding sites have developed in the area including Amrum and Helgoland. More scattered over the Wadden Sea, single births and small groups have been recorded, sometimes breeding, indicating that the grey seal population in the Wadden Sea might still be expanding. The maximum number of grey seals counted during the moult 2009 in the Wadden Sea and at Helgoland, was 2756 animals.

Harbour Porpoise

Estimates in 2005 of harbour porpoise numbers for the total North Sea area amount to 335,000 animals. Parts of the population seem to have shifted from the northern North Sea southwards. As porpoise migrate into coastal waters and close to the Wadden Sea, numbers recorded have strikingly augmented in the early 2000s. German studies show hot spots of abundance and frequency (Sylter Außenriff, Borkum Riffgrund and the area north of Helgoland). Waters around the Knobsände off Amrum and west of the island of Sylt show a relatively high density of mother calf-groups (the suckling-period of this species lasts approx. 8 months) in this area. It can be concluded that this area is an important rearing area for harbour porpoises.

ASSESSMENT

The present and short term conservation status of harbour seals, grey seals and harbour porpoises in the Wadden Sea Area is determined by several environmental factors, including disturbance as a result of various human activities (such as recreation activities, construction activities for off-shore wind parks, fisheries, air traffic, shipping and some military activities) and food availability. At present, the harbour seal population does not show any indication of density dependence.

Pollution is presently not a major issue for marine mammals in this area. The current population levels of the seal species do not seem to be affected. Attention to possible new sources of pollutants should remain however.

Though probably still not at the population level of around 1900, the harbour seal population has recovered well from the very low numbers observed in the mid-1970s after hunting was forbidden, and after the 1988 and 2002 epidemics. The total population size indicates that the present harbour seal population can be regarded as viable. Comparison with other harbour seal populations elsewhere leads to the conclusion that the reproduction capacity of the Wadden Sea harbour seal population is at a satisfying level. Still, juvenile mortality is relatively high (approx. 35% instead of 20-25%), despite good protection of the main resting and nursing places. Other factors such as disturbance are in some cases still not satisfactory.

For both the grey seal and the harbour porpoise, data are lacking to enable an assessment of whether the current stocks dependent on the Wadden Sea area are viable, or to enable an adequate estimate of the natural reproduction capacity. In both cases the current stocks show strong interdependencies with stocks subsisting elsewhere in the North Sea.

HOW TO PROCEED

The quality of the habitat of harbour and grey seals, as well as harbour porpoises, needs at least to be maintained. This is the case both within the Wadden Sea area and in the adjacent North Sea, especially as extensive plans exist to further exploit the areas for a

variety of industry, including sand mining and wind farming in the near future. Policies for harbour and grey seals have to be further developed in accordance with the actual Seal Management Plan 2007-2010.

For harbour porpoises, more ambitious policies for protected areas may be considered. However, with such a highly migratory species it will be difficult to identify adequate sites and design a flexible management regime.

TRILATERAL POLICY AND MANAGEMENT

Harbour and Grey Seal

The 'Agreement on the Conservation of Seals in the Wadden Sea' (Seal Agreement) was enacted on October 1, 1991 as the first agreement as defined in Article 4, of the Convention on the Conservation of Migratory Species of Wild Animals (The Bonn Convention). The agreement was concluded between the Wadden Sea states with the aim to cooperate closely in achieving and maintaining a favourable conservation status for the harbour seal population of the Wadden Sea Area. The Seal Agreement contains provisions, amongst others, on research and monitoring, on taking and on the protection of habitats, which have been specified in the 'Conservation and Management Plan for the Wadden Sea Seal Population 1991 - 95' (Seal Management Plan) and the revised Seal Management Plan 2007-2010. The latter also includes additional measures for the protection of the grey seal.

Regarding the implementation of the Targets for the harbour and the grey seal, reference is made to the specific measures related to the different habitat types and, especially, to the Seal Management Plan 2007-2010.

Measures for the implementation of the Targets on seals are especially listed under "Required efforts and objectives" and Actions in the Seal Management Plan 2007-2010, which are divided into actions on the trilateral and national level. These actions include measures which should be implemented in different habitats and for different purposes, such as research, monitoring and protection of habitats

The Seal Management Plan will be updated covering the period 2011-2014.

Harbour Porpoise

The Agreement on the Conservation of Small Cetaceans of the Baltic and the North Seas (ASCOBANS) was also concluded under the auspices of the UNEP Convention on Migratory Species (the Bonn Convention) in September 1990 and came into force in March 1994. The ASCOBANS Conservation and Management Plan requires the parties to implement a variety of different measures including reducing by-catch, marine pollution and disturbance, conducting surveys and research on species ecology and abundance, adopting protective national laws and raising public awareness. A Conservation Plan for harbour porpoises in the North Sea is under development.

- 10.1 The trilateral policy for harbour porpoise is to ensure to the greatest possible extent low disturbance levels, to limit underwater noise to an extent that it does not cause damage for harbour porpoises, to minimize the collision risks with ships and to use fishing techniques which are not a threat to whale species.
- 10.2 It is the aim to protect important breeding/rearing areas of the harbour porpoise in the Wadden Sea Area and adjacent areas through appropriate measures.
- 10.3 The public will be informed about small cetaceans in the Wadden Sea Area and the North Sea on a common basis in cooperation with ASCOBANS.
- 10.4 To develop a joint monitoring strategy on harbour porpoise in cooperation with North Sea wide monitoring schemes.
- 10.5 The recreational values of the Wadden Sea will be maintained for the benefit of man and nature. To this end in the Nature Conservation Area,
 - in the ecologically most sensitive areas, zones have been or will be established where no recreational activities, including excursion ships and recreational

- boating, is allowed;
- the use of jet skis, water skis and similar motorized equipment has been, or will be, prohibited, or limited, to small designated areas;
 - new marinas will be avoided and the extension of the existing marina capacity will only be allowed within the approved levels;
 - water sports like wind surfing have to be balanced with the needs of nature protection and bathing tourism;
 - kitesurfing can distort nature values, in particular roosting sites for birds. The aim is a harmonised approach to kitesurfing ,consisting of zoning where the activity is allowed under conditions. (Identical with 4.28 and 9.21)
- 10.6 Speed limits for ships have been imposed, taking into account safety, environmental recreational and fishery factors. (Identical with 4.29 and 9.22).

11 Fish

THE SPECIES

The shallow coastal waters of the Wadden Sea and its tributary estuaries and rivers provide indispensable ecological functions to life of fish. They support functions such as reproduction, breeding and feeding and they serve as an acclimatisation area and transit route for long-distance migrants from sea to their spawning grounds located in fresh water. The estuaries, with their pronounced salinity gradient due to the mixing of riverine and marine waters, constitute a very specialised habitat within the Wadden Sea. This is reflected by the special fish fauna composition. The Wadden Sea ecosystem is also connected with and influenced by the North Sea: marine juvenile and marine seasonal species form an important constituent of the Wadden Sea fish fauna.

The tidal area, with its flats, seagrass meadows and gullies, is not only the habitat for fish species living permanently in the Wadden Sea but is also an indispensable spawning and nursery ground for those species which migrate in a latter stage of life to the North Sea and Atlantic Ocean. Many of them are of commercial importance.

The Wadden Sea fish fauna consists of approximately 150 species, including 13 fresh-water species, of which about half are common or fairly common. The other half must be considered rare or even extremely rare in the Wadden Sea.

THE TARGETS

- Viable stocks of populations and a natural reproduction of typical Wadden Sea fish species.
- Occurrence and abundance of fish species according to the natural dynamics in (a)biotic conditions.
- Favourable living conditions for endangered fish species.
- Maintenance of the diversity of natural habitats to provide substratum for spawning and nursery functions for juvenile fish.
- Maintaining and restoring the possibilities for the passage of migrating fish between the Wadden Sea and inland waters

The Water Framework Directive recognizes fish as a biological quality element for transitional waters (estuaries) and selected fish species are listed in the Habitats Directive. Among those are the twaite shad, river lamprey, sea lamprey and houting. In addition, characteristic fish species may be used to assess the status of the relevant habitat types described in the HD (e.g. 1110 submerged sandbanks, 1130 estuaries, 1140 sand- and mud-flats). Furthermore, some fish species listed under the Birds and Habitats Directives for the Wadden Sea Natura 2000 network serve as main food item for birds or marine mammals.

In the Marine Strategy Framework Directive, one of the descriptors of the good environmental status deals with commercially exploited fish and shellfish.

STATUS AND ASSESSMENT

The Wadden Sea estuaries and rivers are subject to substantial anthropogenic pressures, which are reflected in the aquatic biotic communities and in the fish fauna in particular. Among the most relevant anthropogenic factors influencing the habitat conditions in river systems are dams, sluices, weirs and riverbed maintenance. In the estuaries, dredging and the disposal of dredged material, coastal flood protection and flood defence and the direct or diffuse input of substances from industry and agriculture are main factors. The North Sea is subject to increasing human demands for shipping, exploitation of resources

(gas and oil, sand and gravel) and wind energy, and to a lesser extent for coastal fishery. Intermingled with the anthropogenic pressures that are exerted, natural variability plays a very important role. Recently, an increasing number of publications point to the relationship between the North Atlantic Oscillation, or regime shifts in the North Sea, and fish populations, or to the effects of increasing water temperatures on fish.

The diadromous fish currently seem to suffer most from bottlenecks in the upstream parts of (some) estuaries where water quality and essential habitats are failing. This has resulted in some species going missing and low abundance of the remaining species. Unhindered migration for near-extinct species like houting and salmon, plus good water quality, suitable spawning habitats and favourable conditions for larval recruitment are essential to maintain vital populations of all diadromous fish in the estuaries and river systems in the Wadden Sea. Pumps and sluices are a barrier to diadromous fish migration. Autonomous developments (sea level rise, climate change) leading to more pumps and sluices, tend to increase the pressure on diadromous fish.

The houting belongs to the most endangered fish populations of the Wadden Sea/North Sea and is one of two prioritized species under the EC Habitats Directive. Previously, it was common in the Wadden Sea Area and adjacent river systems. Today it is found in the Danish part of the Wadden Sea Area and in upstream river systems in self sustaining populations. The actual conservation status is unfavourable in Denmark. In Schleswig-Holstein, single individuals are found, but there is no reproducing population.

In order to save the houting from complete extinction in the Wadden Sea, a Danish management plan was published in 2003, and as a follow up a large-scale EU LIFE Houting Rescue Project was set up. The project is primarily focused on creating access to usable spawning grounds for the adults, and creating new nursery areas for juveniles.

The observed distribution shifts of juvenile flatfish indicate changed conditions in the Wadden Sea nursery, which may have become less favourable due to higher water temperatures during summer. At the same time the North Sea coastal and offshore area may now offer increased chances of survival due to decreased predation risk and competition since commercial fish stocks are at low levels. Here, a combination of high fishing pressure on the North Sea and regime-shifts in the North Sea and Wadden Sea ecosystems plays a role.

The estuarine resident species are the least known and understood group, although of all fish species they may reflect the status and quality of the Wadden Sea ecosystem to the largest extent.

The TMAP common package does not include fish monitoring, and the above information is derived from fish monitoring for other purposes (fish stock assessment for ICES or EU obligations).

Following the requirements of the EC Water Framework Directive, new fish monitoring was initiated in 2006 in all transitional waters of the estuaries of the Ems, Weser, Elbe and Eider, to collect data on particularly pelagic and diadromous fish species in these water bodies. The status of fish in estuaries can thus be assessed by using the estuarine fish index that was developed for the Water Framework Directive transitional waters. The status of fish in nearly all WFD transitional waters shows moderate to large deviations from the 'undisturbed' condition for natural estuaries. Although the species composition still resembles the assumed reference conditions, except for the too low number of diadromous species, the abundance of typical indicator species is currently at a very low level compared to the early 20th century.

In contrast to the assessment of the fish fauna in estuaries in accordance with the WFD, there is no existing fish index or tool to assess the status of fish fauna the entire Wadden Sea. Some fish species are not adequately covered in the current monitoring programs. The number of fish species and the species composition in terms of ecological guilds seem to have remained fairly stable over the last decades. The abundance of several fish species has decreased to levels below the long-term average, but factors causing these changes are still largely unknown. Also the role of saltmarshes for young fish is not known yet.

HOW TO PROCEED

In general, the following conditions are necessary to reach the Fish Targets:

- Diversity of habitats (subtidal areas and tidal flats, including areas with seagrass and mussel beds), to provide shelter and food for juvenile fish (nursery function and substratum for spawning for estuarine resident species and marine seasonal species).
- Suitable physical, chemical and morphological conditions with the underlying dynamic processes typical for tidal areas (for resident species and marine seasonal species).

In addition, the existing Targets on tidal area (subtidal and intertidal) and salt marshes are regarded as beneficial.

Estuaries and River Systems

Conservation and restoration of estuarine habitats are priority issues. Improving water quality (including sufficient oxygen and reduced suspended matter concentrations) and increasing the connectivity between waters will benefit diadromous fish populations, including the species that are protected by the EC Habitats Directive. Fish friendly management of sluices, avoidance of pumps or mitigation of these by creating fish passages and other techniques, and a more natural discharge of fresh water are needed.

Juvenile Fish

The abundance of juvenile fish in the Wadden Sea has decreased, partly as a result of a distribution shift to the coastal zone which leads to juvenile flatfish in particular making less use of the Wadden Sea nursery. Reducing the fishing pressure on the North Sea commercial stocks leads to a more natural recruitment in the Wadden Sea.

Juvenile fish and some estuarine resident fish species are susceptible to bycatch in the shrimp fishery. Measures to increase the sustainability of this type of fishery – by reducing discards and bottom disturbance – will benefit Wadden Sea fish populations.

Because of their limited swimming capacities, marine juvenile fish are susceptible to being trapped in the cooling water of power stations and other industries. Large scale extraction of cooling water from the Wadden Sea or estuaries should be mitigated by applying the best available technology to reduce marine organism deaths caused by this entrainment.

Research and Monitoring

For a better understanding of the observed changes in the fish community, working hypotheses and subsequent analyses need to be formulated. The functional relationship between fish species and typical habitats should be investigated to better understand the functioning and importance of those habitats for fish. Fundamental research on natural processes and anthropogenic impact affecting fish populations is needed to increase our knowledge of the ecology of Wadden Sea fish and to understand the observed changes in the fish community.

We should continue monitoring the occurring changes in the (Wadden Sea) fish fauna to advance our understanding. There are gaps concerning the monitoring of pelagic fish and the monitoring of the seasonal occurrence of species. The assessment of fish in estuaries will be advanced by the development of an assessment tool and continued (fish) monitoring, to meet the requirements of the WFD. For Wadden Sea fish, a first step toward a common assessment and the selection of suitable underlying metrics was made for the QSR 2009, but further effort is needed to develop an applicable analysis tool. In addition, the role of salt marsh gullies as habitat for fish should be better elucidated.

TRILATERAL POLICY AND MANAGEMENT

11.1 Promote conditions for unhindered migration between the sea and upstream and/or inland waters and improvement of the physical conditions in river systems for for diadromous fish.

- 11.2 The living conditions and the total area of habitats for Directive species will be maintained.
- 11.3 In order to further reduce bycatch and to reduce impacts on the sea floor, the tri-lateral policy principles for a sustainable shrimp fishery will be developed in close cooperation with the fisheries sector. (Identical with 4.27)